

Curriculum for MD/MS Ayurveda
(PRESCRIBED BY NCISM)

अभ्यासात्प्राप्यते दृष्टिः कर्मसिद्धिप्रकाशिनी ।

Semester III-VI
Rachana Sharira
(Human Anatomy)
(SUBJECT CODE : AYPG-RS)

(Applicable from 2024-25 batch, from the academic year 2025-26 onwards until further notification by NCISM)



आयुषे सर्वलोकानाम्



BOARD OF AYURVEDA
NATIONAL COMMISSION FOR INDIAN SYSTEM OF MEDICINE
NEW DELHI-110026

PREFACE

Knowledge of Sharir is foundational to both understanding and managing health and disease in Ayurveda. Among the various branches of Sharir, Rachana Sharir provides the anatomical framework upon which the principles of Dosha-Dhatu-Mala Siddhanta, Srotovijnana, and Marma Vijnana operate. From Garbhotpatti (embryology) to Anga-Pratyanga (regional anatomy), this discipline illuminates the structural basis of physiological processes and pathological changes. Just as Sharir Rachana informs diagnostic reasoning in Ayurveda, it also supports decision-making in Chikitsa, Panchakarma, and even Roga Marga analysis.

The postgraduate curriculum in Rachana Sharir is designed to expand the role of anatomical knowledge beyond the conventional. While classical concepts such as Pramana Sharir, Marma Sharir, and Garbha Sharir remain core to the curriculum, renewed emphasis is placed on their Chikitsopayogi (clinically relevant) applications. Topics like Vaikrit Sharir (pathological anatomy) are introduced to help students correlate anatomical derangements with Roga Nidan, prognosis, and treatment strategies. Innovations such as Anuvanshiki (Ayurvedic genetics) and Ayurvedic anthropometry are integrated to address evolving challenges in public health, personalized medicine (Prakriti-based), and predictive diagnostics.

In terms of pedagogy, the curriculum promotes immersive, experiential learning. Cadaveric and virtual dissection, case-based learning, clinical correlation exercises, and interdisciplinary exposure form the backbone of the learning experience. Students are encouraged to interpret classical texts in the light of applied anatomy and contribute to research that bridges Shastra and Anubhava. This transformative approach to Rachana Sharir aims not only to produce skilled educators and researchers but also to foster Ayurvedic anatomists capable of contributing meaningfully to diagnostics, Rogavijnana, surgical planning, Panchakarma, Yoga, and beyond. This curriculum aspires to bring Sharir Rachana into its rightful place at the heart of Ayurvedic clinical excellence

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We want that education by which character is formed, strength of mind is increased, the intellect is expanded, and by which one can stand on one's own feet.

-Swami Vivekananda



NCISM

(NATIONAL COMMISSION FOR INDIAN SYSTEM OF MEDICINE)

Curriculum MD/ MS Ayurveda

Rachana Sharira (AYPG-RS)

Summary & Credit Framework

Semester III-VI

Module Number & Name	Credits	Notional Learning Hours	Maximum Marks of assessment of modules (Formative Assessment)
Semester No : 3			
Paper No : 1 (Garbha Sharir, Dhatu Sharir evum Anuvanshiki)			
M1 General Histology	2	60	50
M2 Embryology (Tissues, Branchial arches and Face)	2	60	50
Paper No : 2 (Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir)			
M8 Plastination and Angarekhankan Sharir (Surface Anatomy))	3	90	75
Paper No : 3 (Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa)			
M15 Urdhvajatrugata evum Prishthagata Asthi- Peshi Sharir (Osteology and Myology of Head, Neck and Back)	2	60	50
M16 Shakhagata Asthi evum Peshi Sharir (osteology and Myology of Upper and Lower limbs)	3	90	75
Paper No : 4 (Tantrika Indriya Granthi Jara Sharir evum Yogasana)			
M22 Brain	2	60	50
M23 Spinal cord and spinal nerves	2	60	50
Total	16	480	400
Semester No : 4			
Paper No : 1 (Garbha Sharir, Dhatu Sharir evum Anuvanshiki)			
M3 Histology and Embryology of respiratory, cardiovascular and lymphatic system	3	90	75

Paper No : 2 (Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir)			
M9 Pranavaha Srotas (Respiratory system)	2	60	50
M10 Raktavaha Srotas (Heart and Arteries)	2	60	50
M11 Raktavaha Srotas (Veins and Lymphatics))	2	60	50
Paper No : 3 (Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa)			
M17 Asthi-sandhi sharir (Arthrology)	2	60	50
M18 Udar evum Vaksha Peshi Sharir (Myology of Abdomen and thorax) and AsthiBhagna (Fractures))	2	60	50
Paper No : 4 (Tantrika Indriya Granthi Jara Sharir evum Yogasana)			
M24 Cranial Nerves	3	90	75
Total	16	480	400
Semester No : 5			
Paper No : 1 (Garbha Sharir, Dhatu Sharir evum Anuvanshiki)			
M4 Histology and embryology of digestive system	2	60	50
Paper No : 2 (Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir)			
M12 Annavaha Srotas (Digestive tract)	2	60	50
M13 Annavaha Srotas(Digestive glands and peritoneum))	2	60	50
Paper No : 3 (Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa)			
M19 Marma Sharir	3	90	75
M20 Radiology and anatomical application in viddha chikitsa	2	60	50
Paper No : 4 (Tantrika Indriya Granthi Jara Sharir evum Yogasana)			
M25 Autonomic nervous system and Endocrinology	2	60	50
M26 Gyanendriya Sharir(Sense Organs)	3	90	75
Total	16	480	400
Semester No : 6			
Paper No : 1 (Garbha Sharir, Dhatu Sharir evum Anuvanshiki)			
M5 Histology and Embryology of Urogenital System	3	90	75
M6 Histology and Embryology of Nervous System, Sense organs and Endocrine glandss	2	60	50
M7 Anuvanshiki and Paranuvanshiki- Genetics and epigenetics	2	60	50
Paper No : 2 (Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir)			
M14 Mutravaha, Shukravaha evum Aartvavaha Srotas (Urogenital system)	3	90	75

Paper No : 3 (Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa)			
M21 Pramana Sharir (Anthropometry)	2	60	50
Paper No : 4 (Tantrika Indriya Granthi Jara Sharir evum Yogasana)			
M27 Jara Sharir (Geriatric anatomy) and Application of anatomy in panchakarma	2	60	50
M28 Anatomical Basis of Physiotherapy and Yogasana	2	60	50
Total	16	480	400
Grand Total	64	1920	1600

Credit frame work

AYPG-RS consists of 28 modules totaling 64 credits, which correspond to 1920 Notional Learning Hours. Each credit comprises 30 hours of learner engagement, distributed across teaching, practical, and experiential learning in the ratio of 1:2:3. Accordingly, one credit includes 5 hours of teaching, 10 hours of practical training, 13 hours of experiential learning, and 2 hours allocated for modular assessment, which carries 25 marks.

Important Note: The User Manual MD/MS Ayurveda is a valuable resource that provides comprehensive details about the curriculum file. It will help you understand and implement the curriculum. Please read the User Manual before reading this curriculum file. The curriculum file has been thoroughly reviewed and verified for accuracy. However, if you find any discrepancies, please note that the contents related to the MSE should be considered authentic. Each paper has 16 credits and each semester covers 16 credits across 4 papers. In case of difficulty and questions regarding the curriculum, write to syllabus24ayu@ncismindia.org.

Credit Analysis Overview					
Sem/Paper	Paper No 1	Paper No 2	Paper No 3	Paper No 4	Credits
Semester 3	M-1 2 Crs M-2 2 Crs	M-8 3 Crs	M-15 2 Crs M-16 3 Crs	M-22 2 Crs M-23 2 Crs	16
Semester 4	M-3 3 Crs	M-9 2 Crs M-10 2 Crs M-11 2 Crs	M-17 2 Crs M-18 2 Crs	M-24 3 Crs	16
Semester 5	M-4 2 Crs	M-12 2 Crs M-13 2 Crs	M-19 3 Crs M-20 2 Crs	M-25 2 Crs M-26 3 Crs	16
Semester 6	M-5 3 Crs M-6 2 Crs M-7 2 Crs	M-14 3 Crs	M-21 2 Crs	M-27 2 Crs M-28 2 Crs	16
Credits	16	16	16	16	64

Semester VI University examination	
Theory	Practical*

Paper	Marks	Total	Practical Heads	Marks	Total
Paper -1	100	400	Long case or procedure/Major practical as applicable	100	400
			Short case or procedure/Minor practical	50	
Paper -2	100		Spotters	50	
			Assessing teaching ability	20	
Paper -3	100		Assessing presentation skills	20	
			Viva (4 examiners: 20 marks/each examiner)	80	
Paper -4	100		Dissertation Viva	40	
			Logbook (Activity record)	20	
			Practical/Clinical Record	20	
			Semester VI University examination – 800 Marks		

* Details in 6H table

Course Code and Name of Course

Course code	Name of Course
AYPG-RS	Rachana Sharira (Human Anatomy)

Table 1 : Course learning outcomes and mapped Program learning outcomes

CO No	A1 Course learning Outcomes (CO) AYPG-RS At the end of the course AYPG-RS, the students should be able to-	B1 Course learning Outcomes mapped with program learning outcomes.
CO1	Analyze the principles of Rachana Sharir in relation to contemporary anatomical fundamentals, demonstrating the ability to integrate this knowledge into holistic patient care and contribute to research advancements.	PO1,PO3,PO5
CO2	Analyze and integrate the principles of Garbha Sharir with embryology and genetic principles to provide comprehensive counseling for maternal and child health, emphasizing wellness and preventive care.	PO1,PO3,PO8
CO3	Identify Marma points and evaluate their relevance in modern anatomy, while demonstrating critical application in Marma Chikitsa for therapeutic interventions.	PO2,PO3,PO8
CO4	Interpret Asthi, Sandhi, Peshi, Snayu,siradi Sharir and musculoskeletal anatomy to develop preventive and rehabilitation strategies for musculoskeletal disorders using Ayurveda.	PO1,PO3,PO4
CO5	Analyze systemic Anatomy and Neuroanatomy to understand clinical conditions, fostering critical clinical judgment and applications in Ayurveda.	PO1,PO6,PO8
CO6	Demonstrate expertise in cadaveric/virtual dissection and advanced preservation techniques, measuring respect for the cadaver as a teacher, while refining anatomical skills.	PO1,PO2,PO6
CO7	Demonstrate comprehensive knowledge of anga- pratyangadi surface markings and application in procedures like Viddhakarma, Siravedhan ensuring clinical relevance, precision, and safety in practice.	PO2,PO7,PO8
CO8	Develop proficiency in histological slide identification and anatomical interpretation through advanced imaging techniques, fostering self-directed learning.	PO1,PO2,PO7
CO9	Demonstrate professional leadership skills in the Ayurveda field by showing proficiency in academics, research, and entrepreneurship, while upholding ethical	PO4,PO5,PO6

	principles.	
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Table 2 : Course contents (Modules- Credits and Notional Learning Hours)

Paper No : 1 (Garbha Sharir, Dhatu Sharir evum Anuvanshiki)						
Semester No : 3						
2A Modu le Nu mber	2B Modules & units	2C Num ber of Credi ts	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
1	M-1 General Histology This module covers general histology, along with Ayurvedic concepts of Dhatu and Kala, integrating modern microscopic anatomy with traditional Ayurvedic principles of Dhatu formation and organization. • M1U1 General classification of Dhatu, cell and tissue 1.1.1. Dhatu and its classification. 1.1.2. Cell division and Tissue division. • M1U2 Kala, Ras Dhatu and Meda Dhatu 1.2.1. Epithelial tissue (Kala). 1.2.2. Loose connective tissue proper, reticular tissue (Rasa Dhatu) and adipose tissue (Meda Dhatu). • M1U3 Rakta Dhatu and Maans Dhatu	2	10	20	30	60

	1.3.1. Special connective tissues; Rakta Dhatu (blood and Lymph) 1.3.2. Muscular tissue; Maans Dhatu. • M1U4 Asthi, Majja and Shukra Dhatu; and Snayu 1.4.1. Special connective tissue; bone and cartilage (Asthi). 1.4.2. Dense connective tissue proper, tendons, ligaments and aponeurosis (Snayu). 1.4.3. Nervous tissue, Majja Dhatu 1.4.4. Shukra Dhatu					
2	M-2 Embryology (Tissues, Branchial arches and Face) This module delves into formation and development of tissues of the body along with structures related to branchial arches from modern perspective. • M2U1 Dhatu Nirman - Formation of tissues of the body 2.1.1. Formation of epithelial tissues 2.1.2. Formation of connective tissues 2.1.3. Formation of muscular tissue 2.1.4. Formation of nervous tissue • M2U2 Branchial arches 2.2.1. Derivatives of Branchial arches.	2	10	20	30	60

	2.2.2. Fate of ectodermal cleft and Endodermal pouch • M2U3 Development of face and nose 2.3.1. Development of Face. 2.3.2. Development of Nasal cavity and Palate. • M2U4 Garbhavridhhi and foetal development 2.4.1. Garbhavridhhi. 2.4.2. Chronology of events during foetal development.					
		4	20	40	60	120
Semester No : 4						
2A Modu le Nu mber	2B Modules & units	2C Num ber of Credi ts	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
3	M-3 Histology and Embryology of respiratory, cardiovascular and lymphatic system Describes histology and embryology of respiratory, cardiovascular and lymphatic system along with Ayurveda description.	3	15	30	45	90

	• M3U1 Histology and embryology of respiratory system 3.1.1. Histology, formation, development and developmental anomalies of respiratory system. 3.1.2. Description of Phuphus Nirman. • M3U2 Histology and embryology of cardiovascular system 3.2.1. Histology, formation, development and developmental anomalies of cardiovascular system. 3.2.2. Raktavahi Dhamani, Sira evum Damani Nirman and Hridaya Nirman. • M3U3 Histology and embryology of lymphatic system 3.3.1. Histology, formation, development and developmental anomalies of lymphatic system. 3.3.2. Rasavahi Dhamani and Pleeha Nirman • M3U4 Dhatu, Pratyanga and Srotas 3.4.1. Dhatu, Pratyanga and Srotas as Tissue, organs and systems respectively.					
		3	15	30	45	90
Semester No : 5						
2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular	2G Total

					Assessment	
4	M-4 Histology and embryology of digestive system Description of histology and embryology of digestive system alongwith Ayurvedic description in the same context. • M4U1 Histology and embryology of foregut 4.1.1. Histology, formation, development and developmental anamolies of foregut. 4.1.2. Description of Amashya, Agnyashya, Pittashya and Yakrit. • M4U2 Histology and embryology of midgut 4.2.1. Histology, formation, development and developmental anamolies of midgut. 4.2.2. Description of Aantra and Unduka. • M4U3 Histology and embryology of hindgut 4.3.1. Histology, formation, development and developmental anamolies of hindgut. 4.3.2. Description of Guda. • M4U4 Development of body cavities 4.4.1. Formation, development and developmental anamolies of body cavities and membranes. 4.4.2. Kala Nirman.	2	10	20	30	60
		2	10	20	30	60

Semester No : 6						
2A Modu le Nu mber	2B Modules & units	2C Num ber of Credi ts	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
5	M-5 Histology and Embryology of Urogenital System Describes the histology and embryology of Urinary and Genital Systems alongwith Identical Description in Ayurveda. • M5U1 Mutravaha Srotas and formation and development of Urinary system 5.1.1. Histology, formation, development and developmental anamolies of Urinary system. 5.1.2. Description of Mutravaha Srotas. • M5U2 Shukravaha Srotas and formation and development of male reproductive system 5.2.1. Histology, formation, development and developmental anamolies of male reproductive system. 5.2.2. Description of Shukravaha Srotas. • M5U3 Aartvavaha Srotas and formation and development of female	3	15	30	45	90

	reproductive system 5.3.1. Histology, formation, development and developmental anomalies of female reproductive system. 5.3.2. Description of Aartvavaha Srotas. • M5U4 Koshthanga and Pratyanga of Srotas 5.4.1. Description of various Koshthanga and Pratyanga related to Mutravaha, Shukravaha and Aartvavaha Srotas.					
6	M-6 Histology and Embryology of Nervous System, Sense organs and Endocrine glands Describes the Histology and Embryology of Nervous system, sense organs and endocrine glands. • M6U1 Majjavaha Srotas; development of neural tube and neural crest 6.1.1. Formation and development of neural tube and neural crest and their derivatives. 6.1.2. Description of Majjavaha Srotas. • M6U2 Histology and embryology of forebrain and midbrain 6.2.1. Histology, formation, development and developmental anomalies of forebrain and midbrain. • M6U3 Histology and embryology of hind brain and spinal cord 6.3.1. Histology, formation, development and developmental anomalies of Hindbrain and spinal cord.	2	10	20	30	60

	• M6U4 Histology and embryology of sense organs and endocrine glands; Gyanendriya Nirman 6.4.1. Histology, formation, development and developmental anomalies of sense organs 6.4.2. Histology, formation, development and developmental anomalies of endocrine glands					
7	M-7 Anuvanshiki and Paranuvanshiki- Genetics and epigenetics Describes the basic fundamentals of Anuvanshiki and Paranuvanshiki- Genetics and epigenetics. • M7U1 Beej, Beejbhag and Beejbhagavyaya 7.1.1. Concept of Beej, Beejbhag and Beejbhagavyaya 7.1.2. Human Chromosomes, DNA, Gene and Genetic inheritance • M7U2 Garbha Vikara and Anuvanshiki Paramarsh 7.2.1. Garbhaj Vikara - teratology. 7.2.2. Anuvanshiki Paramarsh - Genetic counselling • M7U3 Epigenetics; Prakriti and Garbhakar Bhava 7.3.1. Types and principles of epigenetics. 7.3.2. Prakriti as Paranuvanshiki model in Rachana sharir. 7.3.3. Factors affecting epigenetics and Garbhakar Bhava.	2	10	20	30	60

	• M7U4 Mechanism of epigenetics and Pranuvanshiki Paramarsh 7.4.1. Mechanism of epigenetics and principle of Purusho-ayam loksamhitah. 7.4.2. Cancer and epigenetics. 7.4.3. Paranuvanshiki Paramarsh (epigenetic counselling)					
		7	35	70	105	210
		16	80	160	240	480
Paper No : 2 (Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir)						
Semester No : 3						
2A Modu le Nu mber	2B Modules & units	2C Num ber of Credi ts	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
8	M-8 Plastination and Angarekhankan Sharir (Surface Anatomy)) Describes method of preservation of cadaveric specimens for the purpose of display in museum alongwith preservation of body parts for academic purposes. Description of Angarekhankan (surface anatomy) in modern perspective.	3	15	30	45	90

• **M8U1 Plastination - history, types and techniques**

8.1.1. Introduction, historical review, ethical issues and need of plastination

8.1.2. Types of plastination

8.1.3. Materials, instruments and equipment used in plastination

8.1.4. Techniques of plastination

• **M8U2 Post-plastination procedures and plastination lab**

8.2.1. Post plastination procedures.

8.2.2. Maintenance of plastinated organ and set-up of plastination lab.

• **M8U3 Angarehankan - Bahu and Vaksha**

8.3.1. Angarekhankan of upper limb (Bahu).

8.3.2. Angarekhankan of thorax (Vaksha).

• **M8U4 Angarekhankan - Sakthi and Udar**

8.4.1. Angarekhankan of lower limb (Sakthi)

8.4.2. Angarekhankan of abdomen (Udar)

• **M8U5 Angarekhankan - Urdhvajatru**

8.5.1. Angarekhankan of head & neck (Urdhvajatrugata)

		3	15	30	45	90
Semester No : 4						
2A Modu le Nu mber	2B Modules & units	2C Num ber of Credi ts	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
9	M-9 Pranavaha Srotas (Respiratory system) Description of Pranvaha Srotas with structural aspects of Upper and Lower Respiratory tract. • M9U1 Nose and nasal cavities 9.1.1. Structural aspect of nose and paranasal sinuses 9.1.2. Nasal cavity • M9U2 Upper respiratory tract - pharynx and laryngeal apparatus; lower respiratory tract - trachea and bronchial tree 9.2.1. Pharynx 9.2.2. Laryngeal apparatus	2	10	20	30	60

	9.2.3. Trachea and bronchial tree • M9U3 Lungs and pleura; Pratyanga of Pranavaha Srotas 9.3.1. Lungs 9.3.2. Pleura 9.3.3. Analysis of Pratyanga related to Shvasan Sansthan					
10	M-10 Raktavaha Srotas (Heart and Arteries) Description of heart and major arteries of the body in detail with concepts of Hridaya in Ayurveda. • M10U1 Heart and concept of Hridaya 10.1.1. External and internal structure of heart 10.1.2. Fibrous skeleton of heart 10.1.3. Foetal heart 10.1.4. Analysis of concept of Hridaya in Ayurveda • M10U2 Major arteries of heart 10.2.1. Aorta, Pulmonary artery and its distribution 10.2.2. Subclavian artery and its distribution	2	10	20	30	60

	10.2.3. Carotid system of artery • M10U3 Arteries of limbs and concept of Dhamani 10.3.1. Arteries of the trunk & lower limbs 10.3.2. Analysis of concept of Dhamani in Ayurveda					
11	M-11 Raktavaha Srotas (Veins and Lymphatics)) Description of veins and lymphatics in detail with concepts of Sira in Ayurveda. • M11U1 Veins and lymphatics of head and neck 11.1.1. Veins of head and neck 11.1.2. Lymphatics of head and neck • M11U2 Veins and lymphatics of abdomen, pelvis and lower limb 11.2.1. Veins and lymphatics of Abdomen and Pelvis 11.2.2. Veins and lymphatics of Lower limb • M11U3 Veins and lymphatics of thorax and upper limb; and Rasavaha Srotas 11.3.1. Veins and lymphatics of upper limb and thorax 11.3.2. Veins opening in heart	2	10	20	30	60

	11.3.3. Analysis of concept of Sira in Ayurveda					
	11.3.4. Clinical anatomy of lymphatic system and interpretation of Rasavaha Srotas					
		6	30	60	90	180
Semester No : 5						
2A Modu le Nu mber	2B Modules & units	2C Num ber of Credi ts	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
12	M-12 Annavaha Srotas (Digestive tract) Description of Annavaha Srotas and Digestive tract in detail with its clinical application. • M12U1 Digestive tract - mouth 12.1.1. Oral cavity 12.1.2. Salivary glands 12.1.3. Teeth and Tongue 12.1.4. Pharynx	2	10	20	30	60

	• M12U2 Digestive tract - foregut 12.2.1. Oesophagus 12.2.2. Stomach 12.2.3. Duodenum • M12U3 Digestive tract - midgut and hindgut 12.3.1. Small intestine 12.3.2. Large Intestine					
13	M-13 Annavaha Srotas(Digestive glands and peritoneum)) Description of Annavaha Srotas (Digestive Glands and Peritoneum)” focuses on the anatomical aspects of salivary glands,digestive glands, the role and structure of the peritoneum and their relevance in Ayurveda. • M13U1 Digestive glands of oral cavity 13.1.1. sublingual and submandibular salivary glands 13.1.2. Parotid glands • M13U2 Digestive glands - liver and pancreas; and spleen 13.2.1. External and internal features of Pancreas 13.2.2. Spleen	2	10	20	30	60

	13.2.3. External and internal features of liver 13.2.4. Billiary apparatus • M13U3 Peritoneum and Pratyanga of Annavaha Srotas 13.3.1. Peritoneum 13.3.2. Analysis of Pratyanga related to Annavaha Srotas					
		4	20	40	60	120
Semester No : 6						
2A Modu le Nu mber	2B Modules & units	2C Num ber of Credi ts	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
14	M-14 Mutravaha, Shukravaha evum Aartvavaha Srotas (Urogenital system) Description of the Mutravaha, Shukravaha and Aartvavaha Srotas while focusing on the anatomy of urogenital system. • M14U1 Urinary tract and organs 14.1.1. Kidneys	3	15	30	45	90

14.1.2. Ureters					
14.1.3. Bladder					
• M14U2 Male genital tract and organs					
14.2.1. Testes, Epididymis and Vas deferens					
14.2.2. Prostate gland					
14.2.3. Structure of Seminal Vesicle and Bulbo-Urethral glands					
• M14U3 3					
14.3.1. Ovary					
14.3.2. Uterine tubes and Uterus					
• M14U4 Male-female urethra and external genitalia					
14.4.1. Male and female urethra .					
14.4.2. Male External Genitalia.					
14.4.3. Vagina.					
• M14U5 Pratyanga of Mutra, Shukra and Artva vaha Srotas					
14.5.1 Analysis of Pratyanga related to Mutravaha Srotas					
14.5.2. Analysis of Pratyanga related to Shukravaha Srotas					
14.5.3. Analysis of Pratyanga related to Artavavaha Srotas					
	3	15	30	45	90

		16	80	160	240	480
Paper No : 3 (Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa)						
Semester No : 3						
2A Modu le Nu mber	2B Modules & units	2C Num ber of Credi ts	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
15	M-15 Urdhvajatrugata evum Prishthagata Asthi- Peshi Sharir (Osteology and Myology of Head, Neck and Back) Describes the osteology and myology of axial skeleton. • M15U1 osteology and myology of skull 15.1.1. Axial skeleton- Normas of Skull 15.1.2. Individual bones of Face and Cranium 15.1.3. Muscles of Cranial Vault and Mastication and Facial Expression • M15U2 Osteology and myology of cervical region 15.2.1. Cervical Vertebrae 15.2.2. Muscles of Neck	2	10	20	30	60

	15.2.3. Anterior and lateral vertebral muscles of Neck • M15U3 Osteology and myology of lumbar and sacral region 15.3.1. Thoracic vertebrae 15.3.2. Lumbar, Sacral and Coccygeal Vertebrae 15.3.3. Muscles of vertebral column					
16	M-16 Shakhagata Asthi evum Peshi Sharir (osteology and Myology of Upper and Lower limbs) Describes osteology and myology of limbs • M16U1 Osteology and myology of shoulder and arm 16.1.1. Bones and muscles of Shoulder 16.1.2. Bones and muscles of Arm • M16U2 Osteology and myology of forearm and hand 16.2.1. Bones and muscles of Forearm and Hand 16.2.2. Bones and muscles of Forearm and Hand • M16U3 Osteology and myology of hip and thigh 16.3.1. Bones and Muscles of Hip 16.3.2. Bones and Muscles of Thigh • M16U4 Osteology and myology of leg and foot	3	15	30	45	90

	16.4.1. Bones and Muscles of Leg 16.4.2. Bones and Muscles of Foot • M16U5 Comparative osteology and myology of limbs; Asthi and bones 16.5.1. Comparison of bones and muscles of upper and lower appendicular skeleton. 16.5.2. Analysis of Ayurvedokt Asthi Sharir in context of modern Anatomy					
		5	25	50	75	150
Semester No : 4						
2A Modu le Nu mber	2B Modules & units	2C Num ber of Credi ts	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
17	M-17 Asthi-sandhi sharir (Arthrology) Describe joints of the body. • M17U1 Joints of vertebral column 17.1.1. Sacro-coccygeal joint 17.1.2. Intervertebral and Zygapophysial joints	2	10	20	30	60

	17.1.3. Atlanto-occipital joint and Atlanto-axial Joint 17.1.4. Temporomandibular Joint • M17U2 Joints of upper limb 17.2.1. Sternal joints 17.2.2. Shoulder joint 17.2.3. Elbow joint 17.2.4. Wrist joint 17.2.5. Joints of hand • M17U3 Joints of lower limb 17.3.1. Hip joint 17.3.2. Knee joint 17.3.3. Ankle joint 17.3.4. Joints of foot 17.3.5. Analysis of Ayurvedokt Sandhi Sharir in context of modern anatomy					
18	M-18 Udar evum Vaksha Peshi Sharir (Myology of Abdomen and thorax) and AsthiBhagna (Fractures)) Describes myology of abdomen and Asthibhagna (Fractures) of different bones	2	10	20	30	60

	of body. • M18U1 Osteology and myology of thorax and abdomen 18.1.1. Bones and Muscles of Thorax 18.1.2. Muscles of Abdomen • M18U2 Fractures of head, neck, vertebral column and chest 18.2.1. Fractures of bones of Head and Neck 18.2.2. Fractures of bones of Vertebral Column 18.2.3. Fractures of bones of Chest • M18U3 Fractures of limbs 18.3.1. Fractures of bones of Upper Limb 18.3.2. Fractures of bones of Lower Limb					
		4	20	40	60	120
Semester No : 5						
2A Modu le Nu mber	2B Modules & units	2C Num ber of Credi	Notional Learning hours			

		ts	2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
19	M-19 Marma Sharir Describes the vital points present on body mentioned in Ayurvedic text. • M19U1 Classification of Marma 19.1.1. General descriptions and classification of Marma 19.1.2. Marma based on Abhigata (parinam) 19.1.3. Marma Based on Rachana (constituents) 19.1.4. Marma Based on Pramana (Size) • M19U2 Marma of Bahu and Sakthi 19.2.1. Marma of Bahu (upper limb) 19.2.2. Marma of Sakthi (lower limb) • M19U3 Marma of Prishtha, Udara and Urah	3	15	30	45	90

	19.3.1. Udaragata marma (Marma of abdomen and pelvis) and Prishtha (back) 19.3.2. Marma of Urah (Thorax Marma) 19.3.3. Prana, Pranayama and Marma • M19U4 4 19.4.1. Urdhajatrugata Marma 19.4.2. Asana and Marma 19.4.3. Marma Chikitsa • M19U5 Marma Chikitsa and other Parasurgical procedures related to Marma 19.5.1. Parasurgical measures related to Marma 19.5.2. Marma therapy and its relevance with respect to acupressure, Vyadhakarma , acupuncture, meridian points, Varman Chikitsa and Kalaripattu					
20	M-20 Radiology and anatomical application in viddha chikitsa Describes use of imaging techniues to identify the anatomical structures. Describes anatomical aspects of Viddha Chikitsa • M20U1 Avedhya Siras 20.1.1. Concept of Vedhya and Avedhya Sira 20.1.2. Avedhya Siras of the body..	2	10	20	30	60

	• M20U2 Vedhya Siras 20.2.1. Vedhya Siras of the body. • M20U3 Radiological anatomy 20.3.1. Principles of Radiology and New Imaging Techniques 20.3.2. Radiology of Limbs 20.3.3. Radiology of Thorax 20.3.4. Radiology of Abdomen and Pelvis 20.3.5. Radiology of Head and Neck					
		5	25	50	75	150
Semester No : 6						
2A Modu le Nu mber	2B Modules & units	2C Num ber of Credi ts	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
21	M-21 Pramana Sharir (Anthropometry)	2	10	20	30	60

	Describes different measurement techniques of body parts mentioned in Ayurveda and modern sciences. • M21U1 Anthropometry - general description 21.1.1. Somatometry and osteometry 21.1.2. Anthropometric landmarks and measurement of length, breadth, girth and skin fold parameters of the body. 21.1.3 Instrumentation in anthropometry. • M21U2 Anthropometry of Head, neck and limbs 21.2.1. Measurements of head and face 21.2.2. Measurements of upper extremities. 21.2.3. Measurements of lower extremities. • M21U3 Metric and non-metric measurements; Anguli and Anjali Pramana 21.3.1. Infant and adult anthropometry 21.3.2. Anguli and Anjali Pramana in Ayurveda 21.3.3. Anthroposcopy					
		2	10	20	30	60
		16	80	160	240	480
Paper No : 4 (Tantrika Indriya Granthi Jara Sharir evum Yogasana)						

Semester No : 3						
2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
22	M-22 Brain Describes the Brain in detail • M22U1 Hindbrain and Midbrain 22.1.1. Brain stem (Medulla ,Pons and Mid brain) 22.1.2. Cerebellum • M22U2 Forebrain 22.2.1. Cerebrum, Diencephalon and Basal nuclei • M22U3 Meninges and ventricular system 22.3.1. Meninges of brain 22.3.2. Ventricular system of brain	2	10	20	30	60
23	M-23 Spinal cord and spinal nerves	2	10	20	30	60

	Describes the spinal cord and spinal nerves in detail • M23U1 General structure of spinal cord 23.1.1. Internal structure of spinal cord. 23.1.2. Reflex arc. • M23U2 Tracts of spinal cord 23.2.1. Ascending and descending tracts of spinal cord 23.2.2. Intersegmental tracts of spinal cord • M23U3 Spinal nerves 23.3.1. Spinal nerves. 23.3.2. Brachial plexus. 23.3.3. Lumbosacral Plexus.					
		4	20	40	60	120

Semester No : 4

2A Module Number	2B Modules & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total

24	M-24 Cranial Nerves Describes cranial nerve and its applied anatomy in detail • M24U1 Cranial nerve nuclei 24.1.1. Deep origin of cranial nerves 24.1.2. Examination of cranial nerves • M24U2 Description of cranial nerves - nose and eyes 24.2.1. Olfactory and Optic nerves 24.2.2. Oculomotor, trochlear and Abducens nerves • M24U3 Description of cranial nerves - face and ear 24.3.1. Trigeminal nerve 24.3.2. Facial and Vestibulo-chochlear nerves • M24U4 Description of cranial nerves - IX to XII 24.4.1. Glossopharyngeal nerve and Vagus nerve 24.4.2. Spinal Accessory and Hypoglossal nerves • M24U5 Sympathetic and parasympathetic ganglia of cranial nerves 24.5.1. Parasympathetic ganglia associated with cranial nerves. 24.5.2. Sensory ganglia associated with cranial nerves.	3	15	30	45	90

		3	15	30	45	90
Semester No : 5						
2A Modu le Nu mber	2B Modules & units	2C Num ber of Credi ts	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
25	M-25 Autonomic nervous system and Endocrinology Describes anatomy of Autonomic nervous system and Endocrinology • M25U1 Autonomic nervous system - classification 25.1.1. Sympathetic Nervous system 25.1.2. Parasympathetic Nervous System 25.1.3. Chromaffin system • M25U2 Autonomic plexuses 25.2.1. Autonomic plexuses, and visceral afferent pathways 25.2.2. Enteric nervous system • M25U3 Endocrine glands related to brain; suprarenal glands	2	10	20	30	60

	25.3.1. Pituitary gland 25.3.2. Pineal gland 25.3.3. Suprarenal glands • M25U4 Endocrine glands of branchial arches 25.4.1. Thyroid gland 25.4.2. Parathyroid glands 25.4.3. Thymus gland					
26	M-26 Gyanendriya Sharir(Sense Organs) Describes Gyanendriya Sharir (Sense Organs) in detail with their applied aspects. • M26U1 Sense organs - eye 26.1.1. Microstructure of eye. 26.1.2. Visual apparatus. 26.1.3. Visual pathways. • M26U2 Sense organs - ear 26.2.1. Microstructure of Ear.	3	15	30	45	90

	26.2.2. Peripheral auditory system. 26.2.3. Central auditory pathways. • M26U3 Sense organs - nose and tongue 26.3.1. Structure of nose and olfactory apparatus. 26.3.2. Olfactory pathways 26.3.3. Structure of tongue and Gustatory apparatus. 26.3.4. Gustatory pathways. • M26U4 Sense organs - skin 26.4.1. Structure Skin and appendeges. 26.4.2. Gyanendriya in Ayurveda					
		5	25	50	75	150
Semester No : 6						
2A Modu le Nu mber	2B Modules & units	2C Num ber of Credi ts	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
27	M-27 Jara Sharir (Geriatric anatomy) and Application of anatomy in	2	10	20	30	60

	panchakarma Describes the Jara Sharir (Geriatric anatomy) and Application of anatomy in Panchakarma in detail. • M27U1 cellular aging and age related changes in tissues 27.1.1. Age related changes in epithelial tissue, connective tissue (Bones, cartilages, tendons, ligaments, fascias), muscular tissue and nervous tissue. 27.1.2. Cellular age and life style. • M27U2 Geriatric anatomy of respiratory, cardiovascular, digestive and urogenital systems; and Rasayana 27.2.1. Age related changes in Respiratory and Cardiovascular systems. 27.2.2. Age related changes in Digestive system and Urogenital systems. 27.2.3. Cellular rejuvenation and Rasayana. • M27U3 Geriatric anatomy of nervous system and sense organs; and panchakarma 27.3.1. Age related changes in Nervous system. 27.3.2. Age related changes in Sense organs. 27.3.3. Cellular aging and Panchakarma.					
28	M-28 Anatomical Basis of Physiotherapy and Yogasana	2	10	20	30	60

	Describes the biomechanics and anatomical basis of Physiotherapy and Yogasana. • M28U1 Microanatomy and biomechanics of musculoskeletal system 28.1.1. Microanatomy of muscular tissues. 28.1.2. Microanatomy of skeletal tissues. 28.1.3. Biomechanics of musculoskeletal system. • M28U2 Musculoskeletal strengthening - Yogasanas and stretch exercises 28.2.1. Yogasanas 28.2.2. Stretch exercises. • M28U3 Application of Yogasanas 28.3.1. Postural disorders and Yogasanas.					
		4	20	40	60	120
		16	80	160	240	480
		64	320	640	960	1920

Table 3 : Modules - Unit - Module Learning Objectives and Session Learning Objective- Notional Learning Hours- Domain-Level- TL Methods

Paper No : 1 Garbha Sharir, Dhatu Sharir evum Anuvanshiki						
Semester No : 3						
3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical training /experiential learning) session, the students should be able to)	3C Notional learning Hours	3D Lecture/ Practical Training/ Experientia l Learning	3E Domain/ Sub Domain	3F Level (D oes/Sho ws how/ Knows h ow/Kno w)	3G Teachin g Learnin g Methods
Module 1 : General Histology						
Module Learning Objectives (At the end of the module, the students should be able to)						
Perform histological techniques and analyze Dhatu in context of tissues.						
M 1 Unit 1 General classification of Dhatu, cell and tissue 1.1.1. Dhatu and its classification. 1.1.2. Cell division and Tissue division.						
References: 6,7						
3A	3B	3C	3D	3E	3F	3G
CO1	Analyze concept and purpose of cell division in maintaining tissue structure and function in terms of its importance in growth, repair and reproduction. Relate the analysis with Dhatu Poshana.	1	Lecture	CAN	Knows-how	L&PPT
CO1	Demonstrate the structure of cell and identify various intercellular organelles; and	1	Practical	CAN	Knows-	D,DIS

	illustrate composition of Dhatu.		Training 1.1		how	
CO8	Display tissue preparation and staining techniques.	3	Experiential-Learning 1.1	PSY-MEC	Shows-how	DL,PAL
CO8	Demonstrate the tissue section, staining techniques; and calculation of mitotic index in human tissue.	2	Practical Training 1.2	PSY-MEC	Shows-how	D
CO8	Evaluate the role of mitosis and meiosis in specific diseases like cancers and genetic disorders.	3	Experiential-Learning 1.2	CE	Knows-how	TBL
CO8	Evaluate the interconnections between Dhatus and other body systems; and analyze Dhatu imbalances leading to diseases (e.g. osteoporosis from Asthi Kshaya, anemia from Rakta Kshaya).	3	Experiential-Learning 1.3	CE	Knows-how	DSN,CBL
CO1	Analyze classification of tissues and relate with uttarottor Dhatu formation.	1	Lecture	CAN	Knows-how	LS,L

M 1 Unit 2 Kala, Ras Dhatu and Meda Dhatu 1.2.1. Epithelial tissue (Kala).

1.2.2. Loose connective tissue proper, reticular tissue (Rasa Dhatu) and adipose tissue (Meda Dhatu).

References: 6,7

3A	3B	3C	3D	3E	3F	3G
CO1	Analyze structure, classification, distribution and function of epithelium, mesothelium and endothelium; and distribution of Twak and Kala in parlance with contemporary science with its clinical applicability .	1	Lecture	CAN	Knows-how	L_VC
CO8	Corelate the Twaka slide as epithelial tissue in relation with Twaka Stara (layers of skin).	1	Practical Training 1.3	CAP	Knows-how	L&PPT,DL,DIS
CO1,CO8	Appraise Kala as Aabhyantara Dhatu –Ashaya Maryada with its clinical importance to identify limiting membranes grossly and histologically; and Evaluate developmental, functional and clinical relavance of limiting membranes.	1	Experiential-Learning 1.4	CE	Knows-how	CBL,PBL

CO8	Analyze structure, classification, distribution and function of Connective Tissue Analyze and discuss features of Rasa Dhatu in relation to plasma/lymph Analyze Medodhatu in relation to adipose tissue.	1	Lecture	CAN	Knows-how	CD
CO8	Relate the concept of Rasa Dhatu with concept of reticular tissue and plasma.	1	Practical Training 1.4	CAP	Knows-how	DL,PAL
CO1,CO8	Relate the concept of Meda Dhatu with adipose tissue.	1	Practical Training 1.5	CAN	Knows-how	DL,PL
CO1,CO8	Evaluate structural changes seen due to Vridhi or Kshaya of Rasa Dhatu and relate with reticular tissue and plasma.	1	Experiential-Learning 1.5	CE	Knows-how	PAL,DIS
CO1,CO8	Relate the structural changes seen due to Vridhi or Kshaya of Meda Dhatu with adipose tissue.	1	Experiential-Learning 1.6	CE	Knows-how	PAL,DIS

M 1 Unit 3 Rakta Dhatu and Maans Dhatu
 1.3.1. Special connective tissues; Rakta Dhatu (blood and Lymph)
 1.3.2. Muscular tissue; Maans Dhatu.

References: 6,7

3A	3B	3C	3D	3E	3F	3G
CO8	Analyze Rakta Dhatu in relation to histology of blood and its components.	1	Lecture	CAN	Knows-how	L&GD,L &PPT
CO1,CO8	Interpret the comprehensive concept of Rakta Dhatu and relate it with concept of blood and lymph.	2	Practical Training 1.6	CE	Knows-how	DL,DIS
CO8	Compare the concept of Maans Dhatu with concept of muscular tissue. Identify and demonstrate slides of muscle disorders.	2	Practical Training 1.7	CE	Knows-how	D,DIS
CO8	Evaluate and appreciate the clinical importance of Rakta Dhatu and relate them with pathologies of blood and lymph.	2	Experiential-Learning 1.7	CE	Knows-how	PBL,PER, CBL

CO8	Evaluate clinical importance of Maans Dhatu and relate them with pathologies of muscular tissue.	2	Experiential-Learning 1.8	CE	Knows-how	SIM,CBL
CO1	Analyze lymphoid tissue, lymph node and lymphatics and their relation with spleen and thymus.	1	Lecture	CAN	Knows-how	L
CO8	Analyze Maans Dhatu in relation to histology of muscular tissue.	1	Lecture	CAN	Knows-how	

M 1 Unit 4 Asthi, Majja and Shukra Dhatu; and Snayu1.4.1. Special connective tissue; bone and cartilage (Asthi).

1.4.2. Dense connective tissue proper, tendons, ligaments and aponeurosis (Snayu).

1.4.3. Nervous tissue, Majja Dhatu

1.4.4. Shukra Dhatu

References: 6,7

3A	3B	3C	3D	3E	3F	3G
CO8	Evaluate clinical importance of Snayu and relate them with pathologies of tendon, ligaments and aponeurosis.	2	Experiential-Learning 1.9	CE	Knows-how	PL,CBL, D
CO8	Analyze structure of Asthi Dhatu, Majja Dhatu and Shukra Dhatu in modern perspective. Analyze histological description and architecture of bone, cartilage and nervous tissue. Analyze Updhatu and positioning of ligament/tendon/nerve/neuroconnective Tissue.	3	Lecture	CAN	Knows-how	L&PPT
CO8	Demonstrate Haversian system of canals in compact and spongy bone structure. Demonstrate types of cartilage and their histological difference and distribution.	4	Practical Training 1.8	CAP	Shows-how	D
CO8	Evaluate clinical importance of Asthi Dhatu and relate them with pathologies of bone and cartilage.	4	Experiential-Learning 1.10	CE	Knows-how	DSN,SIM ,L&PPT ,RLE,PB L
CO8	Compare the concept of Snayu with concept of dense connective tissue proper (tendon,	2	Practical	CAN	Knows-	D

	ligaments and aponeurosis).		Training 1.9		how	
CO8	Demonstrate the concept of Majja Dhatu and relate them with concept of nervous tissue.	2	Practical Training 1.10	CAP	Knows-how	DL
CO8	Relate the concept of Shukra Dhatu with concept of reproductive tissue.	2	Practical Training 1.11	CE	Knows-how	DL,PAL
CO8	Evaluate clinical importance of Majja Dhatu and relate them with pathologies of nervous tissue.	2	Experiential-Learning 1.11	CE	Does	CBL
CO8	Evaluate clinical importance of Shukra Dhatu and relate them with pathologies of reproductive tissue.	2	Experiential-Learning 1.12	CE	Knows-how	PER,C_L

Practical Training Activity

Practical Training 1.1 : Microscopic Examination of a cell.

Microscopic Examination of a cell - Teacher shall guide the scholars through key features of a human cell. Scholar shall perform microscopic examination of a cell. Scholar can also take the help of data resources to identify the slides related to structure of cell. Scholar shall attempt to identify cellular organelles in different types of cells. Scholars shall share their observation with peers to initiate group discussion. Scholar should attempt to identify basic unit of life (cell) in Ayurvedic concept.

Practical Training 1.2 : Tissue sectioning, fixing and slide-preparation techniques.

Tissue sectioning, fixing and slide-preparation techniques.

Practice tissue sectioning, fixing, slide preparation, mounting and staining Technique with peer; Calculate the mitotic index in a given tissue sample and compare with mitotic index of different tissue; and use simulation to demonstrate stages of mitosis, meiosis and cell cycle.

Practical Training 1.3 : Microscopic examination of Twaka (layers of skin).

Microscopic examination of Twaka (layers of skin)

Teacher shall allot a separate topic to each student. Slide examination of Twaka/Skin as epithelial tissue and microscopic examination of features of various epithelial tissue like cornea. Explore other epithelia in the body by observing relevant slides procured through various data resources. Identify the similarities/specialities in different types of epithelial tissue.

Practical Training 1.4 : Microscopic Examination of reticular tissue and plasma.

Microscopic Examination of reticular tissue and plasma

Teacher shall guide the scholars through key features of plasma and reticular tissue. Scholar shall perform microscopic examination of blood smears to observe plasma and WBCs. Scholar can also take the help of data resources to identify the slides related to plasma and reticular tissue. Scholar shall share their observation with peers to initiate group discussion.

Practical Training 1.5 : Microscopic Examination of adipose tissue.

Microscopic Examination of adipose tissue

Staining and examining of adipose tissue shall be performed under a microscope. Scholar can also take the help of data resources to identify the slides related to adipose tissue. Scholar shall share their observation with peers to initiate group discussion.

Practical Training 1.6 : Microscopic examination of blood smears or peripheral blood films of different blood cells.

Microscopic examination of blood smears or peripheral blood films -

All scholars should be allotted separate topic of discussion after the observation of blood film. Microscopic examination of blood smears to observe plasma and blood cells to identify anatomical basis of their structural features. Scholars should share their observations and initiate a group discussion. scholar can perform RBC and WBC differential count, Blood clotting experiments etc.

Practical Training 1.7 : Microscopic study of muscular tissue

Microscopic study of muscular tissue -

Scholar shall attempt to observe the microscopic section of skeletal muscle to identify key features. Scholar shall share the observation with fellow students and initiate a group discussion.

Practical Training 1.8 : Microscopic structure of bones, cartilages.

Teacher shall allot separate topic to every scholar for each practical activity and guide scholar on identification of key features.

1. Microscopic structure of bones - Student will perform the Histological study of spongy bone and compact bone with the help of microscopic slides of sections of bone. Scholar should be able to identify Haversian canalicular system, lamellae and trabeculae etc. All scholars shall work separately and share their observations. (2 hours)
2. Microscopic structure of cartilages - Scholar shall observe slides of different types of cartilages like, hyaline cartilage, fibrous cartilage and elastic cartilage. scholar shall attempt to identify key points to differentiate them. Scholar should be able to identify chondroblasts, lacunae etc. Scholar should be able to differentiate slides of different types of cartilages. (2 hours)

Practical Training 1.9 : Microscopic Examination of tendons, ligaments and aponeurosis.

Microscopic Examination of tendons, ligaments and aponeurosis -

Teacher shall demonstrate the key microscopic features of tendon, ligaments and aponeurosis. Scholar shall observe the sections of tendon, ligament and bone under the microscope to identify key features. Scholar shall attempt to differentiate them and relate with concept of Snayu.

Practical Training 1.10 : Microscopic examination of nervous Tissues.

Microscopic examination of nervous Tissues -

Student shall observe the microscopic sections of nervous tissues like cerebral cortex, cerebellar cortex, spinal cord, nerve fibre with the help of microscope. Scholar shall also observe bone marrow smear by referring to various data resources. Scholar shall identify the key features and their functions. Scholar shall attempt to relate the observations with Majja Dhatu.

Practical Training 1.11 : Microscopic examination of testes and semen.

Microscopic examination of testes and semen -

Student shall observe the microscopic section of testis to observe developing sperms and other key features. Scholar shall also perform semen examination to observe sperms. Scholar can take the help of various data resources to study section of testis and semen examination. Scholar shall share the findings with peers.

Experiential learning Activity

Experiential-Learning 1.1 : Tissue preparation and staining.

Perform/practice/observe steps involved in tissue preparation (Tissue collection, Fixation, Effects of fixation) and Tissue processing (Dehydration, Clearing, Infiltration, Embedding, Sectioning, Staining).

After practicing or observing these steps, students will share their experiences with peers, discuss the importance of each stage and analyze what could go wrong if a step is missed. They can also reflect on challenges like handling the wax or staining evenly and suggest ways to improve the technique.

Experiential-Learning 1.2 : Role of cell division in specific diseases like cancer.

Role of cell division in specific diseases like cancer.

Teacher shall allot a separate topic to every student. Learn/observe techniques to create a venn diagram comparing and contrasting mitosis and meiosis. Take at least three cases of genetic disorder and specify the role of cell division. Submit the observation in the form of creative writing.

Experiential-Learning 1.3 : Interconnections between Dhatus and other body systems and Dhatu imbalance.

Interconnections between Dhatus and other body systems and Dhatu imbalance.

Separate topic shall be allotted to every student for the activity. Observation of various Dhatu in gross dissection like Asthi , Maans , Medas etc and correlate the concept of Dhatu with clinical conditions ,such as Anaemia (Raktha Dhatu imbalance} or Osteoporosis (Asthi Dhatu imbalance)-Seminar presentation.

Experiential-Learning 1.4 : Histopathological examination of epithelial tissue.

Histopathological examination of epithelial tissue -

Teacher shall allot a separate topic to each student. All activities will be performed by the scholars separately on the allotted topic. Evaluate the key features of membranes and fascia to understand the nature of a limiting membrane. Take the help of prepared slides/data resources of serous, synovial, mucous membranes and e membranes in context of Kala and explore clinical application as under or as suggested by teacher.(suggested example as following)

a. A 50 years old lady having sedentary life style was suffering from joint pain, early morning stiffness, swelling, crackling sound while walking.- Name the disorder/disease in lady and anatomical basis.

b. A 40 year old women present with symptoms of irritable bowel syndrome, abdominal pain, bloating and changes in bowel habits. She has history of stress and anxiety. Discuss the membrane involved in maintaining gut health and its anatomo-clinical relevance. Prepare a summary of 2 cases.

Experiential-Learning 1.5 : Histopathological examination of reticular tissue/plasma.

Histopathological examination of reticular tissue/plasma -

Scholar shall perform microscopic examination of blood smears to observe clinical conditions like changes in collagen and elastic fibres, plasma cell abnormalities. Scholar can also take the help of data resources to identify the slides related to plasma and reticular tissue. Scholar shall relate abnormalities with clinical conditions,like; pseudoxanthoma elasticum, plasma cell dyscrasias etc. Scholar shall share their observation with peers to initiate group discussion.

Experiential-Learning 1.6 : Histopathological examination of adipose tissue.

Histopathological examination of adipose tissue

Staining and examining of adipose tissue shall be performed under a microscope. Scholar can also take the help of data resources to identify abnormalities like cell death or altered fat distribution. Scholar shall attempt to relate abnormalities with clinical conditions like obesity, lipodystrophy etc. Scholar shall share their observation with peers to initiate group discussion.

Experiential-Learning 1.7 : Histopathology of blood and lymph.

Histopathology of blood and lymph

All scholars should be allotted separate topic for the activity. Scholar shall be able to identify abnormality in the blood film. Scholar shall be able to relate identified pathology with clinical conditions, like; haemophilia, blood clots, leukemia etc. Scholars should share their observations and present them in the class in the form of power point presentation.

Experiential-Learning 1.8 : Histopathology of muscular tissue

Histopathology of muscular tissue -

All scholars should be allotted separate topic for the activity. Scholar shall attempt to observe the microscopic section of skeletal muscle to identify abnormality in the muscular tissue under the microscope. Scholar shall be able to relate identified pathology with clinical conditions, like; muscular dystrophies, inflammatory myopathies etc. Scholars should share their observations and present them in the class in the form of power point presentation. Finally, scholar should evaluate the structural changes observed in Mamsa Vriddhi and Mamsa Kshaya and its impact on health status in the light of conceptual knowledge.

Experiential-Learning 1.9 : Histopathology of tendons, ligaments and aponeurosis.

Histopathology of tendons, ligaments and aponeurosis

All scholars should be allotted separate topic for the activity. Scholar shall attempt to observe the microscopic section of tendons, ligaments or aponeurosis to identify abnormality in the tissue under the microscope. Scholar shall be able to relate identified pathology with clinical conditions, like; tendinosis, tenosynovitis in tendons; chondroid metaplasia, vascular proliferation in ligaments; and Dupuytren's disease, plantar fasciitis etc. Scholars should share their observations and present in the class in the form of power point presentation.

Experiential-Learning 1.10 : Histopathology of bone and cartilage.

Every scholar shall be assigned separate topic by the teacher.

Histopathology of bone tissue -(2hour)

Scholar shall attempt to observe the microscopic section of bone to identify key features of abnormalities. Scholar shall be able to relate identified pathology with clinical conditions, like; achondroplasia, osteogenesis imperfecta, osteomalacia etc. Scholars should share their observations and present in the class in the form of power point presentation.

Histopathology of cartilage -(2hour)

Scholar shall attempt to observe the microscopic section of cartilage to identify key features of abnormalities. Scholar shall be able to relate identified pathology with clinical conditions, like; osteoarthritis, rheumatoid arthritis etc. Scholars should share their observations and present in the class in the form of power point presentation.

Experiential-Learning 1.11 : Histopathology of nervous tissue.

Histopathology of nervous tissue -

All scholars should be allotted separate topic for the activity. Scholar shall attempt to observe the microscopic section of nervous tissue to identify abnormalities. Scholar should be able to relate identified pathology with clinical conditions, like; Alzheimer's disease, parkinson's disease, multiple sclerosis etc. Scholars should share their observations and present in the class in the form of power point presentation.

Experiential-Learning 1.12 : Histopathology of reproductive tissue.

Histopathology of reproductive tissue

All scholars should be allotted separate topic for the activity. Scholar shall attempt to observe the microscopic section of testis, ovary to identify abnormalities. Scholar shall be able to relate identified pathology with clinical conditions, like; inflammation, atrophy, cellular infiltration etc. scholar shall also evaluate disorders/abnormalities of sperm and ovum and its impact on fertility - Sukra dusti and Arthava dusti and its influence in Garbadhana and Garbha Vikriti; and take a field visit to reputed histology Laboratory. Scholars should share their observations and present in the class in the form of power point presentation.

Modular Assessment

Assessment method

Hour

Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C.

4

1.OSPE (25mark)

Prepare OSPE station with help of following topic

- Identify Dhatu-related body tissues in histological slides (e.g., Rakta: blood smear, Mamsa: skeletal muscle)
- Tissue sectioning , fixing
- slide preparation ,
- mounting and staining
- Muscle contraction study using EMG.

2. Case-Based Group Discussion (CBGD) (25marks)

Students are divided into small groups and assigned different clinical cases related to disorders of Shukra or Majja Dhatu (e.g., Shukrakshaya in infertility, Majjakshaya in neurodegenerative diseases). Each group analyzes the case and presents their findings with respect to following points

- 1.Role of the Dhatu involved
2. Correct identification of Dhatu Sthana
3. Accurate anatomical mapping
4. Integration of pathology with structure involved
5. Relevance to case discussion

or
Any practical in converted form can be taken for assessment.(25Mark)
and
Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical training /experiential learning) session, the students should be able to)	3C Notional learning Hours	3D Lecture/ Practical Training/ Experientia l Learning	3E Domain/ Sub Domain	3F Level (D oes/Sho ws how/ Knows h ow/Kno w)	3G Teachin g Learnin g Methods
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Module 2 : Embryology (Tissues, Branchial arches and Face)						
Module Learning Objectives (At the end of the module, the students should be able to) - Describe the role of embryological principles in formation of tissues. - Analyze and compare the changes in the Branchial arches during the course of formation of face, nasal cavity and oral cavity. .						
M 2 Unit 1 Dhatu Nirman - Formation of tissues of the body 2.1.1. Formation of epithelial tissues 2.1.2. Formation of connective tissues 2.1.3. Formation of muscular tissue 2.1.4. Formation of nervous tissue References: 1,2,3,4,5,43,44,45,46						

3A	3B	3C	3D	3E	3F	3G
CO2	Analyze formation of epithelial tissue of the body; and differentiation of epithelial tissue in different parts of the body in relation to functional requirements of the organ/system.	1	Lecture	CAN	Knows-how	L&PPT ,L
CO2	Demonstrate formation and development of epithelial tissue of the body in relation to lining epithelia. Demonstrate Formation and development of connective tissue of the body in relation to distribution of nourishment and forming a compact body. Demonstrate formation and development of muscular tissue of the body in relation to contractility as a major force of evolution. Demonstrate Formation and development of nervous tissue of the body in relation to complex function of co-ordination of different parts of the body.	5	Practical Training 2.1	CAP	Knows-how	PER,PL
CO2	Evaluate the clinical disorders in relation to anomalies of epitheliogenesis, connective tissue, myogenesis, neurogenesis.	8	Experiential-Learning 2.1	CE	Knows-how	DIS,CBL, C_L
CO2	Analyze formation of connective tissue of the body; and differentiation pathways of connective tissue to adapt in different organs/systems.	1	Lecture	CAN	Knows-how	DIS,L
CO2	Analyze myogenesis and impact of contractile ability of tissue on embryogenesis.	1	Lecture	CAN	Knows-how	L&GD
CO2	Analyze Formation of nervous tissue of the body; and differentiation, maturation and migration of nervous tissue.	1	Lecture	CAN	Knows-how	

M 2 Unit 2 Branchial arches2.2.1. Derivatives of Branchial arches.

2.2.2. Fate of ectodermal cleft and Endodermal pouch

References: 1,2,3,4,5,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
CO2	Analyze the fate of endodermal pouches, ectodermal clefts and mesodermal components	2	Lecture	CAN	Knows-	L,L&PPT

	of each arch.				how	
CO2	Demonstrate various stages in the formation and fate of endodermal pouches of branchial arches (pharyngeal arches), fate of ectodermal clefts of branchial arches, fate of mesodermal component of branchial arches.	3	Practical Training 2.2	CAP	Knows-how	D-M
CO2	Evaluate congenital anomalies related to development of endodermal pouches,ectodermal clefts,mesodermal components of branchial arches.	6	Experiential-Learning 2.2	CE	Does	LRI,C_L, CBL

M 2 Unit 3 Development of face and nose2.3.1. Development of Face.
2.3.2. Development of Nasal cavity and Palate.

References: 1,2,3,4,5,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
CO2	Analyze development of face to understand the complexity of human face in reflecting different emotions; Development of nasal cavity as an external link of lungs; Development of palate as partition between respiratory and digestive tracts.	3	Lecture	CAN	Knows-how	L&PPT ,L
CO2	Demonstrate the key aspects of development of face and relate association of muscular, neurological components with bony and cartilaginous components. Demonstrate development of the nasal cavity. Demonstrate development of palate marking separation of olfactory senses from gustatory senses.	6	Practical Training 2.3	CAP	Knows-how	DIS,PAL
CO2	Evaluate developmental anomalies of the face, nasal cavity, palate and relate them with clinical conditions.	6	Experiential-Learning 2.3	CE	Knows-how	CBL,PBL ,DIS

M 2 Unit 4 Garbhavridhhi and foetal development2.4.1. Garbhavridhhi.
2.4.2. Chronology of events during foetal development.

References: 1,2,3,4,5

3A	3B	3C	3D	3E	3F	3G
CO2	Analyze chronology of foetal development.	1	Lecture	CAN	Knows-how	L&PPT
CO2	Demonstrate development of digestive system, respiratory systems, cardiovascular system, urinary system, female genital system, male genital system and nervous system; and ability to relate proximity of different body systems in terms of chronology.	6	Practical Training 2.4	CE	Knows-how	L_VC,DL,LS
CO2	Evaluate the chronological time period of the developmental anomaly of a specific organ during the course of development.	6	Experiential-Learning 2.4	CE	Knows-how	CBL,L_VC

Practical Training Activity

Practical Training 2.1 : Formation and development of epithelial tissues (epitheliogenesis), connective tissues, muscular tissues (myogenesis), nervous tissues (neurogenesis) of the body.

Teacher shall demonstrate the cardinal features of development of epithelial, connective, muscular and nervous tissues. Teacher shall assign one topic from each of the practical activity to every scholar.

1. Epitheliogenesis -(2hour)

Scholar shall see the slides related to development of skin, enamel organ of teeth and formation of various gland. Scholar shall view the animation video from data resources and textual diagram from the authentic text. Scholar should comprehend the development of epithelia as per requirement (tissue specific differentiation) in limiting various cavities, spaces, channels within the body. Every scholar shall work on assigned topic and share the findings with peers.

2. Formation and development of connective tissues of the body - (1 hour)

Scholar shall see the slides related to development of various cell types, like; fibroblasts, macrophages, mast cells, adipocytes etc. Scholar shall view the animation video from data resources and textual diagram from the authentic text. Scholar should comprehend the development of frame work of the body by formation of bulk of the body. Every scholar shall work on assigned topic and share the findings with peers.

3. Myogenesis - (1 hour)

Scholar shall see the slides related to development of various cell types, like; myoblasts, myotubes etc. Scholar shall view the animation video from data resources and textual diagram from the authentic text. Scholar should understand the development of contractility as main feature of muscular tissue. Every scholar shall work on assigned topic and share the findings with peers.

4. Formation and development of nervous tissues of the body -(1 hour)

Scholar shall see the slides related to development of various cell types, like; neuroblasts, neuron, neuroglial cells etc. Scholar shall view the animation video from data

resources and textual diagram from the authentic text. Scholar should comprehend the development of nervous tissue in key stages of proliferation, migration, differentiation and synapse formation. Every scholar shall work on assigned topic and share the findings with peers.

Practical Training 2.2 : Fate of endodermal pouches, ectodermal clefts,mesodermal components of branchial arches

Teacher wil Demonstrate key features of development of branchial arches and guide the scholar to do the allotted topic.

1. Fate of endodermal pouches (1 hour)

Scholar shall prepare a table with timeline of events of development of each endodermal pouch of the branchial arches. Scholar shall learn the importanceof developmental origin of endocrine glands within the endodermal pouches. Scholar shall discuss observations with the peers to initiate a group discussion.

2. Fate of ectodermal clefts (1 hour)

Scholar shall prepare a table with timeline of events of development of each ectodermal cleft of the branchial arches. Scholar shall learn the importanceof developmental origin of ear within the ectodermal cleft. Scholar shall also learn and discuss the evolutionary importance of ectodermal cleftas respiratory organ. Scholar shall discuss observations with the peers to initiate a group discussion.

3. Fate of mesodermal components of branchial arches (1 hour)

Scholar shall take the help of animation video or the authentic texts in embryology to understand fate of Branchial arches. Scholar should discuss the formation and development of muscles, blood vessels, bones, cartilages of face and their nervous relation. scholar shall prepare a power point presentation on allotted topic.

Practical Training 2.3 : Formation and development of face, nasal cavity, palate.

Scholars will learn development of face, nasal cavity and palate through animated embryology videos/slides or models under the direction of teacher. every scholar shall be allotted seperate topic for activity.

1. Formation and development of face (2 hours)

Scholar shallsee the slides related to development of face. Scholar shall view the animation video from data resources and textual diagram from the authentic text. Scholar should visualize the development of face as powerful means of communication. Every scholar shall work on assigned topic and share the findings with peers.

2. Formation and development of nasal cavity (2 hours)

Scholar shall see the slides related to development of nasal cavity. Scholar shall view the animation video from data resources and textual diagram from the authentic text. Scholar should visualize the development of nasal cavity as first interaction with food just before entering mouth. Every scholar shall work on assigned topic and share the findings with peers.

3. Formation and development of palate (2 hours)

Scholar shall see the slides related to development of palate. Scholar shall view the animation video from data resources and textual diagram from the authentic text. Scholar should visualize the development of palate as divider of olfactory and gustatory senses.. Every scholar shall work on assigned topic and share the findings with peers.

Practical Training 2.4 : Chronological development of body systems .

Chronological development of systems of the body

Teacher shall demonstrate the fundamental points in development of a system in chronological order and allot separate topics to each scholar on different systems/parts of the systems. Scholar shall attempt to choose atleast 4 topic from different systems as assigned by the teacher and prepare those topics with the help of slides/internet resources and present in the class before teacher. Scholar shall also discuss chronological proximity of developing organs/systems.

Experiential learning Activity

Experiential-Learning 2.1 : Anomalies of epitheliogenesis, connective tissue, myogenesis, neurogenesis.

Teacher will discuss case studies of tissue related disorders and assign separate topics to scholars for study of anomalies of histogenesis.

Mapping of clinical feature related to defective histogenesis.

1. Anomalies of epitheliogenesis - All scholars should be allotted separate topic for the activity. Scholar shall attempt to observe the clinical cases from the data source to identify anomalies of epitheliogenesis, like; aplasia cutis (epithelia imperfecta), epithelial-mesenchymal transition defect, corneal epithelial defects etc. Scholars should attempt to identify the causes of anomalies and share their observations and present in the class in the form of power point presentation. (2 hours)
2. Anomalies of connective tissue - All scholars should be allotted separate topic for the activity. Scholar shall attempt to observe the clinical cases from the data source to identify anomalies of connective tissue, like; marfan syndrome, ehlers-danlos syndrome, osteogenesis imperfecta, stickler syndrome, marfan syndrome, arterial tortuosity syndrome etc. Scholars should attempt to identify the causes of anomalies and share their observations and present in the class in the form of power point presentation. (2 hours)
3. Anomalies of myogenesis - All scholars should be allotted separate topic for the activity. Scholar shall attempt to observe the clinical cases from the data source to identify anomalies of myogenesis, like; congenital muscular dystrophies, congenital myopathies, club foot Poland syndrome etc. Scholars should attempt to identify the causes of anomalies and share their observations and present in the class in the form of power point presentation. (2 hours)
4. Anomalies of neurogenesis - All scholars should be allotted separate topic for the activity. Scholar shall attempt to observe the clinical cases from the data source to identify anomalies of neurogenesis, like; spina bifida, anencephaly, encephalocele, hydrocephalus, lissencephaly, focal cortical dysplasia, hydranencephaly etc. Scholars should attempt to identify the causes of anomalies and share their observations and present in the class in the form of power point presentation. (2 hours)

Experiential-Learning 2.2 : Congenital anomalies of endodermal pouches, ectodermal clefts, mesodermal components of branchial arches.

Teacher shall distribute separate topics to every student related to clinical condition of maldevelopment of branchial arches.

1. Congenital anomalies of endodermal pouches (2 hours)

Scholar shall attempt to observe the clinical conditions from the data source to identify anomalies of endodermal pouches, like; formation of cysts, fistulae or sinus due to incomplete closure of endodermal pouches. Scholars should attempt to identify the causes of anomalies and their clinical manifestation. Scholar should share their

observations and present in the class in the form of power point presentation.

2. Congenital anomalies of ectodermal clefts (2 hours)

Scholar shall attempt to observe the clinical conditions from the data source to identify anomalies of ectodermal clefts like; broncho-oto-renal syndrome, broncho-oculofacial syndrome, second branchial cleft deformity etc.. Scholars should attempt to identify the clinical manifestations. Scholar should share their observations and present in the class in the form of power point presentation.

3. Congenital anomalies of mesodermal components of branchial arches(2 hours)

Scholar shall attempt to observe the clinical conditions from the data source to identify anomalies of ectodermal clefts like; First arch syndrome, Treacher Collins syndrome, Pierre Robin syndrome etc.. Scholars should attempt to identify the clinical manifestations. Scholar should share their observations and present in the class in the form of power point presentation.

Experiential-Learning 2.3 : Developmental anomalies of the face, nasal cavity, palate.

Teacher shall distribute separate topics to every student on each of the activity.

1. Developmental anomalies of the face(2 hours)

Scholar shall identify the clinical conditions from the data source to identify anomalies of face, like; craniosynostosis, hemifacial microsomia, cleft lip etc. Scholars should attempt to find the causes of anomalies and their clinical manifestation. Scholar should share their observations and present in the class in the form of power point presentation.

2. Developmental anomalies of the nasal cavity (2 hours)

Scholar shall identify the clinical conditions from the data source to identify anomalies of nasal cavity, like; choanal atresia, nasal gliomas etc. Scholars should find the causes of anomalies and their clinical manifestation. Scholar should share their observations and present in the class in the form of power point presentation.

3. Developmental anomalies of the palate (2 hours)

Scholar shall identify the clinical conditions from the data source to identify anomalies of palate, like; cleft palate, Pierre Robin sequence etc. Scholars should find the causes of anomalies and their clinical manifestation. Scholar shall prepare a presentation for the class for further group discussion.

Experiential-Learning 2.4 : Congenital developmental anomalies and their exact chronological time of appearance.

Congenital developmental anomalies and their exact chronological time of appearance

Teacher shall distribute at least three separate cases of congenital developmental anomalies to every student. Scholar shall identify the onset of congenital anomalies with the help of data resources. Scholar should attempt to link the onset of anomaly with environmental causes/ genetic causes. Scholars should share their observation and reflection. Cases with new clinical finding and unique feature can be published as case report

Modular Assessment

Assessment method

Hour

Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1.OSPE (25Mark) In this method, students are presented with clinical scenarios or anatomical models) at different stations. They answer structured questions related to following given points. • Embryological origin of the tissue/structure • Timeline or developmental stage • Development of tissues • Chronology of fetal development • Derivatives of branchial arches • Fate of clefts and pouches • Development of face, nasal cavity, and palate • Associated anomalies and their causes /Short clinical scenarios or embryological models (e.g., cleft lip, congenital heart defect) 2.Concept Mapping (25Mark) Students visually organize information by creating maps that link germ layers to specific tissues, arches to their derivatives, and clefts/pouches to their adult outcomes. so that students visualize the integration of structural and functional development. or Any practical in converted form can be taken for assessment.(25Mark) and Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)	4
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Semester No : 4

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical training /experiential learning) session, the students should be able to)	3C Notional learning Hours	3D Lecture/ Practical Training/ Experientia l Learning	3E Domain/ Sub Domain	3F Level (D oes/Sho ws how/ Knows h ow/Kno w)	3G Teachin g Learnin g Methods
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Module 3 : Histology and Embryology of respiratory, cardiovascular and lymphatic system

Module Learning Objectives

(At the end of the module, the students should be able to)

Compare development and formation of Pranvaha, Raktavaha and Rasa vaha srotas in context of modern histology and embryology.

M 3 Unit 1 Histology and embryology of respiratory system3.1.1. Histology, formation, development and developmental anomalies of respiratory system.
3.1.2. Description of Phuphus Nirman.

References: 1,2,3,4,5,6,7,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
CO8	Analyze histology of respiratory mucosa of nose; pharynx, larynx, trachea; lungs, pleura and bronchi.	3	Lecture	CAN	Knows-how	L&PPT
CO8	Identify and demonstrate key histological structures of respiratory mucosa, olfactory mucosa of nose; lung, larynx, trachea, bronchus, bronchiole, bronchopulmonary segment and Alveoli.	3	Practical Training 3.1	CE	Knows-how	DL
CO8	Estimate real life scenarios involving problems related to micromorphological changes in respiratory system and Histological /structural changes in a covid lung.	6	Experiential-Learning 3.1	CS	Does	RLE,SDL,PrBL
CO2	Analyze Formation and development of respiratory system with Phuphus Nirman from Shonit Phena and formation of lungs; and substantiate Phuphus as Pratyanga in relation to Pranavahasrotas.	2	Lecture	CAN	Knows-how	DIS
CO8	Demonstrate clinical histological features of various slides related to respiratory disorders.	3	Practical Training 3.2	CAP	Knows-how	D,D-BED

CO2	Demonstrate the stages of maturation of lungs and developmental anomalies of respiratory system.	2	Practical Training 3.3	CAP	Knows-how	L_VC,PER,D-M
CO2	Evaluate the Developmental anomalies related to respiratory system at various stages.	4	Practical Training 3.4	CE	Knows-how	LRI,DL,SIM
CO8	Perform the procedures like thoracocentesis.	8	Experiential-Learning 3.2	PSY-ADT	Does	SIM,CBL

M 3 Unit 2 Histology and embryology of cardiovascular system3.2.1. Histology, formation, development and developmental anomalies of cardiovascular system.
3.2.2. Raktavahi Dhamani, Sira evum Damani Nirman and Hridaya Nirman.

References: 1,2,3,4,5,6,7,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
CO8	Analyze histology of heart and pericardium, arteries, veins, capillaries and sinusoids.	1	Lecture	CAN	Knows-how	L&PPT
CO8	Demonstrate histological internal structure of heart wall , cardiac muscle and pericardium; identify and differentiate histology of large artery, large vein, medium artery, medium sized vein, venules, arteriole and types of blood capillaries with function and sinusoids; comparison between artery and vein; and specialized cardiac tissue like purkinje fibres.	7	Practical Training 3.5	CE	Knows-how	D,IBL
CO8	Evaluate the histopathological slides of cardiovascular system and correlate the clinical cases of cardiovascular system with histopathology.	6	Experiential-Learning 3.3	CE	Does	CBL,LRI
CO8	Demonstrate the fetal heart formation; course branching and termination of arteries/veins of foetus; and the Foetal circulation and developmental anomalies of cardiovascular system.	2	Practical Training 3.6	CE	Knows-how	DIS,CBL
CO8	Evaluate the causes and consequences of developmental anomalies of cardiovascular system.	6	Experiential-Learning 3.4	CE	Knows-how	CBL

CO8	Analyze development of heart, lymphatic vessels, arteries and veins.	1	Lecture	CAN	Knows-how	C_L
CO1,CO2	Analyze Ayurvedic perspective of Hridaya and Raktavahi Dhamani and Rasavahi Dhamani as Pratyenga; and Sira, Dhamani and Hridaya Nirman.	1	Lecture	CAN	Knows-how	L&GD
M 3 Unit 3 Histology and embryology of lymphatic system 3.3.1. Histology, formation, development and developmental anomalies of lymphatic system. 3.3.2. Rasavahi Dhamani and Pleeha Nirman References: 1,2,3,4,5,6,7,43,44,45,46						
3A	3B	3C	3D	3E	3F	3G
CO1,CO8	Analyze Concept of Rasa Dhatu, Lasika and Rasayani in context of histology of lymphoid tissue (plasma cells, lymphocytes, lymph node, lymphatics, thymus and tonsils and spleen).	3	Lecture	CAN	Knows-how	L&PPT,DIS
CO8	Demonstrate the histology of lymph nodes and lymphatic vessels and lymphatic glands.	6	Practical Training 3.7	PSY-MEC	Shows-how	D
CO8	Corelate the radiological and functional aspect of lymphatic system.	2	Experiential-Learning 3.5	CAP	Knows-how	X-Ray,CBL,LRI,SIM
CO8	Analyze development of lymph tissue in perspective of Ayurvedic and contemporary sciences.	2	Lecture	CAN	Knows-how	LS
CO2	Demonstrate the development of lymphatic system.	2	Practical Training 3.8	CAP	Knows-how	D
CO5	Map the distribution of lymphatics and lymph nodes in the body.	2	Experiential-Learning 3.6	PSY-ADT	Shows-how	DSN,D
CO2	Demonstrate the development of lymphatic system and lymphatic disorders.	4	Experiential-Learning 3.7	CAN	Knows-how	SIM,PER,CBL

M 3 Unit 4 Dhatu, Pratyanga and Srotas 3.4.1. Dhatu, Pratyanga and Srotas as Tissue, organs and systems respectively.						
References: 1,2,3,4,5,6,7						
3A	3B	3C	3D	3E	3F	3G
CO1	Analyze Dhatu, Pratyanga and Srotas as tissue, organ & Organ system.	1	Lecture	CAN	Knows-how	L&PPT ,BL,L
CO2	Demonstrate the structural and functional relation/proximity of organs and systems.	1	Practical Training 3.9	CAP	Knows-how	D,DIS
CO2	Evaluate the inter-relation between different systems constituting the human body through embryological studies.	5	Experiential-Learning 3.8	CE	Knows-how	CBL
CO1,CO8	Analyze histological understanding of Moolasthana of Rasa, Rakta and Pranavaha Srotas and their interconnections with replenishment of nourishment to the whole body.	1	Lecture	CAN	Knows-how	L&GD
Practical Training Activity						
Practical Training 3.1 : Histology of respiratory tract and structural adaptations in respiratory organs.						
Teacher shall separately allot one topic for each of the activity to every scholar. Scholar is expected to prepare assigned topic for group demonstration (3 hour) See histology of Nasal mucosa, Larynx, trachea, Bronchus, Bronchiole and alveoli of lungs under microscope. Identify and differentiate between various parts of respiratory system based on epithelial lining and structural composition with respect to exchange of gases and related cellular architecture to understand the structural adaptations of respiratory organs for functions like -Air conditioning, Humidification, filtration and gaseous exchange.						
Practical Training 3.2 : Demonstrate the stages of maturation of lungs and developmental anomalies of respiratory system.						
Correlate histological features with clinical conditions like Tamaka Shwasa, Rajayaksma, Shwasa and Kaasa etc. (3 hour)						
Practical Training 3.3 : Formation of bronchi and stages of maturation of Lungs						
Prepare a presentation on formation of bronchi and demonstrate stages of maturation of lungs with help of foetal model or video presentation. (2 hours)						
Practical Training 3.4 : Developmental anomalies related to bronchi and larynx.						

Identification and evaluation of developmental anomalies related to bronchi and larynx with the help of Scan reports and clinical video. List out the changes seen in various stages of development of Lung and related congenital anomalies with help of 3D model or video simulation. (4 hours)

Practical Training 3.5 : Histological structure of Heart and blood vessels.

Teacher shall allot separate topic from each of the activity to every student and guide them.

a. Demonstration of Histology of heart and blood vessels (1 hr)

Architecture of heart with the help of slides showing cardiac muscle (Intercalated disc and branching fibres), myocardium section- striated muscles, central nuclei, Intercalated Disc and endocardium section -Purkinje Fibres

b. Comparison of artery and vein with the help of slides (2hr).

Elastic artery, muscular artery, medium sized vein, large vein - key features to see are tunica intima, media and adventitia and elastic laminae: thickness differences

c. Slides of different types of capillaries (4hr)

Continuous capillary (Ex: Skeletal Muscle), Fenestrated capillary (Ex: Glomerulus of Kidney), Sinusoidal Capillary (Ex : Bone Marrow, liver) for observing endothelial lining, basement membrane, fenestrations and open spaces.

Practical Training 3.6 : Fetal heart and congenital anomalies related to cardiovascular system.

1. Demonstration of Fetal Heart with help of Plastinated Models and Video. Demonstration of formation, course, branching and termination of arteries of foetus with the help on preparation of charts and Model. Demonstration of formation, course branching and termination of veins of foetus with help of preparation charts, model and with help of animated videos. Demonstration of Foetal circulation with help of use of Animated Diagram and making charts. (1 hours)

2. Scholar should take the help of video clips, attend OPD of clinical departments for specific case studies on congenital anomalies of cardiovascular system Group discussion on similar case base learning. (1 hours)

Practical Training 3.7 : Histological features of lymph nodes, lymphatic vessels and lymphoid glands.

Teacher shall allot topic to every scholar on each activity to guide them through the demonstration.

1. Demonstration of lymph nodes and lymphatic vessels (3 hours)

Demonstrate transverse section of lymph node to identify capsule with trabeculae, cortex with lymphoid follicles, paracortex with T-cells, Medulla with medullary cords and sinuses along with subcapsular sinuses. Demonstration of slide with tissue of lymphatic capillaries stained with silver for observing features like thin endothelium, absence of basal lamina, seen in loose connective tissue - and its comparison with pathology slides like hyperplastic lymph node (Reactive lymph node) , Lymphoma (Hodgkins or non hodgkin's) and Thymic Involution with age .

2. Demonstration of section of spleen (3 hours) for observing features like capsule with smooth muscle and trabeculae, white pulp with lymphoid nodules around central arteries, red pulp with splenic sinusoids and cord of Billroth; Section of Palatine Tonsils : for identifying features like crypts lined by stratified squamous epithelium, lymphoid follicles with germinal centres, partial capsule with surrounding connective tissue; Section of Thymus- for identification of features like lobule, cortex

densely packed with lymphocytes, Medulla with hassall's corpuscles that stains lighter. Demonstrate the Histology of peyer's patches and palatine tonsils.

Practical Training 3.8 : Development of lymphoid glands.

Demonstrate the development of lymphatic system through the power point presentation prepared from various data resources.

Practical Training 3.9 : Mutual relation among organs constituting a system of the body.

Teacher shall demonstrate the key features of development of a system (like respiratory system). Scholar shall identify and define the role of all organs of the system. Each scholar shall work on different system of the body as assigned by the teacher and give a presentation.

Experiential learning Activity

Experiential-Learning 3.1 : Micromorphology and micromorphological changes in respiratory tract and Histological changes in covid lung.

Teacher shall allot one topic from each of the following activity to every scholar. Scholar is expected to prepare given topic for presentation in the class and submission.

1. Histology practicals with clinical correlation (3 hours)

study and analysis of slides related to trachea (pseudostratified epithelium, C-Shaped cartilage), Bronchi and bronchioles with smooth muscles and clara cells, Alveoli with type I & type II Pneumocytes and capillary network - compare normal vs pathological history (Ex : Emphysema, asthma, Pneumonia) also compare them with dust-related lakshana of pranavaha srotas and its effect on related organ. (3 hours)

2. Literature review and micro project on histological changes in covid lung- retrospective study to develop research / writing skill. (3 hours).

Experiential-Learning 3.2 : Procedure related to thoracocentesis and intubation.

Perform the thoracocentesis and intubation in the minor OT of hospital/ simulation and prepare a presentation by observing the procedure. (8 hours)

Experiential-Learning 3.3 : Identification of histopathological slides of cardiovascular system clinical case integration with histopathological study.

Teacher shall allot a separate topic to every scholar from each of the activity.

1. Identification of histopathological slides (3 hours)

Scholar should attempt to identify the abnormality in the histopathological slides related to cardiovascular system available on data resource, textual references or from the histopathology lab of institute.

2. Clinical case integration (3 hours).

Correlate histology with cardiovascular pathologies like atherosclerosis (lipid laden plaques), hypertension (Thickened arteriolar wall), myocardial infarction (necrosis and inflammatory infiltration). Find out clinical cases mentioned in Ayurveda in this regard.

Experiential-Learning 3.4 : Implication of the cardiovascular anomalies.	
Clinical evaluation of cardiovascular anomalies - scholar shall identify all clinical application of the allotted cardiovascular anomalies with the help of data resource and prepare a presentation for class. (6 hours)	
Experiential-Learning 3.5 : Radiological and functional co-relates of histology of lymphatic system.	
Teacher shall allot a separate topic to every scholar from each of the activity. Radiological and functional correlation - Scholar should attempt to study X- rays/CT/MRI scans of mediastinum and abdominal lymph nodes. Understand lymphatic drainage patterns using lymphangiography or 3D imaging tools.	
Experiential-Learning 3.6 : Mapping of lymphatic system in the body.	
Lymphatic mapping (2 hours) Scholar should understand the pattern of distribution of lymphatics and lymph nodes and map the position during dissection.	
Experiential-Learning 3.7 : Formation, development and clinical application of lymphatic system.	
Development of lymphatic system (2 hours) Scholar should prepare a power point presentation on the development of lymphatic system and present in the class through animation/videos. Clinical study of lymphatic system (2 hours) Discuss clinical cases involving lymphadenopathy, lymphedema, Hodgkin's lymphoma, tonsillitis, splenomegaly and correlate anatomical and histological basis of disease. Observe bone Marrow biopsy to identify lymphopoietic cells, and myeloid cells.	
Experiential-Learning 3.8 : Inter-relation between lymphatic and cardiovascular system through embryological studies.	
Teacher shall assign topic to every scholar to identify the relation between lymphatic and cardiovascular system of the body as an example in embryological study. Scholar should identify the individual importance of each system and inter-dependency of the both systems. Scholar shall prepare own set of observation and present them in the class. In similar any other two systems can be assigned to scholars to identify inter-relation.	
Modular Assessment	
Assessment method	Hour
Instructions—Conduct a structured modular assessment. The assessment will be for 75 marks. Keep a structured marking pattern. Use different assessment	6

methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C.

1.Histology Portfolio(25Mark)

Reinforce understanding of microscopic anatomy and link it to structure-function and Ayurvedic concepts (e.g., Dhatu, Srotas)

Instructions for Students

- Maintain a portfolio of any 5 histological slides (e.g. lymph node, lung alveoli, heart wall, lymphatic vessel, artery, vein, sinusoids etc).
- For each slide, Student will provide
 - Labelled diagram (hand-drawn or printed with annotation)
- Cell types and structural features identified
- Function of the tissue/structure
- Possible pathological changes
- Ayurvedic correlation (e.g.Rasa Dhatu for lymphatic system)

Teacher Remarks

Teacher will give the remark about the students performance as Reviewed /Needs Revision /Marks Awarded

2. 360 Degree evaluation(CVS)(25Mark)

The student will receives Multi-source feedback from

- Faculty,
- Peers ,
- Self-assessment,
- Non teaching Staff (e.g lab technicians)

for histological slide preparation and demonstration on topic Cardiac muscle(any part of CVS can be taken as veins, arteries etc), so that can assess practical skill, communication skill, Team work and collaboration, Ethics and Professionalism

3. 360 Degree evaluation (RS)(25Mark)

The student will receives Multi-source feedback from

- Faculty,
- Peers ,
- Self-assessment,
- Non teaching Staff (e.g lab technicians)

for histological slide preparation and demonstration on topic Cardiac muscle(any part of RS) can be taken, so that can assess practical skill, communication skill, Team work and collaboration, Ethics and Professionalism
or
Any practical in converted form can be taken for assessment.(40Mark)
and
Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (35Mark)

Semester No : 5

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical training /experiential learning) session, the students should be able to)	3C Notional learning Hours	3D Lecture/ Practical Training/ Experientia l Learning	3E Domain/ Sub Domain	3F Level (D oes/Sho ws how/ Knows h ow/Kno w)	3G Teachin g Learnin g Methods
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Module 4 : Histology and embryology of digestive system

Module Learning Objectives

(At the end of the module, the students should be able to)

Describe development and formation of Annavaha Srotas in terms of modern embryology and histology.

M 4 Unit 1 Histology and embryology of foregut4.1.1. Histology, formation, development and developmental anamolies of foregut.
4.1.2. Description of Amashya, Agnyashya, Pittashya and Yakrit.

References: 1,2,3,4,5,6,7,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
CO8	Analyze histology of structures of oral cavity and foregut.	2	Lecture	CAN	Knows-how	L
CO8	Demonstrate histology of structures of oral cavity (lips, gums, cheeks, teeth, tongue and salivary glands) and derivatives of foregut in cervical, thoracic and abdominal region.	4	Practical Training 4.1	CE	Knows-how	D
CO8	Evaluate histological changes in structures of oral cavity, foregut and congenital anomalies of oral cavity and foregut and discuss in the pervue of Ayurveda .	6	Experiential-Learning 4.1	CE	Does	CBL
CO2	Analyze the formation and development of oral cavity and foregut.	1	Lecture	CAN	Knows-how	
CO2	Demonstrate development of oral cavity and foregut.	2	Practical Training 4.2	CE	Knows-how	D

M 4 Unit 2 Histology and embryology of midgut4.2.1. Histology, formation, development and developmental anomalies of midgut.
4.2.2. Description of Aantra and Unduka.

References: 1,2,3,4,5,6,7,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
CO8	Analyze histology of midgut derivatives.	1	Lecture	CAN	Knows-how	L&PPT
CO8	Demonstrate and differentiate histology of various parts of midgut and analyze in terms of structure of Kala, Dhatu and Aashaya .	2	Practical Training 4.3	CAN	Knows-how	D
CO8	Evaluate of histological changes in diseases and developmental anomalies of midgut of gastrointestinal tract.	5	Experiential-Learning 4.2	PSY-MEC	Shows-how	DIS,CBL

CO2	Demonstrate the Development of various parts of midgut and compare it with related Ayurvedic concepts.	3	Practical Training 4.4	CAP	Knows-how	DL
CO1,CO2	Analyze Ayurvedic concept of Antra and contemporary anatomical perspective of formation and development of midgut along with developmental anomalies.	1	Lecture	CAN	Knows-how	L&GD

M 4 Unit 3 Histology and embryology of hindgut4.3.1. Histology, formation, development and developmental anomalies of hindgut.
4.3.2. Description of Guda.

References: 1,2,3,4,5,6,7,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
CO2,CO8	Analyze histology of hindgut; and compare formation and development of hindgut described in modern sciences with the description in Ayurveda.	1	Lecture	CAN	Knows-how	L
CO8	Demonstrate and differentiate histology of various parts of hindgut.	2	Practical Training 4.5	CAP	Knows-how	D
CO8	Evaluate histological changes in diseases of hindgut.	3	Experiential-Learning 4.3	CAP	Knows-how	CBL
CO2	Identify and evaluate the developmental anomalies related to hind gut.	5	Experiential-Learning 4.4	CE	Does	CBL,SIM
CO1	Analyze Utpatti of Pakwashaya, Guda, Unduka, Purisha-dhara Kala and its relation with Purishavaha Srotas	2	Lecture	CAN	Knows-how	SDL

M 4 Unit 4 Development of body cavities4.4.1. Formation, development and developmental anomalies of body cavities and membranes.
4.4.2. Kala Nirman.

References: 1,2,3,4,5,6,7,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
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CO1,CO8	Analyze histology of the body cavities and link them with broader concept of Kala in Ayurveda.	1	Lecture	CAN	Knows-how	L&GD,JC,L
CO1,CO8	Demonstrate histological structure of body (coelomic) cavities.	4	Practical Training 4.6	CAP	Knows-how	D
CO8	Evaluate and differentiate histological structure of different body (coelomic) cavities.	4	Experiential-Learning 4.5	CE	Knows-how	CBL,PER
CO1,CO2	Analyze formation and development of body cavities.	1	Lecture	CAN	Knows-how	L&GD
CO1,CO2	Demonstrate the formation and development of body (coelomic) cavities.	3	Practical Training 4.7	CAP	Knows-how	PER,LS,D
CO1,CO2	Evaluate the formation and development of body (coelomic) cavities.	3	Experiential-Learning 4.6	CE	Knows-how	LS,CBL

Practical Training Activity

Practical Training 4.1 : Histology of oral cavity and foregut.

Teacher shall demonstrate and guide the scholar through the practical activity and allot a separate topic for each of the activity to every student.

1. Histology of lips, gums, cheeks, teeth, tongue, palate and salivary glands (2 hours)

Scholar shall explore the data base for normal histology and see the slides related to histology of lips gums, cheeks, teeth, tongue and salivary glands.

2. Histology of foregut proper(2 hour)

Scholar shall see the slides related to histological section of different structures of foregut, like; pharynx , oesophagus, stomach, duodenum, pancreas, liver and biliary apparatus

Scholar should identify cardinal features and should demonstrate the same under the guidance of teacher.

Practical Training 4.2 : Formation and development of oral cavity and foregut.

Formation and development of oral cavity and foregut.

Scholar shall study the development of oral cavity and foregut with the help of available slides, models or video animations under the guidance of teacher.

Practical Training 4.3 : Histology of midgut/midgut derivatives.

Teacher shall guide through the demonstration on microscopic section of different parts of gastro-intestinal tract and allot separate topic to every scholar from each activity.

1. Histology of midgut (1 hour)

View photographs and slides of sections of different parts of gastro-intestinal tract, like; duodenum, jejunum, ileum, appendix, caecum, proximal colon. View the specific feature of each section and make comparison with other sections. Identify unique features of each section. Share findings with peers through a power point presentation.

2. Presentation (1 Hr)

Discuss the histological features in context of Pittadhara Kala, Pureeshadhara Kala , Dhatu and Aashaya and associated function to present the findings. .

Practical Training 4.4 : Formation and development of midgut.**Formation and development of midgut**

Study the resource material to understand development of midgut . take the help from animation videos to prepare a presentation. Compare the modern concept of development with Ayurvedic concepts of Unduka Nirman.

Practical Training 4.5 : Histology of hindgut and its derivatives.**Histology of hindgut**

Teacher shall guide through the microscopic section of different parts of hindgut and allot separate topic to every scholar from each activity. View photographs of sections and slides of the sections of different parts of hindgut, like; distal colon, rectum and anal canal. View the specific feature of each section and make comparison with other sections. identify unique features of each section. Share findings with peers through a power point presentation.

Practical Training 4.6 : Histological structure of body cavities.**Histological structure of body cavities**

Teacher shall allot one topic to every scholar from each of the activity and guide through by demonstrating cardinal features of body cavities.Scholar shall view slides of the sections of pericardium, pleura and peritoneum procured from data resources. Scholar shall also identify the cardinal feature of each slide and attempt to differentiate different sections.

Practical Training 4.7 : Formation and development of body cavities.**Formation and development of body cavities**

Scholar shall consult literature to find pictures related to sequence of development of three body cavities. Scholar shall also view video animation to prepare a presentation

for peers. Teacher will show animated development timeline.

Experiential learning Activity

Experiential-Learning 4.1 : Histological changes in diseases of oral cavity, foregut with their clinical consequences.

Teacher shall assign separate topic to every scholar on each of the activity.

1. Structural changes in histology of oral cavity, gums, tongue and salivary glands(2 hours)

Scholar should take up histopathological study from data sources and directly observe the patient if possible in the OPD of the hospital. observations can be presented for discussion. Relate diseases with respect to Tridosha theory of Ayurved and its influence on cellular architecture in various parts of gut as explained in Ayurveda

2. Histological changes observed in diseases related to foregut (2 hours)

Scholar shall take up a case related to histopathology of oesophagus, stomach, duodenum, pancreas, liver and biliary apparatus from data resources or from OPD of the hospital and present the case for group discussion.

3. Congenital anomalies of oral cavity and foregut (2 hours)

Scholar should prepare a presentation with the help of video clips, real life scenario 'if available' and specific cases available in OPD and IPD. Findings should be presented in the form of power point presentation. Try to relate diseases with respect to Tridosha theory of Ayurveda.

Experiential-Learning 4.2 : Histological changes in diseases and developmental Anomalies of midgut of gastrointestinal tract.

Teacher shall allot separate topic to every scholar for each activity.

1. Histological changes in diseases of midgut of gastrointestinal Tract (2 hours)

Scholar shall view histopathological slides of atleast one assigned disease related to any of the diseases of midgut of gastrointestinal tract, like; duodenum, jejunum, ileum, appendix, caecum and proximal colon. Histopathological slides can be obtained from data resources or from histopathology lab of the hospital. Scholar should identify the cardinal features of the disorder and should attempt to find the causes of disease.

2. Interrelate changes (1hr)

Interrelate changes that occur in lining epithelium of midgut with Pittadhara Kala and impairment in Annavaha/ Pureeshavaha Srotas / pathohistological changes damaging normal cellular architecture and disrupting its function

3. Developmental Anomalies of midgut of gastrointestinal tract (2 hours)

Identify developmental anomalies related to midgut of the GIT with the help of clinical video presentation and simulated case base learning. Scholar should keep an eye to identify a patient from OPD of the hospital. Scholar shall isolate the causes behind the anomalies.

Experiential-Learning 4.3 : Histological changes in diseases of hindgut of gastrointestinal Tract.

Histological changes in diseases of hindgut of gastrointestinal Tract Teacher shall allot separate topic to every scholar for each activity. Scholar shall view histopathological slides of atleast one assigned disease related to any of the diseases of hindgut of gastrointestinal tract, like; distal colon, rectum and anal canal. Histopathological slides can be obtained from data resources or from histopathology lab of the hospital. Scholar should identify the cardinal features of the disorder and should attempt to find the causes of disease.	
Experiential-Learning 4.4 : Developmental Anomalies of hindgut of gastrointestinal tract.	
Developmental Anomalies of hindgut of gastrointestinal tract Identification of Developmental Anomalies related to hindgut with the help of clinical video presentation and simulated case base learning. Scholar should keep an eye to identify a patient from OPD of the hospital. Scholar shall attempt to isolate the causes behind the anomalies and give his reflection.	
Experiential-Learning 4.5 : Histopathological structure of membranes related to body cavities/Vishesha Kala.	
Teacher shall allot one topic to every scholar from each of the activity and guide through by demonstrating cardinal features of body cavities. Histopathology structure of body cavities- scholar shall study slides of the sections of diseases related to pericardium, pleura and peritoneum by searching through data resource. scholar shall also identify the cardinal features of each slide and attempt to link them with related diseases. scholar shall also try to identify causes of pathology and present the observations for group discussion. Discuss the same with diseases as per Ayurveda like Jalodara, Yakruthodara etc, Critically analyze and conclude with reflection/presentation/publication.	
Experiential-Learning 4.6 : Developmental anomalies of body cavities.	
Developmental anomalies of body cavities Scholar shall consult literature to find pictures related to developmental anomalies related to three major body cavities. scholar shall attempt to link the anomalies with clinical cases and present the finding in the form of case study if possible. (3 hours)	
Modular Assessment	
Assessment method	Hour
Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1.DOAP (Demonstration Observation Assistance Performance)(25Mark) DOAP assessment can be performed in Dissection Hall / Histology Lab / Skills Lab of institute. be prepared with required material for conduction of assessment as microscope, histological slides etc.	4

a. Demonstration

Teacher will introduce and visually explain structures and development using models, charts, or digital animations. (e.g. Shows histological slides for Liver foregut derivative)

b. Observation

Student will observe carefully demonstration given by faculty or video. Observation will be done carefully as per checklist for structure recognition and histological identification. Microscopic slides of Liver tissue (central vein, hepatocytes, sinusoids)

c. Assistance

- Students will work in pairs /small groups under supervision to identify liver structures (e.g. portal triad, hepatocytes)
- Teacher assists by Guiding to identify the structures under microscope

d. Performance

Final step for self-performance and assessment. Student performs independently and interprets about the histological slide.

At the end teacher will give remark

2.Creative Writing(25Mark)

In this activity, students will integrate Ayurvedic concepts of Amashya, Agnyashya, Pittashya and yakrit, Aantra and Unduka, Guda. The evaluation criteria will focus on five key aspects: anatomical accuracy of the Ayurvedic organs, appropriate integration of Ayurvedic principles of development of organs with contemporary sciences, use of classical references from Samhita and commentaries, Critical review of literature and final conclusion.

or

Any practical in converted form can be taken for assessment.(25Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)

Semester No : 6

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical training /experiential learning) session, the students should be able to)	3C Notional learning	3D Lecture/ Practical	3E Domain/ Sub	3F Level (D oes/Sho	3G Teachin g
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		Hours	Training/ Experientia l Learning	Domain	ws how/ Knows h ow/Kno w)	Learnin g Methods
Module 5 : Histology and Embryology of Urogenital System						
Module Learning Objectives (At the end of the module, the students should be able to)						
Compare development and formation of Mutravaha, Shukravaha and Aartavavaha srotas in purview of modern histology and embryology.						
M 5 Unit 1 Mutravaha Srotas and formation and development of Urinary system 5.1.1. Histology, formation, development and developmental anamolies of Urinary system. 5.1.2. Description of Mutravaha Srotas. References: 1,2,3,4,5,6,7,43,44,45,46						
3A	3B	3C	3D	3E	3F	3G
CO8	Compare histology of structures related to urinary system in contemporary science and relate them with corresponding Ayurvedic concepts of Basti and Mutravaha Srotas.	2	Lecture	CAN	Knows-how	L&GD,L
CO8	Demonstrate histology of kidneys, ureters, urethra and urinary bladder and microscopic structure of nephron.	4	Practical Training 5.1	CAP	Knows-how	D
CO8	Evaluate disease and congenital anomalies related to urinary system and correlate them with histopathology of related structures.	10	Experiential-Learning 5.1	CE	Does	CBL
CO2	Analyze the formation and fate of nephrogenic cords in relation to development of	2	Lecture	CAN	Knows-	L

	kidneys and urinary tract.				how	
CO2	Demonstrate the Development of kidneys, ureters, urinary bladder and urethra.	4	Practical Training 5.2	CAP	Knows-how	DIS,D
M 5 Unit 2 Shukravaha Srotas and formation and development of male reproductive system 5.2.1. Histology, formation, development and developmental anomalies of male reproductive system. 5.2.2. Description of Shukravaha Srotas. References: 1,2,3,4,5,6,7,43,44,45,46						
3A	3B	3C	3D	3E	3F	3G
CO2	Analyze microstructure of the male genital tract and related organs.	3	Lecture	CAN	Knows-how	DIS,L
CO8	Demonstrate the micro-structure of testes, spermatic cords, seminal vesicles and prostate glands.	5	Practical Training 5.3	CE	Knows-how	D
CO8	Estimate the structural changes in the tissues of male reproductive tract in different disease conditions.	7	Experiential-Learning 5.2	CS	Does	D-M,D
CO2	Analyze formation and development of male reproductive tract and organs and relate them with development of Shukravah Srotas.	2	Lecture	CAN	Knows-how	DIS,L
CO2	Demonstrate the formation and development of male reproductive system and relate them with development of structures related to Shukravaha Srotas.	4	Practical Training 5.4	CAP	Knows-how	D
CO2	Evaluate the developmental anomalies related to testis, spermatic cord, seminal vesicles and prostate gland.	7	Experiential-Learning 5.3	CE	Does	BL
M 5 Unit 3 Aartvavaha Srotas and formation and development of female reproductive system 5.3.1. Histology, formation, development and developmental anomalies of female reproductive system. 5.3.2. Description of Aartvavaha Srotas.						

References: 1,2,3,4,5,6,7,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
CO8	Analyze microstructure of the female genital tract and related organs.	2	Lecture	CAN	Knows-how	L,DIS
CO8	Demonstrate the micro-structure of ovaries, fallopian tubes, uterus and vagina.	5	Practical Training 5.5	PSY-MEC	Shows-how	DL
CO8	Evaluate structural changes in the tissues of female reproductive tract in different disease conditions; and evaluate the developmental anomalies related to ovaries, fallopian tubes, uterus and vagina.	10	Experiential-Learning 5.4	CE	Does	C_L,D,C BL
CO2	Analyze formation and development of female reproductive tract and organs and relate them with developmnet of Aartvavaha Srotas.	2	Lecture	CAN	Knows-how	L&GD
CO2	Demonstrate the formation and development of female reproductive system and relate them with development of structures related to Shukravaha Srotas.	5	Practical Training 5.6	CAP	Knows-how	D

M 5 Unit 4 Koshthanga and Pratyanga of Srotas5.4.1. Description of various Koshthanga and Pratyanga related to Mutravaha, Shukravaha and Aartvavaha Srotas.

References: 1,2,3,4,5,6,7,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
CO2	Analyze and compare development of mesonephric duct and paramesonephric duct, penis, vagina and scrotal sacs and labia majora.	2	Lecture	CAN	Knows-how	L&PPT ,C_L
CO2	Demonstrate comparative account of development of mesonephric duct and paramesonephric duct, penis and vagina, scrotal sacs and labia majora.	3	Practical Training 5.7	CE	Knows-how	D
CO2	Evaluate the developmental anamolies of mesonephric duct and paramesonephric duct, penis and vagina scrotal sacs and labia majora.	5	Experiential-Learning 5.5	CE	Knows-how	CBL,D-M

Practical Training Activity

Practical Training 5.1 : Histology of structures of urinary system.

Histology of structures of urinary system

Teacher shall demonstrate key features of the microstructure of structures related to the urinary system and guide them through the observation of slides related to urinary system. Scholar shall attempt to see micro-structure of kidneys, ureters, urethra and urinary bladder and microscopic structure of nephron. Scholar shall explore the data resources and identify sections of different parts of urinary tract to understand normal micro anatomy. Scholar shall identify the cardinal features and prepare a presentation on the allotted topic.

Practical Training 5.2 : Formation and development of urinary system.

Formation and development of urinary system.

Scholar shall collect the images related to chronological development of the kidneys, ureters, urethra and urinary bladder of urinary system and animation videos of the same from data resources. Scholar shall prepare small presentation for group discussion.

Practical Training 5.3 : Histology of male reproductive system.

Teacher shall demonstrate the key features related to the structures of male reproductive system on sections prepared in the form of slides and guide the scholar through observation.

1. Histology of male reproductive system

Scholar shall explore the data resources to view and identify the slides related to micro-structure of testes, spermatic cords, seminal vesicles and prostate glands. Scholar should view the slides and identify the key features. Scholar should also compare the features of different slides. Scholar shall prepare a presentation for the class.

Practical Training 5.4 : Formation and development of male reproductive system.

Formation and development of male reproductive system.

scholar shall consult animation video and images of development of male genital system from the data resources and attempt to relate it with development of similar structures mentioned in Ayurvedic text. student shall conclude the findings.

Practical Training 5.5 : Histology of female reproductive system.

Histology of female reproductive system

Teacher shall demonstrate the key features related to the structures of female reproductive system on sections prepared in the form of slides and guide the scholar through observation. Scholar shall explore the data resources to view and identify the slides related to micro-structure of ovaries, fallopian tubes, uterus and vagina. Scholar should

view the slides and identify the key features. Scholar should also compare the features of different slides. Scholar shall prepare a presentation for the class.

Practical Training 5.6 : Formation and development of female reproductive system.

Formation and development of female reproductive system (5 hours)

Scholar shall consult animation video and images of development of female genital system from the data resources and attempt to relate it with development of similar structures mentioned in Ayurvedic text and prepare a power point presentation on it.

Practical Training 5.7 : Development of mesonephric duct and paramesonephric duct, penis and vagina, scrotal sacs and labia majora.

Teacher shall demonstrate the key features of comparative study and allot a separate topic for the activity to every scholar.

1. Development of mesonephric duct and paramesonephric duct (1hour)

Scholar shall consult data resources for animation videos of the development of mesonephric and paramesonephric ducts. Scholar shall differentiate the pattern of development in respective sexes. Scholar shall observe and present the comparative findings in the form of presentation.

2. Development of penis and vagina (1hour)

Scholar shall consult data resources for animation videos of the development of penis and vagina. Scholar shall differentiate the pattern of development in respective sexes. Scholar shall observe and present the comparative findings in the form of presentation.

3. Development of scrotal sacs and labia majora (1hour)

Scholar shall consult data resources for animation videos of the development of scrotal sac and labia majora. Scholar shall differentiate the pattern of development in respective sexes. Scholar shall observe and present the comparative findings in the form of presentation.

Experiential learning Activity

Experiential-Learning 5.1 : Histopathology structures and developmental anomalies related to urinary system.

Teacher shall allot one separate topic to every scholar from each of the activity.

1. Histopathology of structures related to urinary system (5 hours)

Scholar shall explore the diseases related to the urinary system and should attempt to identify histopathological changes with the help of literature in the form of section of structures related to urinary system at the site of pathology. Scholar shall take the help of prepared slides from the data resources to understand the histopathology. Scholar shall present the observations in the form of case study. Scholar should attempt to co-relate the histopathology and consequent clinical implication with diseases and diagnostic techniques mentioned in Ayurveda.

2. Developmental anomalies of urinary system (5 hours)

Scholar shall view videos and animations related to developmental anomalies of kidneys, ureter, urinary bladder and urethra. Scholar shall consult scholarly articles and cases by searching on the internet and identify the causes behind those anomalies and their clinical consequences. Scholar shall prepare a case study and present /publish .

Experiential-Learning 5.2 : Histopathology of the male reproductive system.

Teacher shall allot one separate topic to every scholar from each of the activity.

1. Histopathology of the male reproductive system

Scholar shall explore the diseases related to the male reproductive system and should identify histopathological changes with the help of literature in the form of section of structures related to male reproductive system at the site of pathology. Scholar shall take the help of prepared slides from the data resources to understand the histopathology. Scholar shall present the observations in the form of case study. Scholar should co-relate the histopathology and consequent clinical implication with diseases and diagnostic techniques mentioned in Ayurveda and give their reflection.

Experiential-Learning 5.3 : Developmental anomalies related to male reproductive system.

Developmental anomalies related to male reproductive system (7 hours)

Scholar shall consult video and animations related to developmental anomalies of testis, spermatic cord, seminal vesicles and prostate gland. Scholar shall consult scholarly articles and case by searching on the internet and attempt to identify the causes behind those anomalies and their clinical consequences. Scholar shall prepare a case study and present /publish it .

Experiential-Learning 5.4 : Histopathology and Developmental anomalies related to female reproductive system.

Teacher shall allot one separate topic to every scholar from each of the activity.

1. Histopathology of the female reproductive system (5 hours)

Scholar shall explore the diseases related to the female reproductive system and should identify histopathological changes with the help of literature in the form of section of structures related to female reproductive system at the site of pathology. Scholar shall take the help of prepared slides from the data resources to understand the histopathology. Scholar shall present the observations in the form of case study. Scholar should co-relate the histopathology and consequent clinical implication with diseases and diagnostic techniques mentioned in Ayurveda.

2. Developmental anomalies related to female reproductive system(5 hours)

Scholar shall view videos and animations related to developmental anomalies of ovaries, fallopian tubes, uterus and vagina. Scholar shall consult scholarly articles and cases by searching on the internet and identify the causes behind those anomalies and their clinical consequences. Scholar shall prepare a case study and present it in the class.

Experiential-Learning 5.5 : Developmental anomalies of mesonephric and paramesonephric duct, penis and vagina, scrotal sacs and labia majora.

Teacher shall allot separate topic for each activity to every scholar.

1. Developmental anomalies of mesonephric duct and paramesonephric duct (3 hours)

Scholar shall consult data resources to identify the cases related to developmental anomalies of mesonephric and paramesonephric ducts. A case study should be prepared to highlight clinical consequences. Observation should be presented in the class for discussion.

2. Developmental anomalies of penis and vagina(1 hours)

Scholar shall consult data resources to identify the cases related to developmental anomalies of penis and vagina. A case study should be prepared to highlight clinical consequences. Observation should be presented in the class for discussion.

3. Developmental anomalies of scrotal sacs and labia majora (1 hours)

Scholar shall consult data resources to identify the cases related to developmental anomalies of scrotal sac and labia majora. A case study should be prepared to highlight clinical consequences. Observation should be presented in the class for discussion.

Modular Assessment

Assessment method

Hour

Instructions—Conduct a structured modular assessment. The assessment will be for 75 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C.

1.DOAP(Demonstration Observation Assistance Performance) (25Mark)

a. Demonstration

Teacher will introduce and visually explain histological structure of the kidney using models, charts, or digital slides,Focus on key structures: renal corpuscle (Bowman's capsule, glomerulus), proximal and distal convoluted tubules, collecting ducts, and medullary rays.Explains functional significance of each component during urine formation.

b.Observation

Students will observe the demonstration attentively given by teacher.

They follow a checklist to identify microscopic structures as Glomerulus and Bowman's capsule,Proximal convoluted tubule (PCT),Distal convoluted tubule (DCT),Loop of Henle,Collecting duct,Renal blood vessels

c.Assistance

Students work in pairs/small groups under teacher supervision.Practice identifying structures like Renal corpuscle,Lumen differences in PCT vs DCT,Collecting ducts in medullaTeacher provides guidance and corrects misunderstandings while viewing through microscope.

d.Performance

Each student independentlyIdentifies all major structures on histological slide of the kidneyInterprets and labels the features.

Faculty will assess using a rubric and provides feedback/remarks.

2.Case Based Assessment (25Mark)

Teacher will assign case scenario related to the topic developmental anomalies and give the task to students in form of questions. For example case scenario given developmental anomalies of female reproductive system.

Case Scenario

A new born female baby is brought to the paediatric OPD with absence of the vaginal opening, a small palpable mass in the lower abdomen, and urinary

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dribbling. Antenatal scans at 20 weeks had shown a single umbilical artery and mild oligohydramnios. An ultrasound now reveals hydrocolpos and imperforate hymen.

Student Tasks

- List all embryonic structures that contribute to the formation of the female reproductive system.
- Describe the normal development of the vagina and uterus from the 5th to 20th week of gestation.

What developmental anomaly explains the absence of vaginal opening in this case?

- Why is there fluid accumulation behind the hymen in this neonate? What could be the long-term risks if not treated?
- Draw a labelled diagram showing development of female reproductive structures (Mullerian duct derivatives).

3.Creative writing(25 marks)

Student will review critically the literature available regarding genital organ (e.g. Yoni, Garbhashaya, dimb etc) and write down the summary or

Any practical in converted form can be taken for assessment.(40Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (35Mark)

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical training /experiential learning) session, the students should be able to)	3C Notional learning Hours	3D Lecture/ Practical Training/ Experientia l Learning	3E Domain/ Sub Domain	3F Level (D oes/Sho ws how/ Knows h ow/Kno w)	3G Teachin g Learnin g Methods
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Module 6 : Histology and Embryology of Nervous System, Sense organs and Endocrine glands

Module Learning Objectives

(At the end of the module, the students should be able to)

Describe Majja vaha srotas alongwith nervous system .

Describe histology and development of sense organs and endocrine glands in association with nervous system.

M 6 Unit 1 Majjavaha Srotas; development of neural tube and neural crest6.1.1. Formation and development of neural tube and neural crest and their derivatives.

6.1.2. Description of Majjavaha Srotas.

References: 1,2,3,4,5,6,7,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
CO8	Analyze micro-structure of different types of neurons and neuroglia.	1	Lecture	CAN	Knows-how	L&GD
CO8	Demonstrate microscopic structure of neuron and neuroglial cells.	3	Practical Training 6.1	CAP	Knows-how	PER,DIS
CO8	Evaluate changes in microscopic structure of neuron and neuroglial cells through histopathological studies.	4	Experiential-Learning 6.1	CE	Does	CBL,D
CO2	Analyze formation and development of neuron and neuroglial cells and formation of Majjavahi Srotas.	1	Lecture	CAN	Knows-how	L&PPT
CO2	Demonstrate the Organs/ structures developed from Neural tube and Neural crest cells.	3	Practical Training 6.2	CAP	Knows-how	D
CO2	Evaluate developmental anamolies of neural tube and neural crest cells.	4	Experiential-Learning 6.2	CE	Knows-how	CBL,IBL

M 6 Unit 2 Histology and embryology of forebrain and midbrain6.2.1. Histology, formation, development and developmental anamolies of forebrain and midbrain.

References: 1,2,3,4,5,6,7,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
CO8	Evaluate the changes in the micro-structure of the parts of forebrain and midbrain in neurodegenerative disorders of forebrain and midbrain.	3	Experiential-Learning 6.3	PSY-MEC	Shows-how	CBL
CO8	Analyze the histological structure of forebrain and midbrain.	1	Lecture	CAN	Knows-how	L&GD
CO8	Demonstrate the micro-structure of the parts of forebrain and midbrain.	3	Practical Training 6.3	CAP	Knows-how	PL,DIS,PER
CO2	Analyze the formation and development of forebrain and midbrain.	1	Lecture	CAN	Knows-how	L
CO2	Demonstrate the formation and development of different parts of forebrain and midbrain.	3	Practical Training 6.4	CAP	Knows-how	DL,PER
CO2	Evaluate developmental anomalies of different parts of forebrain and midbrain.	3	Experiential-Learning 6.4	CE	Does	CBL

M 6 Unit 3 Histology and embryology of hind brain and spinal cord6.3.1. Histology, formation, development and developmental anomalies of Hindbrain and spinal cord.

References: 1,2,3,4,5,6,7,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
CO8	Analyze the histological structure of hindbrain and spinal cord.	1	Lecture	CAN	Know	L&GD
CO8	Demonstrate the micro-structure of the parts of hindbrain and spinal cord.	2	Practical Training 6.5	CAP	Knows-how	DIS,D
CO8	Evaluate the changes in the micro-structure and developmental anomalies of different	6	Experiential-	CE	Does	PSM,CB

	parts of hindbrain and spinal cord in neurodegenerative disorders .		Learning 6.5			L
CO8	Analyze the formation and development of hindbrain and spinal cord.	1	Lecture	CAN	Knows-how	
CO2	Demonstrate the formation and development of different parts of hindbrain and spinal cord.	2	Practical Training 6.6	PSY-MEC	Shows-how	DL

M 6 Unit 4 Histology and embryology of sense organs and endocrine glands; Gyanendriya Nirman6.4.1. Histology, formation, development and developmental anomalies of sense organs
6.4.2. Histology, formation, development and developmental anomalies of endocrine glands

References: 1,2,3,4,5,6,7,43,44,45,46

3A	3B	3C	3D	3E	3F	3G
CO8	Analyze microstructure of sense organs (eye, ear, nose, tongue) and different endocrine glands (pituitary, thyroid, parathyroid, thymus and adrenal)	3	Lecture	CAN	Knows-how	L&GD
CO8	Demonstrate the micro-structure of the parts of sense organs (eye, ear, nose, tongue), different endocrine glands (pituitary, thyroid, parathyroid, thymus and adrenal).	1	Practical Training 6.7	CAP	Knows-how	D
CO8	Evaluate the changes in the micro-structure of the parts of sense organs (eye, ear, nose, tongue) and endocrine glands (pituitary, thyroid, parathyroid, thymus and adrenal).	3	Experiential-Learning 6.6	CE	Knows-how	CBL
CO2	Analyse Formation, Development and developmental anomalies of Sense organs (Panchgyanendriya) and Endocrine glands	1	Lecture	CAN	Knows-how	L,L&PPT
CO2	Demonstrate Formation, Development and developmental anomalies of Sense organs and Endocrine gland	2	Practical Training 6.8	CAN	Knows-how	D-M,BL
CO2	Evaluate developmental anomalies of Sense organs and developmental anomalies of Endocrine glands	3	Experiential-Learning 6.7	CE	Does	CBL
CO2	Demonstrate the formation and development of sense organs (eye, ear, nose, tongue) and	1	Practical	CAP	Knows-	PER,D

	different endocrine glands (pituitary, thyroid, parathyroid, thymus and adrenal).		Training 6.9		how	
Practical Training Activity						
Practical Training 6.1 : Histology of neurons and neuroglial cells.						
Teacher shall demonstrate the key features of neuron and neuroglial cells to scholars and guide them through the activities. 1. Histology of neurons and neuroglial cells scholar shall consult the slides on the structure of neuron and neuroglial cells from data sources and prepared slides and attempt to identify the key features of types of neurons and neuroglial cells. scholar shall be able to differentiate between different kinds of neurons and cardinal features of differentiation from other cells. Scholar shall present the findings for group discussion.						
Practical Training 6.2 : Formation and development of Neural tube and Neural crest cells.						
Formation and development of Neural tube and Neural crest cells - Scholar shall consult the animation video to understand the sequential development of neural tube and neural crest cells and their further fate. scholar should attempt to understand development in terms of neurological development.						
Practical Training 6.3 : Histology of forebrain and midbrain.						
Teacher shall demonstrate the key features of cells of the forebrain and midbrain and guide the scholar through practical activity. 1. Histology of forebrain and midbrain Scholar should collect slides of the sections related to the micro-structure of parts of cerebral hemisphere, diencephalon and brain stem. scholar should identify the key features of each part of the forebrain or midbrain. Scholar should be able to relate the cells with specific functions. scholar shall present the findings for group discussion in the class room.						
Practical Training 6.4 : Formation and development of forebrain and midbrain.						
Formation and development of forebrain and midbrain -						

Student shall use the animation video or other data resources to understand the sequential development of forebrain and midbrain. scholar shall prepare a power point presentation to present in the class.

Practical Training 6.5 : Histology of hindbrain and spinal cord.

Teacher shall demonstrate the key features of cells of the hind brain and spinal cord and guide the scholar through practical activity.

1. Histology of hindbrain and spinal cord -

Scholar should identify the sections related to the micro-structure of parts of cerebellum, pons, medulla and different levels of spinal cord. scholar should identify the key features of each part of the hindbrain and spinal cord. Scholar should be able to relate the cells with specific functions. scholar shall present the findings for group discussion in the class room.

Practical Training 6.6 : Formation and development of hindbrain and spinal cord.

Formation and development of hindbrain and spinal cord - Student shall use the animation video or other data resources to understand the sequential development of midbrain and spinal cord. scholar shall prepare a power point presentation to present in the class. (2 hours)

Practical Training 6.7 : Histology of sense organs (eye, ear, nose, tongue) and endocrine glands (pituitary, thyroid, parathyroid, thymus and adrenal)

Teacher shall demonstrate the key features of cells of the sense organs and endocrine glands and guide the scholar through practical activity.

1. Histology of sense organs - Scholar should identify the sections related to the micro-structure of parts of eye, ear, nose, tongue. scholar should identify the key features of each part of the respective sense organs. Scholar should be able to relate the cells with specific functions. scholar shall present the findings for group discussion in the class room.

2. Histology of endocrine glands - Scholar should identify the sections related to the micro-structure of pituitary, thyroid, parathyroid, thymus and adrenal glands. scholar should identify the key features of each part of the respective endocrine glands. Scholar should be able to relate the cells with specific functions. scholar shall present the findings for group discussion in the class room.

Practical Training 6.8 : Demonstration of Formation, Development and developmental anomalies of Sense organs and Endocrine gland

Demonstration of Formation, Development and developmental anomalies of Sense organs and Endocrine glands with help of 3D models, histology slides and virtual app.

Practical Training 6.9 : Formation and development of sense organs and endocrine glands

1. Formation and development of sense organs - Student shall use the animation video or other data resources to understand the sequential development of eye, ear, nose,

tongue. scholar shall prepare a power point presentation to present in the class.

2. Formation and development of different endocrine glands- Student shall use the animation video or other data resources to understand the sequential development of pituitary, thyroid, parathyroid, thymus and adrenal. scholar shall prepare a power point presentation to present in the class.

Experiential learning Activity

Experiential-Learning 6.1 : Histopathology of neurons and neuroglial cells.

Teacher shall allot a separate topic to every scholar on each topic.

Histopathology of neurons and neuroglial cells -

scholar shall consult the slides on the diseases of neurodegenerative disorders and identify the change in structure of relevant cells. scholar should attempt to identify the causes behind the neurodegenerative changes in perspective of ayurveda also, Scholar shall reflect about the finding.

Experiential-Learning 6.2 : Developmental anomalies of neural tube and neural crest cells.

Formation and development of Neural tube and Neural crest cells -

Scholar should identify the cases of neural tube defects and evaluate the consequences of mal-development. Scholar shall prepare a case study and present it in the class.

Experiential-Learning 6.3 : Histopathology of forebrain and midbrain.

Teacher shall allot a separate topic to every scholar on each topic.

1. Histopathology of forebrain and midbrains - scholar shall consult the slides on the diseases of neurodegenerative disorders like Alzheimer disease, parkinson's disease, tumours etc and identify the change in structure of relevant cells. scholar should attempt to identify the causes behind the neurodegenerative changes. Scholar shall present the findings in the class in the form of power point presentation. (3 hours)

Experiential-Learning 6.4 : Developmental anomalies of forebrain and midbrain.

Developmental anomalies of forebrain and midbrain -

Scholar should identify the cases of developmental anomalies of forebrain and midbrain like holoprosencephaly, agenesis of corpus callosum etc and evaluate the

consequences of mal-development. Scholar shall prepare a case study and present /publish it .

Experiential-Learning 6.5 : Histopathology and developmental anomalies of hindbrain and spinal cord.

Teacher shall allot a separate topic to every scholar on each topic.

1. Histopathology of hindbrain and spinal cord- scholar shall consult the slides on the diseases of neurodegenerative disorders like cranial nerve deficits, multiple sclerosis etc and identify the change in structure of relevant cells. scholar should attempt to identify the causes behind the neurodegenerative changes. Scholar shall present the findings in the class in the form of power point presentation. (3 hours)
2. Developmental anomalies of hindbrain and spinal cord - Scholar should identify the cases of developmental anomalies of hindbrain and spinal cord like pontocerebellar hypoplasia, dandy-walker malformation etc and evaluate the consequences of mal-development. Scholar shall prepare a case study and present/publish it . (3 hours)

Experiential-Learning 6.6 : Histopathology of sense organs (eye, ear, nose, tongue) and endocrine glands (pituitary, thyroid, parathyroid, thymus and adrenal)

Teacher shall allot a separate topic to every scholar on each topic.

1. Histopathology of sense organs - scholar shall consult the slides on the diseases of degenerative disorders like otosclerosis, meniere's disease, glaucoma, cataract, oral lichen planus, geographic tongue, rhinitis etc and identify the change in structure of relevant cells. scholar should attempt to identify the causes behind the degenerative changes. Scholar shall present the findings in the class in the form of power point presentation. (1 hours)
2. Histopathology of endocrine glands - scholar shall consult the slides on the diseases of neurodegenerative disorders like pituitary adenomas, craniopharyngiomas, goiter, thyroiditis, parathyroid adenoma, thymomas, addison's disease, cushing syndrome etc and identify the change in structure of relevant cells. scholar should attempt to identify the causes behind the degenerative changes. Scholar shall present the findings in the class in the form of power point presentation. (1 hours)

Experiential-Learning 6.7 : Evaluation of developmental anomalies of Sense organs and developmental anomalies of Endocrine glands

Evaluation of developmental anomalies of Sense organs and developmental anomalies of Endocrine glands with the help of case base discussion, audio visual animation.

Modular Assessment

Assessment method	Hour
Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1. Histology Slide Practical Assessment (25 Mark) Label and identify features in microscopic slides of 1. Retina (rods/cones) 2. Cochlea (organ of Corti)	4

3.Taste bud 4.Olfactory mucosa 5.Skin cells 2.Presentation (25Mark) The student will prepare the power point presentation and present on the topics any one of these of Nervous System/Sense Organs/and Endocrine Glands.Teacher will assess the presentation on the basis of content depth, integrating Ayurvedic concepts like <i>MajjawahSrotas</i> with modern anatomical understanding with clear transitions and effective use of audio visual aids. Clinical and embryological correlations are relevant and well explained. Time is managed well, and the student engages effectively during the question answer session. At last teacher will give the overall feedback . or Any practical in converted form can be taken for assessment.(25Mark) and Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)	
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3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical training /experiential learning) session, the students should be able to)	3C Notional learning Hours	3D Lecture/ Practical Training/ Experientia l Learning	3E Domain/ Sub Domain	3F Level (D oes/Sho ws how/ Knows h ow/Kno w)	3G Teachin g Learnin g Methods
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Module 7 : Anuvanshiki and Paranuvanshiki- Genetics and epigenetics

Module Learning Objectives (At the end of the module, the students should be able to) Compare fundamentals of Anuvanshiki and Paranuvanshiki in purview of modern knowledge of genetics.
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M 7 Unit 1 Beej, Beejbhag and Beejbhagavyava 7.1.1. Concept of Beej, Beejbhag and Beejbhagavayaya 7.1.2. Human Chromosomes, DNA, Gene and Genetic inheritance References: 8,9,10,47,48,50						
3A	3B	3C	3D	3E	3F	3G
CO2	Analyze and interpret the concept of Beeja in Ayurveda with the concept of human chromosomes in modern sciences.	1	Lecture	CAN	Knows-how	LS,DIS,L &GD
CO2	Analyze and interprete the diseases related to the deformity in Beeja with disorders related to chromosomes.	4	Practical Training 7.1	CE	Knows-how	LS,Mnt,C BL
CO2	Evaluate the significance and causes of the diseases due to Beeja-dosha.	4	Experiential-Learning 7.1	CE	Does	CBL,JC
M 7 Unit 2 Garbha Vikara and Anuvanshiki Paramarsh 7.2.1. Garbhaj Vikara - teratology. 7.2.2. Anuvanshiki Paramarsh - Genetic counselling References: 8,9,10,47,48,50,51						
3A	3B	3C	3D	3E	3F	3G
CO2	Analyze the Garbha Vikara mentioned in Ayurveda in context of the teratology mentioned in genetics.	1	Lecture	CAN	Knows-how	L&PPT , BL,IBL,P AL
CO2	Propose a checklist of Anuvanshiki Paramarsh for better progeny on the basis of Garbhaj Vikara mentioned in Ayurveda.	4	Practical Training 7.2	AFT-CHR	Shows-how	LS,PL,W, TBL,TUT
CO2	Evaluate the possible reasons behind the Garbhaj Vikara mentioned in Ayurveda in context of teratology; and evaluate Anuvanshiki Paramarsh in comparison to genetic counselling.	6	Experiential-Learning 7.2	AFT-CHR	Shows-how	RLE,CBL
CO2	Describe the possible use of genetic counselling in Ayurveda for better progeny	2	Lecture	CAN	Knows-	DIS,SDL

					how	
M 7 Unit 3 Epigenetics; Prakriti and Garbhakar Bhava 7.3.1. Types and principles of epigenetics. 7.3.2. Prakriti as Paranuvasnshiki model in Rachana sharir. 7.3.3. Factors affecting epigenetics and Garbhakar Bhava. References: 8,9,10,49,51						
3A	3B	3C	3D	3E	3F	3G
CO2	Analyze and interpret the principles, types and mechanism of epigenetics and important Bhava (Shadbhava) responsible for the formation of embryo.	3	Lecture	CAN	Knows-how	DIS,L,LS
CO2	Demonstrate the various Matirjadi Bhava and their role in formation of embryo in context of epigenetics.	4	Practical Training 7.3	PSY-MEC	Shows-how	CBL,ML
CO1,CO2	Evaluate Prakriti as a sum of physical, physiological, and psychological traits. Evaluate influence of environmental factors on these traits and identify pattern of changes to assess deviation from original Prakriti.	6	Experiential-Learning 7.3	CE	Does	CBL,BS, DIS,JC
M 7 Unit 4 Mechanism of epigenetics and Paranuvasnshiki Paramarsh 7.4.1. Mechanism of epigenetics and principle of Purusho-ayam loksamhitah. 7.4.2. Cancer and epigenetics. 7.4.3. Paranuvasnshiki Paramarsh (epigenetic counselling) References: 8,9,10						
3A	3B	3C	3D	3E	3F	3G
CO1,CO2	Analyze and interpret the principle of 'Purusho-ayam Loka sanmita'.	1	Lecture	CAN	Knows-how	LS,PER,P BL,L&G D
CO1,CO2	Identify the objects / Bhava present in ecosystem to study their integrative effect on the body.	4	Practical Training 7.4	AFT-SET	Does	DIS,C_L, D-M,BS

CO1,CO2	Relate the Bhavas present in the surrounding with Bhavas present inside the body.	5	Experiential-Learning 7.4	PSY-ADT	Does	Mnt,PBL,BS,RLE
CO1,CO2	Analyze the excessive uncontrolled growth of cells in a tissue and relate to Atiyoga of Ahara and Vihara.	2	Lecture	CAN	Knows-how	L&GD
CO1,CO2	Demonstrate the Atiyoga and its potential in bringing epigenetic changes.	4	Practical Training 7.5	AFT-VAL	Does	RLE,CBL
CO1	Evaluate the role of Atiyoga of Ahar and Vihar in causation of diseases.	5	Experiential-Learning 7.5	CE	Does	PrBL,PL

Practical Training Activity

Practical Training 7.1 : Demonstration of features of the diseases related to Beeja and chromosomes.

Features of the diseases related to Beeja and chromosomes -

Scholar will Critically review the Ayurvedic literature and identify the mention of 'beeja' and also explore literature for disorders related to chromosomes in contemporary sciences. Scholar will compare their features and prepare a review article.

Practical Training 7.2 : Checklist of Garbhaj Vikara mentioned in Ayurveda and genetic counselling.

Garbhaj Vikara mentioned in Ayurveda and genetic counselling -

1. Critically search the literature and identify all Garbhaj Vikara and their aetiological factors mentioned in Ayurveda. Prepare check list of advices mentioned for better progeny.(2hour)
2. Explore the literature from modern genetics and identify the teratological disorders. Prepare a list of advice from modern literature for better progeny. Apply Ayurvedic checklist alongside modern checklist for genetic counselling to develop a SOP.(2hour)

Practical Training 7.3 : Matrijadi Bhavas and epigenetic principles.

Matrijadi Bhavas and epigenetic principles.

Explore literature to identify the traits and organs formed by Matrijadi Bhavas. Carefully study normal function of these organs. Study the effect of environment and behaviour of individual on regulation of functions of these organs. Deduce the impact of habits of individual and environmental factors on the Matrija Bhava in

individuals. Link bodily traits and behavioural traits in context of description of Matrijadi Bhavas.

Practical Training 7.4 : Objects/ Bhava present in the ecosystem.

Objects/ Bhava present in the ecosystem.

Prepare a list of flora, fauna and other material components of environment present in a selected ecosystem. Assign them traits on the basis of their features on basis of Ayurvedic principles. Integrate features of Bhavas of all components to identify commonalities. Describe the trait of ecosystem on the basis of common features, thereby determine the Prakriti of that ecosystem. Prepare a creative note and discuss with peers in class.

Practical Training 7.5 : Atiyoga as potential environmental factor to effect epigenetic changes.

Atiyoga as potential environmental factor to effect epigenetic changes.

Scholars will demonstrate the concept of Atiyoga (excessive use) and its role in the causation of diseases through a practical, integrated approach. They will begin by analyzing case scenarios or lifestyle patterns that represent different forms of Atiyoga—such as excessive consumption of unhealthy food, smoking, stress, and overexertion. Using these examples, scholars will identify how repeated Atiyoga can lead to Dhatu Kshaya, Agni Dushti, and Srotodushti, eventually contributing to disease development. Scholar will do pilot study through survey to reach up to conclusion. Scholar will relate the habitual Atiyoga to epigenetic markings.

Experiential learning Activity

Experiential-Learning 7.1 : Beeja Dosha and chromosomal abnormalities.

Beeja Dosha and chromosomal abnormalities -

Identify the patients related to the chromosomal disorders in the neighbourhood or OPD of the hospital. Observe the features of disease by careful examination. Compare the findings mentioned in Ayurvedic and modern literature. Deduce the signifying observations and share with peers.

Experiential-Learning 7.2 : Ayurvedic Anuvanshiki Pramars and genetic counselling.

Ayurvedic Anuvanshiki Pramars and genetic counselling -

Explore the cases of Garbhaj Vikara/ teratology in OPD set-up and report them. Identify and state similarity/dissimilarity among the reasons behind Garbhaj Vikara and teratology. Compare the outcome of genetic counselling associated Ayurvedic Paramars with genetic counselling. Prepare SOP and bring it to public domain through research.

Experiential-Learning 7.3 : Vikriti as deviation from original Prakriti.

Vikriti as deviation from original Prakriti - Scholars will assess individual Prakriti using validated questionnaires and record influencing factors such as place, time, food, and lifestyle. They will identify deviations (Vikriti) by observing physical, physiological, and psychological changes with respect to diurnal/seasonal variations. Wherever available, they will analyze biochemical profiles (e.g., Hb, glucose, lipids) to correlate lifestyle patterns with physiological alterations. This will help them understand Prakriti as a dynamic integration of body and mind, influenced by environment, and recognize how these influences lead to Vikriti through measurable changes in health indicators. Scholar will conclude the findings and publish it.	
Experiential-Learning 7.4 : Interaction between Bhavas of ecosystem and human body.	
Interaction between Bhavas of ecosystem and human body - Scholars will engage in an experiential activity to understand how Bhavas present in the external environment—such as Desha (place), Kaala (time/season), Ahara (available food), Vihara (lifestyle) etc. influence and correspond to the Bhavas within the body like Rasa, Satva, Ojas, and Dosha balance. Scholar will observe and record features of their local surroundings and map these to internal Bhava expressions. Identify corresponding Bhavas inside the body and relate Bhavas on structural, functional and psychological basis.(5hour).	
Experiential-Learning 7.5 : Potential of Atiyoga in causation of diseases.	
Potential of Atiyoga in causation of diseases. Scholars will be divided into groups (or individual) with each group selecting one disease where Atiyoga plays a major role, such as Madhumeha (due to Atiyoga of Madhura Rasa and sedentary habits), Each group will research the specific Atiyoga responsible for the allotted disease. Finally, each student will reflect/publish in writing on how Atiyoga contributes to disease causation and the importance of recognizing progression and complications early. Scholar shall relate the findings with epigenetic theory.	
Modular Assessment	
Assessment method	Hour
Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1.Essay type question(25Mark) Teacher will assess the students on the basis of essay question with respect to points depth of topics, integration with contemporary sciences, references from samhita and tika understanding of topic 2. (25Mark) Students will effectively correlate Ayurvedic concepts of Anuvanshiki and Paranuvasnshiki with modern principles of genetics, including gene inheritance,	4

mutations, and epigenetic factors. The explanation reflects a good grasp of fundamental Ayurvedic terms such as Beeja, Beejabhaga, and Beejabhagavayava, and their alignment with chromosomes, DNA and genetic expression.

or

Any practical in converted form can be taken for assessment.(25Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)

Paper No : 2 Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir						
Semester No : 3						
Module 8 : Plastination and Angarekhankan Sharir (Surface Anatomy))						
Module Learning Objectives (At the end of the module, the students should be able to) Plastinate cadaver for the academic purpose. Perform and demonstrate the Angarekhankan (surface anatomy).						
M 8 Unit 1 Plastination - history, types and techniques 8.1.1. Introduction, historical review, ethical issues and need of plastination 8.1.2. Types of plastination 8.1.3. Materials, instruments and equipment used in plastination 8.1.4. Techniques of plastination References: 11,12,13,14,15,16						
3A	3B	3C	3D	3E	3F	3G
CO1,CO6	Analyze the need of plastination of cadaver/parts by critical examination of history of cadaveric dissection and emerging ethical issues.	2	Lecture	CAN	Knows-how	L
CO1,CO6	Demonstrate and differentiate between different types of plastination (by the use of different materials).	6	Practical Training 8.1	PSY-GUD	Shows-how	DL
CO1,CO6	Evaluate use of different materials to plastinate different types of organ and use of different materials for different techniques of plastination.	6	Experiential-Learning 8.1	CE	Does	PrBL
CO1,CO6	Analyze different techniques employed for different types of plastination.	1	Lecture	CAN	Knows-	L&GD

					how	
CO1,CO6	Analyze the use of specific materials, instruments and equipment for plastination.	1	Lecture	CAN	Knows-how	L&GD,LS
M 8 Unit 2 Post-plastination procedures and plastination lab 8.2.1. Post plastination procedures. 8.2.2. Maintenance of plastinated organ and set-up of plastination lab. References: 11,12,13,14,15,16						
3A	3B	3C	3D	3E	3F	3G
CO1,CO6	Describe the post plastination procedures for durability and longevity of specimens.	2	Lecture	CC	Knows-how	L
CO1,CO6	Demonstrate post plastination procedures for setting up of a plastination lab.	4	Practical Training 8.2	PSY-MEC	Shows-how	TBL,W,DL
CO1,CO6	Evaluate use of different materials and techniques for finishing and storage of plastinated specimen.	6	Experiential-Learning 8.2	CE	Knows-how	DIS,PL
M 8 Unit 3 Angarehankan - Bahu and Vaksha 8.3.1. Angarekhankan of upper limb (Bahu). 8.3.2. Angarekhankan of thorax (Vaksha). References:						
3A	3B	3C	3D	3E	3F	3G
CO1,CO7	Analyze principles and scope of surface anatomy of Bahu (upper limb),Vaksha (thorax) for clinical and surgical procedures.	3	Lecture	CAN	Knows-how	L&GD
CO1,CO7	Demonstrate surface anatomy of Bahu (upper limb),Vaksha (thorax) on cadaver or mannequin or living body.	6	Practical Training 8.3	CAP	Shows-how	C_L,D
CO1,CO7	Evaluate role of surface anatomy in different clinical and surgical disorders of Bahu	10	Experiential-	PSY-	Shows-	D-

	(upper limb) and Vaksha (thorax).		Learning 8.3	MEC	how	BED,CB L
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M 8 Unit 4 Angarekhankan - Sakthi and Udar8.4.1. Angarekhankan of lower limb (Sakthi)

8.4.2. Angarekhankan of abdomen (Udar)

References: 11,12,13,14,15,16

3A	3B	3C	3D	3E	3F	3G
CO1,CO7	Analyze principles and scope of surface anatomy of Sakthi (lower limb) ,Udar (abdomen) for clinical and surgical procedures.	2	Lecture	CAN	Knows-how	TUT,L_V C,L&PPT
CO1,CO7	Demonstrate surface anatomy of Sakthi (lower limb), Udar (abdomen) on cadaver or mannequin or living body.	8	Practical Training 8.4	PSY-MEC	Shows-how	DL,PL,SI M
CO1,CO7	Evaluate role of surface anatomy in different clinical and surgical disorders of Sakthi (lower limb) and Udara (abdomen).	10	Experiential-Learning 8.4	CE	Does	D-BED,J C,CBL,L S

M 8 Unit 5 Angarekhankan - Urdhvajatru8.5.1. Angarekhankan of head & neck (Urdhvajatrugata)

References: 11,12,13,14,15,16

3A	3B	3C	3D	3E	3F	3G
CO1,CO7	Analyze principles and scope of surface anatomy of Shirah (head),Griva(neck) for clinical and surgical procedures.	4	Lecture	CAN	Knows-how	L&PPT ,IBL
CO1,CO7	Demonstrate surface anatomy of Shirah (head) ,Griva (neck) on cadaver or mannequin or living body.	6	Practical Training 8.5	PSY-GUD	Shows-how	D-M,SDL,D
CO1,CO7	Evaluate role of surface anatomy in different clinical and surgical disorders of Shirah (head) and Griva (neck).	7	Experiential-Learning 8.5	CE	Does	CBL

Practical Training Activity

Practical Training 8.1 : Types and techniques of plastination.

Teacher shall demonstrate key features of plastination and guide the scholars through the activity. teacher shall assign one practical from each of the activity to every student.

Types and techniques of plastination - Scholar shall use specimens from cadaveric dissection for the plastination. teacher shall allot the specimen and scholar shall perform appropriate type of plastination, like; organ plastination, sheet plastination, luminal cast plastination. Scholar should choose appropriate material, like; silicone, epoxy, polyester etc. Scholar shall perform procedures like; fixation, dehydration, forced impregnation and curing to complete the process of plastination. Scholar shall prepare an audiovisual presentation of the total procedure and present in the class.

Practical Training 8.2 : Setting a plastination lab.

Setting a plastination lab - Teacher shall demonstrate key features of a plastination lab to the scholars. Teacher shall separately allot one component of the setting of lab to every student. Student shall perform procedures like: finishing, positioning and storage on the specimen plastinated by them. finishing can be performed by chemicals like; dilute detergent, lubricant etc. scholar shall present the observations before the teacher.

Practical Training 8.3 : Surface anatomy of Bahu (upper limb) Vaksha (thorax).

Teacher shall demonstrate the general principles and features of surface anatomy and guide the scholars through the observations. Teacher shall allot atleast three topics from each activity to every scholar for practical.

1. Surface anatomy of Bahu (upper limb) (3 hours)

Scholar shall identify the key features, like; bony landmarks related to scapula, humerus, radius and ulna; muscular contours related to deltoid, biceps, triceps, flexors-extensors of forearm, thenar-hypothenars of hand; key vascular structures like radial artery, ulnar artery, cephalic vein, basilic vein etc. Scholar shall use the principles of palpation, observation, relation to deeper structures and clinical correlations. Scholar shall demonstrate the findings before the teacher and prepare a presentation.

2. Surface anatomy of Vaksha (thorax) (3 hours)

Scholar shall identify the key features, like; bony landmarks related to sternum, thoracic vertebrae and ribs; muscular contours related to intercostal muscles and diaphragm; intercostal spaces, sternal anglecostal margins; lines like mid-clavicular line etc. Scholar shall use the principles of palpation, counting ribs, anatomical planes, respiratory movements, relation to deeper structures and clinical correlations. Scholar shall demonstrate the findings before the teacher and prepare a presentation.

Practical Training 8.4 : Surface anatomy of Sakthi (lower limb) ,Udar (abdomen).

Teacher shall demonstrate the general principles and features of surface anatomy and guide the scholars through the observations. Teacher shall allot atleast three topics from

each activity to every scholar for practical.

1. Surface anatomy of Sakthi (lower limb) (4 hours)

Scholar shall identify the key features, like; bony landmarks related to hip bone, femur, tibia and fibula; muscular contours related to quadriceps, hamstrings and calf; key vascular structures like femoral artery, great and small saphenous veins; nerves like saphenous, sural and superficial peroneal etc. Scholar shall use the principles of palpation, observation, relation to deeper structures and clinical correlations. Scholar shall demonstrate the findings before the teacher and peers, prepare a presentation.

2. Surface anatomy of Udar (abdomen) (4 hours)

Scholar shall identify the key features, like; costal margin, xiphoid process, umbilicus, pubic symphysis, linea alba, McBurney's point, liver edge, kidney region, rectus abdominis muscles, abdominal quadrants, inguinal ligaments, psoas major muscle, vertebra level etc. Scholar shall use the principles of quadrants, regions, relation to deeper structures and clinical correlations. Scholar shall demonstrate the findings before the teacher and peers, prepare a presentation.

Practical Training 8.5 : Surface anatomy of Shirah (head), Griva (neck).

Teacher shall demonstrate the general principles and features of surface anatomy and guide the scholars through the observations. Teacher shall allot at least three topics from each activity to every scholar for practical.

1. Surface anatomy of Shirah (head) (3 hours)

Scholar shall identify the key features, like; cranium, facial bones, scalp of skull; soft tissues of face etc. Scholar shall use the principles of landmarks, bony framework, fascial layers and clinical correlations. Scholar shall demonstrate the findings before the teacher and prepare a presentation.

2. Surface anatomy of Griva (neck) (3 hours)

Scholar shall identify the key features, like; anterior and posterior triangles with sub-divisions, bony landmarks, fascia, muscles, nerves, blood vessels and clinical correlations. Scholar shall demonstrate the findings before the teacher and prepare a presentation.

Experiential learning Activity

Experiential-Learning 8.1 : Plastination material and type of organ for plastination.

Plastination materials and techniques of plastination.

Teacher shall assign one topic from each of the activity to every student.

1. Plastination material and type of organ for plastination (3 hours)

Scholar shall use the specimen from cadaveric dissection. Scholar shall use different kinds of material like; silicone, epoxy, polyester etc. on same type of organ; and same type of material on different type of organs, like; whole organ, section of organ, luminal organ etc. Scholar shall observe and evaluate the results and identify best suited material for specific type of organ for plastination. Scholar can experiment entirely new material for the purpose of plastination in agreement with teacher. Scholar shall prepare the results and present in the form of audiovisual presentation. x

2. Plastination materials and techniques of plastination (3 hours)

Scholar shall use the specimen from cadaveric dissection. Scholar shall use different kinds of material like; silicone, epoxy, polyester etc. in same technique; and same type

of material on different type of techniques, like; fixation, dehydration, forced impregnation and curing etc. Scholar shall observe and evaluate the results and identify best suited material for specific type of organ for plastination. Scholar can experiment entirely new material for a specific technique in agreement with teacher. Scholar can also experiment with entirely new technique for plastination in agreement with teacher. Scholar shall prepare the results and present in the form of audiovisual presentation.

Experiential-Learning 8.2 : Application in post plastination Techniques.

Application in post plastination Techniques

Scholar shall propose an innovative technique for the post plastination finishing and storage. Scholar can propose use of different material for finishing or may propose any other technique for storage of specimen. Proposal shall be in the form of a research note carrying advantages of new techniques and materials over the conventional methods. Student shall complete the study and place the finding for discussion in class with peer.

Experiential-Learning 8.3 : Clinical and surgical correlates of surface anatomy of Bahu (upper limb) and Vaksha (thorax)

Teacher shall assign atleast five topics from each activity to every scholar.

1. Clinical and surgical correlates of surface anatomy of Bahu (upper limb) - Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder. Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like, general inspection, palpation, range of movement, strength testing, neurological examination and specific tests ment for shoulder elbow and wrist, functional assessment etc. in clinical/surgical conditions of; shoulder (rotator cuff injury, shoulder impingement syndrome, frozen shoulder etc); elbow (tennis elbow, cubital tunnel syndrome etc); wrist and hand (carpal tunnel syndrome, trigger finger, dupuytren's contracture etc); nerve entrapments (radial nerve compression etc);. scholar should prepare record of clinical assessment and submit to teacher for group discussion. (5 hours)
2. Clinical and surgical correlates of surface anatomy of Vaksha (thorax) - Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder. Scholar shall assess the clinical or surgical disorder with the help of different clinical examinations, like, general inspection, palpation, auscultation etc.; and surgical examinations like, thoracoscopy, bronchoscopy, mediastenoscopy etc. Scholar should prepare record of clinical assessment and submit to teacher for group discussion.(5 hours)

Experiential-Learning 8.4 : Clinical and surgical correlates of surface anatomy of Sakthi (lower limb), Udara (abdomen).

Teacher shall assign atleast five topics from each activity to every scholar.

1. Clinical and surgical correlates of surface anatomy of Sakthi (lower limb) (5 hours)

Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder. Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; general inspection, palpation, range of movement, strength testing, neurological examination and specific tests (trendelenburg's test, knee meniscal tests), functional assessment (hop test, balance test, agility test, sit-to-stand test) etc. in clinical/surgical conditions of; fractures, ligament and tendon injury, vascular injury and nerve entrapment (tarsal tunnel syndrome). Scholar should prepare record of clinical assessment and submit to teacher for group discussion.

2. Clinical and surgical correlates of surface anatomy of Udara (abdomen)(5 hours)

Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder. Scholar shall assess the clinical or surgical disorder with the help of different clinical examinations, like, general inspection (distension, femoral inguinal hernias, shape of umbilicus), palpation (rebound tenderness in peritoneal irritation), auscultation etc. scholar shall look to do surface assessment in key areas of; umbilicus (hernia), suprapubic area (distended bladder), Scholar should prepare record of clinical assessment and submit to teacher for group discussion.

Experiential-Learning 8.5 : Clinical and surgical correlation of surface anatomy of Shirah (head), Griva (neck).

Teacher shall assign atleast five topics from each activity to every scholar.

1. Clinical and surgical correlates of surface anatomy of Shirah (head) (4 hours)

Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder. Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like, general inspection (facies, hair and scalp, skull, eyes, mouth etc): palpation (scalp, temporal artery, temporomandibular joint); range of movement (temporomandibular joint): and neurological examination and specific tests ment for shoulder elbow and wrist, functional assessment (olfaction, vision, extra-ocular movements, facial expressions, hearing, swallowing, shoulder shrug etc.) in clinical/surgical conditions. scholar should prepare record of clinical assessment and submit to teacher for group discussion.

2. Clinical and surgical correlates of surface anatomy of Griva (neck)(3 hours)

Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder. Scholar shall assess the clinical or surgical disorder with the help of different clinical examinations, like, general inspection (over-all posture, muscle symmetry, swallowing etc.), palpation (bony landmarks, paraspinal muscles, lymph nodes, thyroid gland, trachea etc.) and range of motion (flexion, extension, rotation and lateral flexion etc.). Scholar should prepare record of clinical assessment and submit to teacher for group discussion.

Modular Assessment

Assessment method

Hour

Instructions—Conduct a structured modular assessment. The assessment will be for 75 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C.

1. DOAP(Demonstration Observation Assistance Performance) (25Mark)

a. Demonstration

The teacher introduces the concept of Angarekhanakan (anatomical surface marking) using models, charts, or digital projection. Demonstrates surface markings of important anatomical structures using bony landmarks and reference lines. Explains the clinical relevance of surface marking in procedures like auscultation, or surgical approaches.

b. Observation

Students observe the demonstration attentively .They use a checklist to identify and note Surface projection of Key reference points midclavicular line,

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costal margins, umbilicus, etc.

c.Assistance

Students practice in small groups or pairs under teacher supervision.They draw surface markings on peers or mannequins.The teacher corrects posture, line orientation.

d.Performance

Each student independently Demonstrates key Angarekhanakan projections on a body surface. Justifies the anatomical reasoning for placement.

Faculty will assess using a rubric based

2.OSPE (plastination)(25Mark)

Teacher will arrange the OSPE station for Steps in the Plastination Procedure

Students are provided with a brief description and setup of plastination materials on the station for Dehydration, Fixation,Curing, etc

students will follow the instruction and go around the OSPE circuit.

3.OSPE (Angrekhankan)(25Mark)

Teacher will arrange the OSPE station for Steps in the Angrekhankan (surface anatomy)Procedure highlighting the Ayurveda terms Angarekhankan of Upper Limb (Bahu), Angarekhankan of Thorax (Vaksha)

students will follow the instruction and go around the OSPE circuit.

or

Any practical in converted form can be taken for assessment.(40Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (35Mark)

Semester No : 4

Module 9 : Pranavaha Srotas (Respiratory system)

Module Learning Objectives

(At the end of the module, the students should be able to)

Analyze the concept of Pranvaha Srotas and its function and correlate them with structural aspects of the upper and lower respiratory tract. Perform and demonstrate the dissection of upper and lower respiratory tract.

M 9 Unit 1 Nose and nasal cavities 9.1.1. Structural aspect of nose and paranasal sinuses 9.1.2. Nasal cavity References: 11,12,13,14,15,16						
3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Interpret and document the structures related to nasal cavity and nasopharynx in relation to its neurovascular supply; and linking these structure in context of perception of olfactory senses and facilitation in respiration.	4	Lecture	CAP	Knows-how	L
CO1,CO6	Dissect and demonstrate nasal septum and walls; vestibular, respiratory and olfactory regions; paranasal sinuses; and nasopharynx.	4	Practical Training 9.1	PSY-MEC	Shows-how	D,DSN
CO1,CO5	Evaluate clinical/surgical anatomy and clinical disorders of nasal septum and walls; vestibular, respiratory and olfactory regions; paranasal sinuses; and nasopharynx etc. by understanding anatomy of the region.	8	Experiential-Learning 9.1	CE	Does	CBL
CO1,CO5	Analyze structures of larynx, trachea and bronchial tree as respiratory passage.	2	Lecture	CAN	Knows-how	
M 9 Unit 2 Upper respiratory tract - pharynx and laryngeal apparatus; lower respiratory tract - trachea and bronchial tree 9.2.1. Pharynx 9.2.2. Laryngeal apparatus 9.2.3. Trachea and bronchial tree References: 11,12,13,14,15,16						
3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Interprete anatomical structures of laryngeal apparatus in relation to voice box.	2	Lecture	CAN	Knows-how	L&GD
CO1,CO5,CO6	Dissect and demonstrate the anatomical structures of laryngeal apparatus in association with their neurovascular supply and structures of trachea and bronchial tree as respiratory passage.	8	Practical Training 9.2	PSY-MEC	Shows-how	DSN,D

CO1,CO5	Evaluate clinical/surgical anatomy and clinical disorders of laryngeal apparatus, trachea and bronchial tree.	9	Experiential-Learning 9.2	CE	Does	CBL
M 9 Unit 3 Lungs and pleura; Pratyanga of Pranavaha Srotas 9.3.1. Lungs 9.3.2. Pleura 9.3.3. Analysis of Pratyanga related to Shvasan Sansthan References: 11,12,13,14,15,16						
3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Interprete the anatomical structures of lungs as oxygenation unit of the body in line with Pranavaha Srotas.	2	Lecture	CAP	Knows-how	DIS,L_V C
CO1,CO5,CO6	Dissect and Demonstrate anatomical structures of pleura and lungs and understand the differences in right and left lung.	8	Practical Training 9.3	PSY-MEC	Shows-how	DSN,D
CO1,CO5	Evaluate clinical/surgical anatomy and clinical disorders of pleura and lungs.	9	Experiential-Learning 9.3	CE	Does	CBL
Practical Training Activity						
Practical Training 9.1 : Dissection of nasal cavity and nasopharynx.						
Dissection of nasal cavity and nasopharynx (4hour) Scholar shall take minimum invasive approachby preservation of critical structures, like skull base and optic nerve. Scholar shall take step by step approach starting from middle turbinate then moving to ethmoid and sphenoid sinus. Precise removal of soft tissues and bones is necessary. Controlling bleeding is crucial as nasal cavity is highly vascularized organ. Dissection can be taken in following steps; The sagittal section of Nose, Dissect Nasal Septum, Dissect Lateral wall of Nose, Identify Blood Supply and Nerve supply of nose, Exposure of the Nasal Cavity, Dissection of the Maxillary Sinus, Dissection of the Ethmoid Sinuses, Dissection of the Frontal Sinus, Dissection of the Sphenoid Sinus, Examination and Identification of Key Anatomical Structures, Expose and Identify the Sinuses, Observe Microscopic structure of Olfactory Area of Nasal Cavity, Study the structure of Bipolar neurons of Olfactory area of Nasal Cavity, Study of superior concha and superior meatus, Observation of Microscopic Structures present in Respiratory area, Study of structural specifications in respiratory area, Take sagittal section of face, Study the structure of Nasopharynx with it's boundaries and structures present in it - pharyngeal tonsil, opening of eustachian tube, pharyngeal recess, levator veli palatini etc.						

Practical Training 9.2 : Cadaveric dissection of laryngeal apparatus, Trachea and bronchial tree.

1. Dissection of laryngeal apparatus on cadaver - Scholar shall attempt the dissection of larynx in a step-by-step approach from outside to inside. Identification and preservation of recurrent laryngeal nerves and its branches is important. Sternohyoid and cricothyroid muscle should be well secured. Dissection should be carried out in a sequential manner by dissecting; identify and dissecting superficial structure, locating and preserving recurrent laryngeal nerve, exploring intrinsic laryngeal muscles and examining laryngeal cavity. (4 hours)
2. Dissection of Trachea and Bronchial tree on cadaver - Scholar shall attempt the dissection of trachea and bronchial tree taking consideration of segmental blood supply to these regions. Tracheal dissection should be proceeded from distal side and should be conservative so as to preserve delicate tracheal rings. Bronchial dissection should be along the main bronchi by carefully separating them from surrounding arteries and veins. (4 hours)

Practical Training 9.3 : Dissection of pleura and lungs.

Dissection of pleura and lungs

1. Scholar shall take care of key aspects of lung dissection, like; accessing the lungs, identifying lobes and fissures, examining the hilum, understanding relation with other structures and studying neurovascular supply, observation of accessory fissures and lobes. (4 hour)
2. Scholar shall carry out the dissection of lungs in following steps; Dissect pectoral muscles and remove them, Remove the thoracic rib cage, Dissect lungs and examine their lobes, fissures and surfaces, Study the differences between right lung and left lung, Dissect root of lung and examine structures related to mediastinal surface of lung, Dissection of Pleura, Anterior thoracic wall, Identify pleura and its layers, Identify cervical, costal, mediastinal and diaphragmatic pleura. (4 hour)

Experiential learning Activity

Experiential-Learning 9.1 : Clinical correlates of nasal cavity and nasopharynx.

Teacher shall separately allot two topics from each activity to the scholar. Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder.

1. Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; inspection (size, shape, skin deformities), palpation (tenderness, crepitus) and internal examination (anterior rhinoscopy, nasal endoscopy). Scholar shall attempt to co-relate clinical finding with clinical disorders. Scholar can take the help from data resources available on the internet to execute the assigned topic. (4 hour)
2. Clinical correlates of nasal cavity and nasopharynx - Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; visual examination (posterior rhinoscopy, endoscopy) to assess clinical disorders, like; nasopharyngitis, cysts, angiofibromas, adenoids etc. Scholar can take the help from data resources available on the internet to execute the assigned topic. (4 hour)

Experiential-Learning 9.2 : Clinical correlates of laryngeal apparatus, trachea and bronchial tree.

Teacher shall separately allot two topics from each activity to the scholar. Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder.

1. Clinical correlates of laryngeal apparatus (3 hours)

Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; history taking, physical examination, voice assessment and laryngoscopy. Scholar should attempt to relate clinical findings with clinical disorders of larynx like; laryngitis, vocal cord paralysis, laryngo pharyngeal reflux, vocal cord dysfunction etc. Scholar can take the help from data resources available on the internet to execute the assigned topic.

2. Clinical correlates of trachea(3 hours)

Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; tracheal position, cricosternal distance, tracheal tug etc. Scholar should attempt to relate clinical findings with clinical disorders of trachea like; tracheal stenosis, trachiomalacia etc. Scholar can take the help from data resources available on the internet to execute the assigned topic.

3. Clinical correlates of bronchial tree (3 hours)

Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; auscultation, bronchoscopy etc. Scholar should attempt to relate clinical findings with clinical disorders of bronchial tree like; bronchitis, bronchiectasis, COPD etc.Scholar can take the help from data resources available on the internet to execute the assigned topic.

Experiential-Learning 9.3 : Clinical correlation of pleura and lungs.

Teacher shall separately allot two topics from each activity to the scholar. Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder.

1. Clinical correlates of pleura

Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; inspection (assymetric swelling), palpation (tenderness, abnormal vibration etc.), percussion (pleural effusion), auscultation (pleural friction etc), imaging techniques (x-ray, CT scan etc), pleuroscopy etc. Scholar should attempt to relate clinical findings with clinical disorders of pleura like; pleural effusion,pneumothorax, empyema, mesothelioma etc. Scholar can take the help from data resources available on the internet to execute the assigned topic. (4 hours)

2. Clinical correlates of lungs

Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; inspection (chest shape and symmetry,skin and colour), palpation (tenderness, chest expansion, vocal fermitus),percussion (percussion notes), auscultation (breathe sounds etc). Scholar should attempt to relate clinical findings with clinical disorders of lungs like; pneumothorax, pleural effusion, aspiration pneumonia etcEvaluate Pathological changes in Lung tissues in different diseases. Scholar can take the help from data resources available on the internet to execute the assigned topic. (5 hours)

Modular Assessment

Assessment method

Hour

Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1.Practical enact Assessment (Dissection) (50Mark) Instructions for Students Dissect ,Expose and identify the nasal cavity, nasal septum, conchae, and meatuses .Trace the pharynx (nasopharynx, oropharynx, laryngopharynx).Identify the laryngeal cartilages thyroid, cricoid, epiglottis, and arytenoid. Locate vocal cords and describe glottis structure. Dissect and demonstrate the trachea (rings, bifurcation).Identify right and left bronchi, bronchial tree, and lung lobes. Demonstrate hilum of lung with contents bronchus, pulmonary artery, pulmonary veins, and lymph nodes.(any one or two part can be choose for dissection) Teacher will Assess on the basis of Identification of structure ,Dissection Skill, Anatomical Orientation ,Clinical Relevance Explanation or Any practical in converted form can be taken for assessment.(25Mark) and Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)							4	
Module 10 : Raktavaha Srotas (Heart and Arteries)								
Module Learning Objectives (At the end of the module, the students should be able to) Perform and demonstrate dissection of the heart and arteries of the body with their application in correlation with Ayurveda								
M 10 Unit 1 Heart and concept of Hridaya 10.1.1. External and internal structure of heart 10.1.2. Fibrous skeleton of heart 10.1.3. Foetal heart 10.1.4. Analysis of concept of Hridaya in Ayurveda References: 11,12,13,14,15,16								
3A	3B			3C	3D	3E	3F	3G

CO1,CO5	Analyze general external and internal architecture of heart.	2	Lecture	CAN	Knows-how	L&PPT
CO1,CO5,CO6	Dissect and Demonstrate external and internal structure of heart and pericardium.	6	Practical Training 10.1	PSY-MEC	Shows-how	D,DSN
CO1,CO5	Evaluate clinical / surgical anatomy and clinical disorders of pericardium and heart.	10	Experiential-Learning 10.1	PSY-ORG	Does	CBL,SIM
CO1,CO5	Analyze structural basis of inflow parts and outflow parts working in perfect rhythm.	1	Lecture	CAN	Knows-how	L&GD
CO1,CO5	Analyze the concept of Hridaya in Ayurveda.	1	Lecture	CAN	Knows-how	L,LS

M 10 Unit 2 Major arteries of heart10.2.1. Aorta, Pulmonary artery and its distribution

10.2.2. Subclavian artery and its distribution

10.2.3. Carotid system of artery

References: 11,12,13,14,15,16

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Map aorta with its major distributerics to depict total arterial supply of body and analyze pulmonary and systemic distributions of arteries.	1	Lecture	CAN	Knows-how	TUT,L&PPT L&GD,PL
CO1,CO5,CO6	Dissect and demonstrate the structure of aorta and pulmonary trunk with their major distributerics.	7	Practical Training 10.2	PSY-MEC	Shows-how	DSN,DL
CO1,CO5	Evaluate clinical/surgical anatomy and clinical disorders of thoracic aorta, pulmonary trunk, subclavian artery and carotid arteries.	8	Experiential-Learning 10.2	CE	Does	CBL,LS, D-BED,X-Ray

CO1,CO5	Analyze comprehensive distribution of carotid artery in relation to the supplied structure of head and neck.	1	Lecture	CAN	Knows-how	L_VC
CO1,CO5	Analyze comprehensive distribution of subclavian artery in relation to the supplied structure of upper limb.	1	Lecture	CAN	Knows-how	L
M 10 Unit 3 Arteries of limbs and concept of Dhamani 10.3.1. Arteries of the trunk & lower limbs 10.3.2. Analysis of concept of Dhamani in Ayurveda References: 11,12,13,14,15,16						
3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Analyze comprehensive distribution of thoracic and abdominal aorta in relation to the supplied structure of thorax and abdomen and distinguish somatic and visceral arteries by their distribution pattern.	1	Lecture	CAN	Knows-how	PAL,BL,L&GD,L
CO1,CO5,CO6	Dissect and demonstrate the thoracic and abdominal aorta and its distributerries to understand arterial supply of thorax and abdomen; and demonstrate the common iliac arteries and its distributerries to understand arterial supply of pelvis and lower limb.	7	Practical Training 10.3	PSY-MEC	Shows-how	D,DSN
CO1,CO5	Evaluate clinical/surgical anatomy and clinical disorders of abdominal aorta and common iliac arteries.	8	Experiential-Learning 10.3	CE	Does	PBL,CBL,X-Ray
CO1,CO5	Analyze comprehensive distribution of common iliac arteries in relation to the supplied structure of pelvis and lower limb.	1	Lecture	CAN	Knows-how	PL,C_L
CO1,CO5	Analyze concept of Dhamani in Ayurveda.	1	Lecture	CAN	Knows-how	Mnt,LS
Practical Training Activity						
Practical Training 10.1 : Dissection of heart.						

Teacher shall demonstrate key features of dissection to scholars.

Dissection of heart

Scholar should follow key principles of dissection of heart and pericardial cavity, like; external examination, pericardium, great blood vessels, chambers, vascular pattern to understand coverings surfaces, valves, septa, musculature and coronary circulation of heart. scholar should follow the principles of appropriate dissection techniques, like; sharp and blunt dissection, maintenance of tissue tension of specimen, use of avascular planes for incision and haemostasis. Scholar shall follow the sequence as suggested under or as guided by the teacher. Dissection sequence can be;

1. Dissect and demonstrate the heart to examine external features (explore the heart, identifying the Borders, exploring the Surfaces, marking the grooves, examining the Auricles and Chamber).
2. Demonstrate the internal structure of heart chambers (overview of the Heart Chambers, internal structure of the chambers, inter and intra chamber structures.)
3. Demonstrate the pericardium layers of heart (fibrous pericardium, serous pericardium, pericardial cavity).
4. Demonstrate the components of foetal circulation.

Practical Training 10.2 : Dissection of major arteries of heart.

Teacher shall demonstrate key features of dissection to scholars.

Dissection of major arteries of heart (7hour)

Scholar should follow key principles of dissection of major arteries of the heart, like; careful identification, isolation and transection of the vessels taking care of tissue planes, exposure and hemostasis. Dissection should be followed from superficial to deep structures and from larger arteries to smaller arteries. Scholar shall follow the sequence as suggested under or as guided by the teacher. Dissection sequence can be;

1. Demonstration of the aorta and its branches (Identification of the aorta, ascending aorta, aortic arch, descending aorta, thoracic aorta, distribution of the aortic branches.
2. Demonstration of the pulmonary trunk and its distribution (identification of the pulmonary trunk, branching of the pulmonary trunk, distribution of the Pulmonary Arteries.
3. Demonstration of the Subclavian artery and its branches (identification, examination of course, identification of branches, study of variations if seen, observation of relations) .
4. Demonstration of carotid system of arteries identification, examination of course (identification of branches, study of variations if seen, observation of relations).

Practical Training 10.3 : Dissection of thoracic and abdominal aorta, common iliac arteries.

Teacher shall demonstrate key features of dissection of thoracic and abdominal aorta, common iliac arteries to scholars.

1. Dissection of thoracic and abdominal aorta (4 hour)

Scholar should follow key principles of studying exposure, identification, branching, relationships, variations and surgical relevance. Dissection should be followed from superficial to deep structures. Scholar shall follow the sequence as guided by the teacher.

2. Dissection of common iliac arteries (3 hour)

Scholar shall follow key aspects of dissection of common iliac arteries as under; exposure, identification, branching, relationships, variations and surgical relevance.

Experiential learning Activity

Experiential-Learning 10.1 : Clinical correlation of pericardium and heart.

Teacher shall separately allot two topics from each activity to the scholar. Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder.

1. Clinical correlates of pericardium (5 hours)

Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; auscultation (pericardial friction rub), palpation (pericardial effusion, cardiac tamponade), percussion (presence of fluid, change in heart size) etc. Scholar should attempt to relate clinical findings with clinical disorders of pericardium like; pericardial effusion, pericarditis, cardiac tamponade, congenital pericardial defects etc.

2. Clinical correlates of heart (5 hours)

Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; inspection (general appearance, abnormal pulsation in chest wall), palpation (carotid pulse, apical impulse, peripheral pulse and oedema), auscultation (heart sounds, bruits) etc. Scholar should attempt to relate clinical findings with clinical disorders of heart, like; ischemic Heart Disease (IHD), coronary Sinus Dysfunction, valvular defects, congenital heart defects etc.

Experiential-Learning 10.2 : Clinical correlates of thoracic aorta, pulmonary trunk, subclavian artery and carotid arteries.

Teacher shall separately allot two topics from each activity to the scholar. Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder.

1. Clinical correlates of thoracic aorta (2 hours)

Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; auscultation (bruit), palpation (abdominal aortic aneurism), pulse examination (carotid, radial and femoral pulse), Imaging (x-ray, CT scan) etc. Scholar should attempt to relate clinical findings with disorders of aorta like; coarctation of the aorta, aortic stenosis, aortic root dilatation, persistent truncus arteriosus, transposition of the great arteries etc.

2. Clinical correlates of pulmonary trunk (2 hours)

Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; auscultation (accentuated pulmonary component of second heart sound, imaging (x-ray, CT scan) etc. Scholar should attempt to relate clinical findings with disorders of pulmonary trunk like; pulmonary hypertension etc.

3. Clinical correlates of subclavian artery (2 hours)

Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; pulse examination (both radial pulse), Imaging (x-ray, CT Angiography) etc. Scholar should attempt to relate clinical findings with disorders of subclavian artery like; subclavian artery stenosis.

4. Clinical correlates of carotid arteries (2 hours)

Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; auscultation (bruit over carotid arteries), palpation (between sternocleidomastoid muscle and trachea), etc. Scholar should attempt to relate clinical findings with disorders of carotid arteries like; carotid stenosis, atherosclerosis etc.

Experiential-Learning 10.3 : Clinical correlates of abdominal aorta and common iliac arteries.

Teacher shall separately allot two topics from each activity to the scholar. Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder.

1. Clinical correlates of abdominal aorta- Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; auscultation (bruit), palpation (pulsation, widening of aorta), imaging (x-ray, CT scan) etc. Scholar should attempt to relate clinical findings with disorders of abdominal aorta like; aortic aneurism etc. (2 hours)

1. Clinical correlates of common iliac arteries - Scholar shall assess the clinical or surgical disorder with the help of different clinical examination, like; pulse assessment (palpate over femoral, popliteal, dorsalis pedis or posterior tibial pulse), auscultation (bruits over iliac arteries and femoral arteries), peripheral pulses (strength and quality) etc. Scholar should attempt to relate clinical findings with disorders of abdominal aorta like; atherosclerosis, stenosis, occlusion aneurism etc. (2 hours)

Modular Assessment**Assessment method****Hour**

Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C.

1. Practical performance -Dissection of heart (25Mark)

students will dissect a preserved human heart to identify its major external and internal features. They will orient the heart correctly and locate key structures such as the atria, ventricles, coronary sulcus, and great vessels externally. Internally, they will open the chambers to identify valves, septa, chordae tendineae, and papillary muscles. Students will trace the blood flow through the heart and explain the clinical relevance of selected structures. Their performance will be assessed based on accuracy of identification, dissection technique, and understanding of structure-function correlation.

2. Making model (25Mark)

Student will prepare the model of heart showing different part, arteries and veins.

or

Any practical in converted form can be taken for assessment.(25Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)

4

Module 11 : Raktavaha Srotas (Veins and Lymphatics))**Module Learning Objectives**

(At the end of the module, the students should be able to)

Analyse, perform and demonstrate the structures of veins and lymphatics of body during dissection with its application in correlation with concept of Sira and Rasavaha Srotas in Ayurveda.

M 11 Unit 1 Veins and lymphatics of head and neck11.1.1. Veins of head and neck
11.1.2. Lymphatics of head and neck

References: 11,12,13,14,15,16

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Discuss superficial and deep venous drainage of of head, face and neck in context of jugular system of veins.	2	Lecture	CAN	Knows-how	DIS,L&P PT
CO1,CO5,CO6	Dissect and demonstrate the superficial and deep veins of the head, neck and face and lymph nodes of horizontal rings and vertical chains of the head and neck.	8	Practical Training 11.1	PSY-MEC	Shows-how	DSN,DL
CO1,CO5	Evaluate clinical and surgical importance of superficial and deep veins of the head, neck and face. Evaluate clinical and surgical importance of lymph nodes of horizontal rings and vertical chains of the head and neck.	10	Experiential-Learning 11.1	CE	Does	PL,JC,BS
CO1,CO5	Discuss deep cervical lymph nodes as final lymph destination of lymphatics of head and neck.	1	Lecture	CAN	Knows-how	L&PPT ,DIS

M 11 Unit 2 Veins and lymphatics of abdomen, pelvis and lower limb11.2.1. Veins and lymphatics of Abdomen and Pelvis
11.2.2. Veins and lymphatics of Lower limb

References: 11,12,13,14,15,16

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3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Discuss inferior vena cava as chief vein of abdomen and lower limbs. Analyze cisterna chyli as collector of lymph from trunk and lower limb.	3	Lecture	CAN	Knows-how	DIS,L&P PT
CO1,CO5,CO6	Dissect and demonstrate tributaries of inferior vena cava and femoral vein to understand venous drainage of abdomen, pelvis and lower limbs. Demonstrate location of lymph nodes draining lymph from lower limb, pelvis and abdomen into cisterna chyli.	6	Practical Training 11.2	PSY- MEC	Shows-how	DL,DSN, PSN
CO1,CO5	Evaluate clinical importance of inferior vena cava, femoral vein, lymph nodes of abdomen and lower limb.	8	Experiential-Learning 11.2	CE	Knows-how	W,IBL,JC ,PL,X-Ray

M 11 Unit 3 Veins and lymphatics of thorax and upper limb; and Rasavaha Srotas11.3.1. Veins and lymphatics of upper limb and thorax

11.3.2. Veins opening in heart

11.3.3. Analysis of concept of Sira in Ayurveda

11.3.4. Clinical anatomy of lymphatic system and interpretation of Rasavaha Srotas

References: 11,12,13,14,15,16

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Analyze axillary vein as primary vein of upper limb; and azygos system of veins, along with internal intercostal veins, as foremost system of venous drainage for thorax.	2	Lecture	CAN	Knows-how	SDL,L&P PT
CO1,CO5	Demonstrate venous drainage of upper limb into subclavian veins on cadaver ; and demonstrate azygos system of veins along with internal intercostal veins. Demonstrate axillary lymph nodes and its tributaries; and demonstrate superficial and deep lymph nodes of thorax.	6	Practical Training 11.3	PSY- MEC	Shows-how	DSN,PSN ,DL
CO1,CO5	Evaluate clinical application of venous drainage of upper limb and thorax and lymph nodes of thorax.	8	Experiential-Learning 11.3	CE	Knows-how	IBL,DIS, CBL

CO1,CO5	Discuss axillary lymph nodes as the final collector of the lymph from upper limb and superficial lymphatics of thorax; and analyze deep lymphatics of thorax.	2	Lecture	CAN	Knows-how	ML,L&GD
Practical Training Activity						
Practical Training 11.1 : Dissection of the veins of the head, neck and face and lymph nodes of head and neck.						
Teacher shall demonstrate key features of dissection of veins and lymph nodes of head and neck to scholars. Scholar should follow key principles of studying exposure, identification, branching, relationships, variations and surgical relevance. 1. Dissection of veins of head and neck (4 hours) Dissection should be followed from superficial to deep structures on either side of deep investing fascia. Scholar shall follow the sequence as guided by the teacher. Scholar should attempt to expose superficial veins of head and neck draining into external jugular vein through anterior or posterior jugular veins. Expose deep veins draining into internal jugular veins. 2. Dissection of lymph nodes of head and neck (4 hours) Scholar should attempt to expose occipital, parotid, submandibular and submental lymph nodes constituting outer superficial ring; and waldeyer ring constituting inner ring of lymph nodes.. scholar should also attempt to expose vertical chain of lymph nodes related to carotid sheath in superior and inferior groups. scholar should expose the receiver of all lymph nodes, the cervical lymph nodes present in the root of neck.						
Practical Training 11.2 : Dissection of veins of abdomen; veins of lower limb, lymph nodes of abdomen and lymph nodes of lower limb.						
Teacher shall demonstrate key features of dissection of veins and lymph nodes of abdomen, pelvis and lower limb to scholars. Scholar should follow key principles of studying exposure, identification, tributaries, relationships, variations and surgical relevance. 1. Dissection of veins of abdomen (dissection of inferior vena cava and its tributaries)(2hour) Dissection should be followed from superficial to deep structures on either side of deep investing fascia. Scholar shall follow the sequence as guided by the teacher. Scholar shall attempt to expose major tributaries of inferior vena cava, like; lumbar veins, gonadal veins, renal veins, suprarenal veins inferior phrenic veins, common iliac veins, external iliac veins and internal iliac veins. 2, Dissection of veins of lower limb (dissection of femoral veins and its tributaries) (2hour) Scholar should understand superficial drainage of lower limb by exposure of great and small saphenous veins. deep venous drainage should be understood by exposure of femoral vein, popliteal vein, tibial veins fibular (peroneal) vein. 3. Dissection of lymph nodes of abdomen (dissection of lymph nodes draining in cisterna chyli) (1hour) scholar should look for convergence of all four major abdominal lymph trunks to cisterna chyli. scholar should attempt to see preaortic, coeliac, superior and inferior mesenteric and lateral group (sometimes retro-aortic group too is present) of lymph nodes and other lymph nodes draining into them. 4. Dissection of lymph nodes of lower limb (dissection of inguinal lymph nodes) (1hour)						

Superficial lymphatic drainage of lower limb is understood by medial and lateral lymphatic vessels. medial vessels drain into superficial inguinal lymph nodes; and lateral vessels drain into popliteal nodes or to inguinal nodes via medial group.

Deep lymphatic drainage is understood through anterior tibial, posterior tibial and peroneal vessels into popliteal lymph nodes.

Practical Training 11.3 : Dissection of veins of upper limb; and dissection of veins of thorax.

Dissection of superficial and deep lymphatics of upper limb; and dissection of superficial and deep lymphatics of thorax.

1. Dissection of veins of upper limb (2hour)

Scholar should understand superficial venous drainage by exposure of dorsal venous network of hand, cephalic vein, basilic vein, median cubital vein and median antebrachial vein.

Deep venous drainage should be understood by radial veins, ulnar veins, brachial veins, axillary veins and subclavian vein.

2. Dissection of veins of thorax (2hour)

major veins of thorax are; superior vena cava (upper thorax), azygos system of veins, internal thoracic vein, intercostal veins, pericardiacophrenic veins and thymic veins.

3. Dissection of superficial and deep lymphatics of upper limb (1hour)

Scholar should understand superficial lymphatics of upper limb by exposure of supratrochlear nodes and lateral axillary nodes. Deep lymphatics of radial, ulnar, interosseous and brachial regions is understood by lateral axillary lymph nodes.

Superficial lymphatics of scapular region are understood through exposure of subscapular axillary nodes or inferior deep cervical nodes. Deep lymphatics of scapular muscles mainly drain through subscapular axillary nodes and pectoral muscles drain through pectoral, central and apical nodes.

4. Dissection of superficial and deep lymphatics of thorax (1hour)

Superficial lymphatics of scapular region are understood through exposure of axillary nodes. Deep lymphatics drain through parasternal, intercostal and diaphragmatic nodes.

Experiential learning Activity

Experiential-Learning 11.1 : Clinical correlates of veins of head, neck and face , lymphatics of head and neck.

Teacher shall separately allot two topics from each activity to the scholar. Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder.

1. Clinical correlates of veins of head, neck and face through journal club (5 hours)

A journal club activity on Clinical Correlation of Venous Disorders of the Head (Venous Sinus Thrombosis, Intracranial Hypertension, Cavernous Sinus Thrombosis, Arteriovenous Malformations) will help scholars critically review articles, case reports, and research papers. Each scholar will present clinical features, diagnostic tools, and

management from their selected study, followed by discussion linking findings to venous anatomy. A comparative chart will be prepared as an integration activity.

Evaluation will be based on critical appraisal, clinical–anatomical correlation, presentation, and participation.

2. Clinical correlates of veins of head, neck and face (5 hours)

Scholar shall assess the clinical or surgical disorder with the help of different clinical examination. Scholar should attempt to relate clinical findings with disorders of lymph like; tonsillitis, sinus Infections, dental abscesses, lymphatic cancer , lymphedema etc.

Experiential-Learning 11.2 : Clinical correlates of veins and lymph nodes of abdomen and lower limb.

Teacher shall separately allot two topics from each activity to the scholar. Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder.

1. Clinical correlates of veins of abdomen and lower limb (4 hours)

Scholar shall assess the clinical or surgical disorder with the help of different Imaging modalities such as ultrasound (Doppler ultrasound), CT/MRI scans, and venography etc. Scholar should attempt to relate clinical findings with disorders of veins like; thrombosis, venous insufficiency and stenosis.

2. Clinical correlates of lymph nodes of abdomen and lower limb (4 hours)

Scholar shall assess the clinical or surgical disorder with the help of different modalities such as ultrasound, CT, or MRI, Fine Needle Aspiration etc. Scholar should attempt to relate clinical findings with disorders of lymph nodes like; Sexually transmitted infections, penile cancer, anal cancer, lymphedema, gastrointestinal cancers, tuberculosis or abdominal inflammatory conditions, para-aortic lymphadenopathy, retro-aortic lymphadenopathy, retroperitoneal tumors, lymphatic obstruction etc.

Experiential-Learning 11.3 : Clinical correlates of veins of upper limb and thorax, lymph nodes of thorax.

Teacher shall separately allot two topics from each activity to the scholar. Scholar shall visit the OPD/IPD of hospital or consult data resources to identify features of assessment on assigned disorder.

1. Clinical correlates of veins of upper limb and thorax (4 hours)

Scholar shall assess the clinical or surgical disorder with the help of different Imaging modalities such as ultrasound (Doppler ultrasound), CT/MRI scans, and venography etc. Scholar should attempt to relate clinical findings with disorders of veins like; thrombosis, venous insufficiency and stenosis. subclavian Vein Thrombosis, thoracic outlet syndrome, superior vena cava syndrome, venous distention, azygos vein dilatation, azygos vein syndrome.

2. Clinical correlates of lymph nodes of thorax (4 hours)

Scholar shall assess the clinical or surgical disorder with the help of different Imaging modalities such as physical examination, ultrasound, CT, or MRI, fine needle apiration etc. Scholar should attempt to relate clinical findings with disorders of veins like; breast cancer, mastitis, cellulitis, lung cancer, oesophageal cancer, lymphadenopathy, lymphangitis, lymphedema etc.

Modular Assessment

Assessment method

Hour

Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1.Practical enact Dissection (25Mark) Students will perform a dissection to identify and demonstrate the major veins and lymphatic structures of the body, such as the cephalic, basilic, femoral, and saphenous veins, along with prominent lymph nodes and lymphatic vessels. They will trace the anatomical course, tributaries, and drainage patterns of these structures and observe their relationships within the dissected region. 2.(25Mark) Students will observed and compare vein and lymphatics of body during dissection with its application in correlation with concept of Sira and Rasavaha Srotas in Ayurveda. or Any practical in converted form can be taken for assessment.(25Mark) and Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)	4
Semester No : 5	
Module 12 : Annavaha Srotas (Digestive tract)	
Module Learning Objectives (At the end of the module, the students should be able to) Analyse, perform and Interpret the concept of Annavaha Srotas and Digestive tract with its clinical application and perform dissection.	
M 12 Unit 1 Digestive tract - mouth12.1.1. Oral cavity 12.1.2. Salivary glands 12.1.3. Teeth and Tongue 12.1.4. Pharynx	

References: 11,12,13,14,15,16

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Describe the collective role of structures of oral cavity, like; vestibule, lips, tongue, teeth, cheeks, hard palate and soft palate in relation to mastication of food.	1	Lecture	CC	Knows-how	L&GD
CO1,CO5,CO6	Dissect and demonstrate anatomical structures present in oral cavity and pharynx by cadaveric dissection or 3D virtual dissection.	6	Practical Training 12.1	PSY-MEC	Shows-how	D,DSN
CO1,CO5	Evaluate anatomical features forming basis of disorders of vestibule, oral cavity, teeth, tongue, cheeks, lips, salivary glands and pharynx.	8	Experiential-Learning 12.1	CE	Does	CBL
CO1,CO5	Analyze role of musculature of tongue in speech in relation to speech therapy.	1	Lecture	CAN	Knows-how	IBL
CO1,CO5	Analyze pharynx as a place of first defense of digestive system against infections and discuss role of structures of pharynx in it.	1	Lecture	CAN	Knows-how	DIS

M 12 Unit 2 Digestive tract - foregut12.2.1. Oesophagus

12.2.2. Stomach

12.2.3. Duodenum

References: 11,12,13,14,15,16

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Analyze the evolution of oesophagus as a conduit to transfer masticated food for digestion in stomach and discuss role of its structure in propulsion of food.	1	Lecture	CAN	Knows-how	L
CO1,CO5,CO6	Dissect and demonstrate oesophagus, stomach and duodenum by cadaveric dissection or 3D virtual dissection.	8	Practical Training 12.2	PSY-MEC	Shows-how	DSN,D
CO1,CO5	Evaluate characteristic anatomical features of oesophagus, stomach and duodenum	10	Experiential-	CE	Does	CBL

	responsible for clinical/surgical disorders.		Learning 12.2			
CO1,CO5	Analyze the structures of stomach involved in churning and digestion of food. Justify advancement of stomach in carrying these functions in comparison to mouth by elaborate comparison of structure present in respective regions.	1	Lecture	CAN	Knows-how	L&GD
CO1,CO5	Analyze duodenum as a transition zone in terms of digestion in stomach and jejunum. Duodenum is half foregut and half midgut. Justify by structures involved in its formation and execution of function.	1	Lecture	CAN	Knows-how	C_L

M 12 Unit 3 Digestive tract - midgut and hindgut12.3.1. Small intestine

12.3.2. Large Intestine

References: 11,12,13,14,15,16

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Analyze the structure features of small intestine those make it primary organ for absorption of food; discuss its structure involved in digestion of food.	1	Lecture	CAN	Knows-how	L
CO1,CO5,CO6	Perform dissection of small intestine Large Intestine.	6	Practical Training 12.3	PSY-MEC	Shows-how	D
CO1,CO5	Evaluate anatomical basis of clinical/surgical features of disorders of small intestine, caecum, appendix, colon, rectum and anal canal.	8	Experiential-Learning 12.3	CE	Does	CBL
CO1,CO5	Describe the musculature of gastrointestinal tract to depict controlled and rhythmic propulsion of food.	1	Lecture	CAP	Knows-how	L&PPT
CO1,CO5	Analyze structural environment for microbiomata in caecum and appendix. Discuss herbivore nature of ancestral human in relation to it.	1	Lecture	CAN	Knows-how	DIS,L&PPT
CO1,CO5	Analyze collective role of structure of colon and rectum in storage and elimination of	1	Lecture	CAN	Knows-	L&GD

undigested food.

how

Practical Training Activity

Practical Training 12.1 : Dissection of structures of oral Cavity and pharynx.

Dissection of structures of oral Cavity and pharynx.

Follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Reherse neurovascular supply before attempting to dissect.

Identify, examine and demonstrate the structures of oral cavity. observe structure of teeth. Identify and expose the musculature, nerves, blood vessels and other structures related to tongue and explore papillae. Identify and examine structures present in the pharynx.

Practical Training 12.2 : Dissection of oesophagus, stomach and duodenum.

Dissection of oesophagus, stomach and duodenum.

Student will Perform dissection of oesohagus, stomach and duodenum under guidance of teacher or while training undergraduate students. Follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Reherse neurovascular supply before attempting to dissect. carefully examine related peritoneal layers.

Practical Training 12.3 : Dissection of small intestine, Large Intestine.

1.Dissection of small intestine, Large Intestine.

Explore the abdominal cavity. Perform dissection of small intestine, caecum, appendix, colon and rectum before teacher or while training undergraduate students. Follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Reherse neurovascular supply before attempting to dissect. carefully examine related peritoneal layers.

Experiential learning Activity

Experiential-Learning 12.1 : Clinical/surgical correlates of structures of oral cavity and pharynx.

Teacher shall allot one activity from each topic to every scholar. Scholar shall consult data resources or OPD/IPD of hospital. Scholar should attempt to identify key features of oral cavity, salivary glands, teeth, tongue and pharynx etc., which are responsible for clinical importance of that structure.

1. Applied anatomy of Oral Cavity - frenulum, opening of parotid glands, interdental spaces.

3. Applied anatomy of teeth - congenital anomalies and malformations, dental caries, gingivitis, tooth sensitivity, structural changes in teeth in different diseases - Enamel hypoplasia, celiac disease, flurosis, osteogenesis imperfecta, pulpal pathologies, acidic erosion, bruxism, periodontal disease, hyperparathyroidism, paget's disease of bone,

anorexia nervosa

4. Applied anatomy of tongue - Congenital anomalies and abnormalities of tongue, glossitis, ankyloglossia, hypoglossal nerve dysfunction, geographic tongue, fissured tongue, lingua villosa, candidiasis, lichen planus, syphilis, xerostomia, scarlet fever.

5. Applied anatomy of Pharynx and Tonsils - Congenital anomalies and malformation, dysphagia, obstructive sleep apnoea, Pharyngitis, tonsillitis, peritonsillar abscess, enlarged adenoids, cancer of pharynx, lymphoma, tuberculosis of the tonsils and pharynx.

Experiential-Learning 12.2 : Clinical/surgical correlates of oesophagus, stomach and duodenum

Teacher shall allot at least two activities from each topic to every scholar to assess anatomical basis of diseases related to oesophagus, stomach and duodenum and its adjacent structure and use various diagnostic techniques for assessment of disease.

1. Applied anatomy of Oesophagus (Congenital anomalies and malformation, GERD, achalasia, oesophageal varices); clinical importance of constrictions of Oesophagus (foreign body obstruction, dysphagia, hiatal hernia); structural changes in Oesophagus in various diseases (oesophagitis, strictures, Barrett's esophagus). (4 hour)

2. Applied anatomy of stomach (Congenital anomalies and malformations, Pyloric stenosis); Evaluate functions of stomach (Acid secretion, enzyme secretion, mucosal protection); Structural changes in pathological conditions of stomach (Gastritis, Hiatal hernia, Gastric motility disorders, Gastric cancer, Helicobacter pylori infection, Celiac disease). (3 hour)

3. Applied Anatomy of Duodenum (Congenital anomalies and malformation, duodenal obstruction, biliary disorders, celiac diseases); Clinical importance of 2nd part of Duodenum (Sphincter of Oddi dysfunction, biliary and pancreatic ducts secretion); Structural changes in pathological conditions (Duodenal ulcers, pancreatitis). (3 hour)

Experiential-Learning 12.3 : Clinical/surgical correlates of small intestine, caecum, appendix, colon, rectum and anal canal.

Teacher shall allot at least two activities from each topic to every scholar to assess anatomical basis of diseases related to oesophagus, stomach and duodenum and its adjacent structure and use various diagnostic techniques for assessment of disease.

1. Applied anatomy of small intestine (Congenital anomalies and malformations, celiac diseases, lactose intolerance); Functional aspects of small intestine (Regulation of digestive enzymes and hormones, maintain fluid balance and waste material, motility and movement, absorption of food); Pathological aspect of small intestine (Gastroenteritis, typhoid fever, Crohn's disease, ulcerative colitis, tumors, obstruction).

2. Applied anatomy of colon, caecum and appendix (Congenital anomalies and malformations, Colitis); Functional aspects of colon, caecum and appendix (Water and electrolyte absorption, Bacterial flora, Defecation); pathological condition of colon, caecum and appendix (Appendicitis, Diverticulitis, IBS, Colonic obstruction).

3. Applied anatomy of Rectum (Congenital anomalies and malformations, Hemorrhoids, Rectal bleeding, Fecal incontinence, Neurogenic bladder or bowel dysfunction, Rectal prolapse); Functional aspects of rectum (sphincter dysfunction, Storage of Fecal Material, Defecation, Sphincter Control and Continence, Absorption and Water Conservation, Micturition and Gastrocolic Reflexes Parkinson's disease, or multiple sclerosis); pathological condition of rectum (Rectal Cancer, Diverticulosis and Diverticulitis, Proctitis, Anal Fissures, Rectal Abscess and Fistula, Rectal Incontinence, Rectal Ulcers).

4. Applied anatomy of Anal canal (Congenital anomalies and malformations, Hemorrhoids, Anal Fissures, Rectal Prolapse, Anal Fistulas); Functional aspects of Anal canal (Fecal Continence, Defecation, Flatus control, Sensory Function); pathological condition of Anal canal (Proctalgia fugax, Anal Cancer, Anal Abscesses, Anal Stenosis)

Modular Assessment	
Assessment method	Hour
Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1. Practical enact Dissection Digestive tract (25Mark) Students will perform a dissection to identify and demonstrate the major components of the digestive tract, including the oesophagus, stomach, small intestine (duodenum, jejunum, ileum), large intestine (cecum, colon, rectum). They will trace the anatomical course, external features, peritoneal relations, blood supply, and lymphatic drainage of each organ, while observing the relationships with surrounding viscera. 2. (25Mark) Students will analyse and interpret the Annavaha strotasa with its clinical application in Ayurveda. or Any practical in converted form can be taken for assessment. (25Mark) and Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)	4
Module 13 : Annavaha Srotas(Digestive glands and peritoneum))	
Module Learning Objectives (At the end of the module, the students should be able to)	
Analyse, perform and demonstrate the structure and function of Annavaha Srotas, their significance. Perform dissection of salivary glands, digestive glands and peritoneum.	
M 13 Unit 1 Digestive glands of oral cavity 13.1.1. sublingual and submandibular salivary glands 13.1.2. Parotid glands References: 11,12,13,14,15,16	

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Analyze digestion in mouth and discuss role of structure and position of salivary glands in relation to initiation of digestion.	1	Lecture	CAN	Knows-how	L&GD
CO1,CO5,CO6	Dissect and demonstrate the structure of sublingual, submandibular and parotid glands by cadaveric dissection or 3D virtual dissection.	4	Practical Training 13.1	PSY-MEC	Shows-how	DL,DSN
CO1,CO5	Evaluate anatomical basis of clinical/surgical features of disorders of parotid, submandibular and sublingual salivary glands.	8	Experiential-Learning 13.1	CE	Knows-how	CBL
CO1,CO5	Discuss structural basis of liver as master provider of nourishment to the body in association with other digestive glands.	2	Lecture	CAN	Knows-how	L&GD

M 13 Unit 2 Digestive glands - liver and pancreas; and spleen13.2.1. External and internal features of Pancreas

13.2.2. Spleen

13.2.3. External and internal features of liver

13.2.4. Biliary apparatus

References: 11,12,13,14,15,16

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Analyze the role of structure of pancreas in preventing self digestion.	1	Lecture	CAN	Knows-how	L_VC,PL
CO1,CO5,CO6	Dissect and Demonstrate structure of pancreas, spleen, liver and extrahepatic biliary apparatus by cadaveric dissection or 3D virtual dissection.	10	Practical Training 13.2	PSY-MEC	Shows-how	DSN,D
CO1,CO5	Evaluate anatomical basis of clinical/surgical features of disorders of pancreas, spleen, liver and extrahepatic biliary apparatus.	10	Experiential-Learning 13.2	CE	Knows-how	CBL
CO1,CO5	Analyze relation of spleen with digestive system on the basis of its structure.	1	Lecture	CAN	Knows-	LS

					how	
M 13 Unit 3 Peritoneum and Pratyanga of Annava Srotas 13.3.1. Peritoneum 13.3.2. Analysis of Pratyanga related to Annava Srotas References: 11,12,13,14,15,16						
3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Analyze role of various peritoneal folds and pouches of peritoneal cavity.	2	Lecture	CAN	Knows-how	L&PPT
CO1,CO5,CO6	Dissect and demonstrate the structure of peritoneum by cadaveric dissection or 3D virtual dissection.	6	Practical Training 13.3	PSY-MEC	Shows-how	D,DSN
CO1,CO5	Evaluate anatomical basis of clinical/surgical features of disorders of peritoneum.	8	Experiential-Learning 13.3	CE	Does	TBL,CBL
CO1,CO5	Analyze Koshtangas related to digestive system in relation with contemporary knowledge.	3	Lecture	CAN	Knows-how	TBL,L&PPT
Practical Training Activity						
Practical Training 13.1 : Dissection of salivary glands.						
Teacher shall demonstrate key features of salivary gland. Scholar shall follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Rehearse neurovascular supply before attempting to dissect. 1. Dissection of parotid gland - parotid gland should be dissected carefully noting its relation with facial nerve, external carotid artery and retromandibular vein. 2. Dissection of submandibular gland - Submandibular gland should be dissected carefully noting its relation with lingual nerve. Wharton's duct should be exposed carefully paying attention to superficial and deep lobes. 3. Dissection of sublingual gland -Sublingual gland should be dissected carefully noting its location in floor of mouth with multiple ducts.						
Practical Training 13.2 : Dissection of pancreas, spleen, liver and extrahepatic biliary apparatus						
Teacher shall demonstrate key features of dissection of digestive glands. Scholar shall follow basic principle of observation and exploration before initiating dissection.						

Observe shape, size, position and relations of the structure to be dissected. Rehearse neurovascular supply before attempting to dissect.

1. Dissection of pancreas (3hour)

Scholar shall identify head, neck, body and tail of pancreas present retroperitoneally; Take note of close association of splenic artery and splenic vein; expose two ducts, duct of wirsung and duct of santorini; two sphinctors.

2. Dissection of spleen(2hour)

Identify close association with two peritoneal folds, gastro splenic ligament and lienorenal ligament; hilum should be dissected carefully.

3. Dissection of liver (3hour)

Identify the liver hanging underneath diaphragm with the help of folds of peritoneum, take note of hepatorenal pouch, carefully identify structures in porta hepatis.

4. Dissection of extrahepatic biliary apparatus (2hour)

Identify hepatic duct, cystic duct and common bile duct. Look for variations in ducts of gall bladder, identify Calot's triangle.

Practical Training 13.3 : Dissection of peritoneum.

Teacher shall demonstrate key features of dissection of peritoneum. Scholar shall follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Rehearse neurovascular supply before attempting to dissect.

Dissection of peritoneum (6hour)

1. Explore vertical and horizontal extensions of peritoneum

2. Identify intraperitoneal (free) and retroperitoneal (fixed) abdominal viscera related to digestive, urinary and reproductive systems

3. Explore folds of peritoneum named as ligaments, sacs, omenta or mesentery.

Experiential learning Activity

Experiential-Learning 13.1 : Clinical/surgical correlates of parotid, submandibular and sublingual salivary glands.

Teacher shall allot at least two activities from each topic to every scholar to assess anatomical basis of diseases related to salivary glands

1. Clinical/surgical correlates of parotid gland (3hour)

Facial nerve injury, Stensen's duct obstruction, parotid tumours, parotitis, sialolithiasis, Sjogren's syndrome, mumps, developmental aplasia, atresia, ptyalism (sialorrhea), Mikulicz disease. Scholar can take the help from data resources available on the internet to execute the assigned topic.

2. Clinical/surgical correlates of submandibular Glands(3hour)

Lingual nerve injury, sialadinitis, tumours, submandibular space infections, sialolithiasis, accessory submandibular gland, dry mouth, sialoadenosis. Scholar can take the help from data resources available on the internet to execute the assigned topic.

3. Clinical/surgical correlates of sublingual gland (2hour)

Ranula, sublingual space infection, tumours, sublingual choice of medication, sialolithiasis, trismus, abnormal taste, xerostomia (dry mouth), sublingual atresia. Scholar can take the help from data resources available on the internet to execute the assigned topic.

Experiential-Learning 13.2 : Clinical/surgical correlates of pancreas, spleen, liver and extrahepatic biliary apparatus.

Teacher shall allot atleast two activities from each topic to every scholar to assess anatomical basis of diseases related to pancreas, spleen, liver and extrahepatic biliary apparatus.

1. Clinical/surgical correlates of disorders of pancreas (3hour)

Applied anatomy of pancreas (Congenital anomalies and malformations, Diabetes Mellitus, Cystic Fibrosis); Functional aspects of pancreas (Exocrine Function, Endocrine Function, Regulation of Pancreatic Secretions, Role in Glucose Homeostasis, Pancreatic Insufficiency, Pancreatic Neuroendocrine Tumors); pathological condition of pancreas (Pancreatitis, Pancreatic Cancer, Pancreatic Cysts). Scholar can take the help from data resources available on the internet to execute the assigned topic.

2. Clinical/surgical correlates of disorders of spleen (2hour)

Applied anatomy of spleen (congenital anomalies and malformations, Splenic Rupture, Splenomegaly); Functional aspects of spleen (Hematological Functions, Immune Function, Blood Reservoir and Storage, Removal of Debris and Old Cells, Fetal Hematopoiesis); pathological condition of spleen (Hypersplenism, Asplenia, Splenic Infarction, Splenic Tumors, Splenic Cysts). Scholar can take the help from data resources available on the internet to execute the assigned topic.

3. Clinical/surgical correlates of disorders liver (3hour)

Applied anatomy of liver (Congenital anomalies and malformations, Cirrhosis, Fatty liver, Liver Trauma, Liver Trauma); Functional aspects of liver (Metabolic Functions, Detoxification and Excretion, Bile Production and Digestion, Storage and Nutrient Regulation, Regulation of Blood Coagulation, Hormonal Regulation, Liver Regeneration); pathological condition of liver (Wilson's Disease Hepatitis, Cirrhosis, Liver Cancer, Liver Abscess, Hepatic Encephalopathy, Hemochromatosis, Liver Failure, Liver Toxicity). Applied anatomy of Hepatic segments (Hepatic Tumors, Portal Hypertension, Variceal Bleeding); Surgical importance of Hepatic segments (Liver Resection, Liver Transplantation, Liver Biopsy, Biliary Surgery, Management of Liver Trauma); Scholar can take the help from data resources available on the internet to execute the assigned topic.

4. Clinical/surgical correlates of disorders of extrahepatic biliary apparatus (2hour)

Applied Anatomy of Biliary Apparatus (Congenital anomalies and malformations, Biliary Atresia, Bile Obstruction, Cholestasis); Functional aspects of Biliary Apparatus (Production of Bile by the Liver, Storage and Concentration of Bile by the Gallbladder, Transport of Bile, Secretion of Bile into the Duodenum, Regulation of Bile Flow, Bile Salt Recycling, Excretion of Waste Products); pathological condition of Biliary Apparatus (Cholelithiasis, Choledocholithiasis, Gallstones and Biliary Colic, Cholangiocarcinoma, Pancreatitis and the Biliary System). Scholar can take the help from data resources available on the internet to execute the assigned topic.

Experiential-Learning 13.3 : Clinical/surgical correlates of peritoneum.

Teacher shall allot at least two activities from each topic to every scholar to assess anatomical basis of diseases related to pancreas, spleen, liver and extrahepatic biliary apparatus.

1. Clinical/surgical correlates of peritoneum - Applied Anatomy of Peritoneum (Congenital anomalies and malformations, Peritoneal Dialysis); Functional aspects and sex differences of Peritoneum (Support and Suspension of Abdominal Organs, Protection and Lubrication, Barrier Against Infection, Regulation of Fluid Balance, Absorption and Secretion, Facilitating Organ Movement, Peritoneal Dialysis, Hormonal Influence, Pelvic Anatomy and Rectouterine Pouch, Pregnancy, Endometriosis); pathological condition of Peritoneum (Peritoneal Infections and Inflammation, Ascites, Peritoneal Tumors and Metastasis). Scholar can take the help from data resources available on the

internet to execute the assigned topic.

Modular Assessment

Assessment method	Hour
Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1. Practical Enact- Dissection of Salivary Glands / Digestive glands (25Mark) Students will dissect the parotid, submandibular, and sublingual glands, identifying their location, lobes, and ducts. They will trace key structures—facial nerve, external carotid artery, and retromandibular vein in the parotid region; Wharton's duct and lingual nerve in the submandibular gland; and the multiple ducts of the sublingual gland in the floor of the mouth.(or digestive glands) 2. Creative writing (25Mark) Describe the major Koshthangas ,Include Ayurvedic correlations dosha dominance, related srotas, and dhatu formation. how they support digestion and metabolism together. Reflect on the significance or Any practical in converted form can be taken for assessment.(25Mark) and Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)	4

Semester No : 6

Module 14 : Mutravaha, Shukravaha evum Aartvavaha Srotas (Urogenital system)

Module Learning Objectives

(At the end of the module, the students should be able to)

Analyse, perform and demonstrate the Mutravaha, Shukravaha, and Aartvavaha Srotas with the anatomy of urogenital system. perform the dissection of urogenital system.

M 14 Unit 1 Urinary tract and organs 14.1.1. Kidneys 14.1.2. Ureters 14.1.3. Bladder References: 11,12,13,14,15,16						
3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Justify present structure and position of modern kidneys in comparison to their distant ancestor to carry out function of excretion.	1	Lecture	CAN	Knows-how	L_VC
CO1,CO5,CO6	Dissect and Demonstrate the structure of kidney, ureter and urinary bladder by cadaveric dissection or 3D virtual dissection.	8	Practical Training 14.1	PSY-MEC	Shows-how	DSN,D
CO1,CO5	Evaluate anatomical basis of clinical/surgical features of disorders of kidney, ureter and urinary bladder.	8	Experiential-Learning 14.1	CE	Knows-how	CBL
CO1,CO5	Analyze structural basis of calyceal tree in formation of ureters and structural basis of urinary bladder as store and regulator of micturition.	2	Lecture	CAN	Knows-how	BS,L&G D
M 14 Unit 2 Male genital tract and organs 14.2.1. Testes, Epididymis and Vas deferens 14.2.2. Prostate gland 14.2.3. Structure of Seminal Vesicle and Bulbo-Urethral glands References: 11,12,13,14,15,16						
3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Analyze structural basis of testis and epididymis in formation and development of sperms and structure of scrotum in relation to anterior abdominal wall.	2	Lecture	CAN	Knows-how	L&PPT ,Mnt
CO1,CO5,CO6	Dissect and Demonstrate testis, epididymis and vas deferens by cadaveric dissection or	7	Practical	PSY-	Shows-	DSN,D

	3D virtual dissection.		Training 14.2	MEC	how	
CO1,CO5	Evaluate anatomical basis of clinical/surgical features of disorders of testis, epididymis and vas deferens.	8	Experiential-Learning 14.2	CE	Knows-how	CBL
M 14 Unit 3 14.3.1. Ovary 14.3.2. Uterine tubes and Uterus References: 11,12,13,14,15,16						
3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Analyze special structural modifications in female genital tract for child bearing.	1	Lecture	CAN	Knows-how	ML,L&GD
CO2,CO6	Dissect and demonstrate the structure of ovary, uterine tubes and uterus by cadaveri dissection or 3D virtual dissection.	6	Practical Training 14.3	PSY-ADT	Does	DSN,D
CO1,CO5	Evaluate anatomical basis of clinical/surgical features of disorders of ovary, uterine tubes and uterus.	8	Experiential-Learning 14.3	CE	Does	CBL
CO1,CO5	Analyze structural and positional adaptation in ovary to facilitate intra-peritoneal release of ovum.	1	Lecture	CAN	Knows-how	BL,LS,L_VC
M 14 Unit 4 Male-female urethra and external genitalia 14.4.1. Male and female urethra . 14.4.2. Male External Genitalia. 14.4.3. Vagina. References: 11,12,13,14,15,16						
3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Analyze structural differences in male and female urethra and discuss causes of	1	Lecture	CAN	Knows-	L&GD

	differences.				how	
CO1,CO5,CO6	Dissect and Demonstrate structure of male urethra and female urethra; vagina and penis; and prostate gland and seminal vesicles by cadaveric dissection or 3D virtual dissection.	8	Practical Training 14.4	PSY-MEC	Shows-how	DSN,D
CO1,CO5	Evaluate anatomical basis of clinical/surgical features of disorders of male urethra, female urethra, vagina, penis, prostate gland and seminal vesicles.	10	Experiential-Learning 14.4	CE	Knows-how	CBL
CO1,CO5	Determine the position, direction and musculature to analyze structural differences in penis and vagina.	2	Lecture	CC	Knows-how	L&PPT
CO1,CO5	Analyze homology in ejaculatory duct-prostate-bulbourethral glands complex of males and fallopian tube-uterus-bartholin gland complex of females. Discuss consequent structural modifications to suite respective sexes.	2	Lecture	CAN	Knows-how	L&GD

M 14 Unit 5 Pratyanga of Mutra, Shukra and Artva vaha Srotas14.5.1 Analysis of Pratyanga related to Mutravaha Srotas

14.5.2. Analysis of Pratyanga related to Shukravaha Srotas

14.5.3. Analysis of Pratyanga related to Artavavaha Srotas

References: 11,12,13,14,15,16

3A	3B	3C	3D	3E	3F	3G
CO1,CO5	Demonstrate Pratyanga related to Mutravaha, Shukravaha and Artavavaha Srotas on model.	1	Practical Training 14.5	PSY-GUD	Shows-how	D-M
CO1,CO5	Evaluate anatomical basis of clinical/surgical features of disorders of Mutravaha, Shukravaha and Artavavaha Srotas mentioned in Samhita.	5	Experiential-Learning 14.5	CE	Does	L_VC,CBL
CO1,CO5	Analyze Mutravaha Srotas ,Shukravaha Srotas ,Aartvavaha Srotas to critically review their description in different Ayurvedic texts.	3	Lecture	CAN	Knows-how	PL,LS,Mnt

Practical Training Activity

Practical Training 14.1 : Dissection of kidney, ureter and urinary bladder

Teacher shall demonstrate key features of dissection of kidney, ureter and urinary bladder. Scholar shall follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Rehearse neurovascular supply before attempting to dissect.

1. Dissection of kidney (3hour)

Identify the kidneys retroperitoneally, carefully expose capsules and fascia and expose adrenal glands, observe adrenal gland secure vascular supply and urinary tract by identifying hilus of kidneys, explore relations of kidneys, observe interior of kidney by sectioning. Repeat the procedure on the other kidney of same body and observe differences between right and left side.

2. Dissection of ureter (2hour)

Trace the ureter behind peritoneum from kidney to urinary bladder, carefully delineate all relations of ureter with surrounding neurovascular structures, observe segmental blood supply of ureter observe the interior by sectioning vertically.

3. Dissection of urinary bladder (3hour)

Identify urinary bladder in pelvic cavity underneath peritoneum, expose urinary bladder to observe its parts, observe peritoneal reflections, secure vascular supply, explore its relation with surrounding structures.

Preserve specimens of kidney, ureter and bladder.

Practical Training 14.2 : Dissection of testis, epididymis and vas deferens.**Dissection of testis, epididymis and vas deferens (7hour)**

Teacher shall demonstrate key features of dissection of testis, epididymis and vas deferens. Scholar shall follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Rehearse neurovascular supply before attempting to dissect.

Identify scrotum underneath penile urethra of male. Observe layers of scrotum by longitudinal incision and relate layers to layers of anterior abdominal wall, expose testes and associated structures like epididymis and spermatic cord. Carefully cut longitudinal section of spermatic cord to expose vas deferens, testicular artery and pampiniform plexus of veins, identify epididymis closely associated with testes and observe its different parts.

Practical Training 14.3 : Dissection of ovary, uterine tubes and uterus.

Teacher shall demonstrate key features of dissection of ovary, uterine tubes and uterus. Scholar shall follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Rehearse neurovascular supply before attempting to dissect.

1. Dissection of ovary, uterine tubes and uterus (2hour)

Explore uterus between urinary bladder and rectum covered in peritoneum, explore uterus and fallopian tubes while enclosed in broad ligaments, identify ovary on lateral wall of pelvis in close association with fimbria, explore position and relations of ovary, secure structures around ovary, remove the ovary along with vascular bundles from the wall, observe interior of ovary.

Explore various parts of fallopian tube by removing ligaments of ovary, explore layers of fallopian tube by sectioning. explore ligaments of uterus, secure its vascular supply, identify body and cervix observe walls of uterus by sectioning

2. Dissect the ovary and other parts (4hour)

- Removal of the ovary from its attachment.
- Visualize and evaluate the gross anatomy of ovary - location, shape, size, weight, surface, borders, poles etc.
- Expose the uterine tubes and uterus.
- Visualize, identify and evaluate the associated structures i.e. fimbriae, infundibulum, ampulla, isthmus, interstitial part and fundus, body, cervix of the uterus.
- Study of the gross anatomy of uterine tubes such as 10 cm long, 4 parts- infundibulum, ampulla, isthmus, uterine part.
- Study of the gross anatomy of uterus - hollow muscular, pear shaped organ, parts of uterus, walls of uterus etc.
- Visualize and evaluate the associated structures of Vagina - urinary bladder, urethra, rectum, pouch of Douglas, cervix of uterus, vulva, hymen etc.
- Study of the gross anatomy of vagina. - fibromuscular, elastic canal, 7-9 cm in length etc.

Practical Training 14.4 : Dissection of male urethra and female urethra; vagina and penis; and prostate gland and seminal vesicles.

Teacher shall demonstrate key features of dissection of male urethra and female urethra; vagina and penis; and prostate gland and seminal vesicles. Scholar shall follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Rehearse neurovascular supply before attempting to dissect.

1. Dissection of male urethra, penis, prostate gland and seminal vesicles (4hour)

perform dissection of the urogenital triangle to expose structure of urethra and penis region, Expose roots, bulb and corpora with various muscles and neurovascular bundles of the penis, Expose and identify urogenital diaphragm, Expose and locate the prostate gland and seminal vesicles, 7. Visualize and evaluate the four parts of urethra beginning from urinary bladder up to exterior of urethra, Study the gross anatomy of urethra by making sagittal and coronal section.

2. Dissection of female urethra and vagina (4hour)

Dissection of urethra and urogenital triangle of the perineum, Identify various parts of external genitalia and glandular structures, Visualize and evaluate the urethra beginning from urinary bladder up to exterior of urethra. Identify the structures of female external genitalia, like; mons pubis, labia majora, labia minora, clitoris, vestibule, external urethral orifice, vaginal orifice, Bartholin's glands, perineum, study of gross anatomy of mons pubis, labia majora, labia minora, clitoris, urethral opening and vaginal opening,

Practical Training 14.5 : Model study of Pratyanga related to Mutravaha, Shukravaha and Artavavaha Srotas

Scholar can perform any activity as guided by teacher, like;

1. Construction of models of various kosthangs with the help of modellers (3D models) in museum.
2. Virtual and app based study of Kosthangs.

Experiential learning Activity

Experiential-Learning 14.1 : Clinical/surgical correlates of kidney, ureter and urinary bladder.

Teacher shall allot atleast two activities from each topic to every scholar to assess anatomical basis of diseases related to kidney, ureter and urinary bladder.

1. Clinical/surgical correlates of kidney (3hour)

Applied Anatomy of kidney (Malformations of kidney, Renal Failure, Kidney stones, Nephrectomy, Dialysis, Kidney transplant); Functional aspects of kidney (Excretion of waste products, Regulation of fluids and Electrolyte balance, Acid - Base Homeostasis, BP regulation, Erythropoiesis regulation, Detoxification and drug metabolism, Regulation of Vitamin D, Detoxification of metabolic products, Glucogenesis, Hormone Secretion); Evaluation of structural changes in pathological condition of kidney (Glomerular Diseases, Tubular Diseases, Renal vascular Diseases, Polycystic Kidney Disease, Kidney stones, Renal Fibrosis, Acute and chronic renal failure, Nephrotic Syndrome); Study of Kidney by Dyes (IVP of X-rays ,CTscan - Urogram, MRI, Ultrasonography). Scholar can take the help from data resources available on the internet to execute the assigned topic.

2. Clinical/surgical correlates of ureter (3hour)

Applied Anatomy of ureter (Malformations of ureter, Duplex ureter, Kidney stones, Ureteric Obstruction, Ureteral Reimplantation Surgery, Transplantation, Ureteropelvic junction Obstruction); Functional aspects of ureter(Ureteral Spincter Mechanism, Chronic distension, Ureteral Colic, Vesicoureteral reflux, Peristalsis, Urine transport, Maintain hydration and electrolyte balance); Clinical importance of constrictions of ureter (Hydronephrosis, Obstruction of urine, ureteral stricture, Tumours). Scholar can take the help from data resources available on the internet to execute the assigned topic.

3. Clinical/surgical correlates of urinary bladder (2hour)

Applied Anatomy of Bladder (Congenital abnormalities and Malformations of Urinary bladder, Bladder stones, bladder rupture, Bladder Diverticula); Functional aspects of Bladder (Bladder Capacity and compliance, Bladder Dysfunction, Regulation of micturition, Urine expulsion, Neurogenic bladder, Urinary retention); Evaluate structural changes in pathological condition of Bladder (Cystitis, Interstitial cystitis, Fibrosis, Cystolithiasis, bladder outlet obstruction, Bladder cancer). Scholar can take the help from data resources available on the internet to execute the assigned topic.

Experiential-Learning 14.2 : Clinical/surgical correlates of testis, epididymis and vas deferens.

Teacher shall allot atleast two activities from each topic to every scholar to assess anatomical basis of diseases related totestis, epididymis and vas deferens.

Clinical/surgical correlates of testis, epididymis and vas deferens - Applied Anatomy (Congenital abnormalities and malformations, Cryptorchidism, Varicocele); Functional aspects (Sperm production, Hormonal balance, Sperm maturation, Sperm storage, Sperm transport); pathological condition (Testicular torsion, Orchitis). Scholar can take the help from data resources available on the internet to execute the assigned topic.

Experiential-Learning 14.3 : Clinical/surgical correlates of ovary, uterine tubes and uterus..

Teacher shall allot atleast two activities from each topic to every scholar to assess anatomical basis of diseases related to ovary, uterine tubes and uterus.

1. Clinical/surgical correlates of ovary (4hour)

Applied Anatomy of Ovary (Malformation and congenital abnormalities of ovary, ovarian torsion, ectopic pregnancy); Functional aspects of Ovary (Regulation of hormones, maintainance of endometrium, role in reproduction, oogenesis, follicular development, ovulation, regulation of menstrual cycle); Evaluate structural changes in pathological condition of Ovary - Ovarian cyst, PCOS, ovarian tumors). Scholar can take the help from data resources available on the internet to execute the assigned topic.

2. Clinical/surgical correlates of uterine tubes and uterus (4hour)

Applied Anatomy (cogenital anomalies and malformation of uterine tubes and uterus, uterine prolapse, ectopic pregnancy, tubal ligation); Functional aspects (Tubal patency, tubal blockage, tubal dysfunction, endometrial changes, menstrual cycle changes, decreased fertility); structural changes in pathological condition (Pelvic inflammatory disease, endometriosis, fibroids, cervical cancer, adenomyosis). Scholar can take the help from data resources available on the internet to execute the assigned topic.

Experiential-Learning 14.4 : Clinical correlates of male urethra, female urethra, vagina, penis, prostate gland and seminal vesicles.

Teacher shall allot atleast two activities from each topic to every scholar to assess anatomical basis of diseases related to male urethra, female urethra, vagina, penis, prostate gland and seminal vesicles.

1. Clinical correlates of male urethra (2hour)

Malformations of male urethra, Penile fractures, Urethral trauma, Bladder outlet; Functional aspects of male urethra (External sphincter dysfunction); structural changes in pathological condition of male urethra (Urethral strictures, urethritis, urethral carcinoma, Urethritis, BPH, Prostate cancer, Ejaculatory dysfunction, Hypospadias). Scholar can take the help from data resources available on the internet to execute the assigned topic.

2. Clinical correlates of female urethra (1hour)

Applied Anatomy of female urethra (Malformations of female urethra, Urethral prolapse, Urethral Diverticulum); Functional aspects of female urethra (Urinary Incontinence, Bladder Dysfunction); structural changes in pathological condition of female urethra (Urethral strictures, Urethritis, Cystitis, UTI). Scholar can take the help from data resources available on the internet to execute the assigned topic.

3. Clinical correlates of penis (1hour)

Applied Anatomy of Male external genitalia (Congenital anomilies and malformation, Peyronie's disease, penile fracture, epididymitis, spermatic cord torsion, perineal trouma, STI's); Functional aspects of Male external genitalia (Sexual dysfunction, hypogonadism, erectile dysfunction); structural changes in pathological condition of Male External Genitalia (Hydrocele, varicocele, testicular torsion, testicular cancer, spermatocele). Scholar can take the help from data resources available on the internet to execute the assigned topic.

4. Clinical correlates of female external genitalia (1hour)

Applied Anatomy of Female external genitalia (Congenital anomalies and malformation of female external genitalia, bartholins cyst, vulvar carcinoma, episiotomy, urethral caruncle); Functional aspects of Female external genitalia (Regulation of hormones, thermal regulation, protection, lubrication, child birth); structural changes in pathological condition of Female external Genitalia - UTI,vulvitis,bartholins cyst, lichen sclerosus, vulvar cancer etc.). Scholar can take the help from data resources

available on the internet to execute the assigned topic.

5. Clinical correlates of vagina (2hour)

Applied Anatomy of Vagina (Congenital anomalies and malformations of vagina, prolapse; Functional aspects of Vagina (Dyspareunia, vaginismus, vaginal dryness); structural changes in pathological condition of Vagina - Vaginal infections, vaginal atrophy, cervical cancer, vaginitis). Scholar can take the help from data resources available on the internet to execute the assigned topic.

6. Clinical correlates of prostate gland (2hour)

Applied Anatomy of prostate gland (Congenital anomalies and malformations of prostatic gland, Prostatitis); Age related changes of prostate gland (Benign prostatic hyperplasia, Prostatic calcification); structural changes in pathological condition of prostate gland (Prostate Cancer, Changes in Prostate Histology). Scholar can take the help from data resources available on the internet to execute the assigned topic

7. Clinical correlates of Seminal Vesicle and bulbourethral glands (1hour)

Applied Anatomy (Congenital anomalies and malformation, Seminal vesiculitis); Functional aspects (Blockage / malfunction); structural changes in pathological condition (Seminal vesicle cysts, Bulbourethritis). Scholar can take the help from data resources available on the internet to execute the assigned topic

Experiential-Learning 14.5 : Clinical/surgical correlates of Mutravaha, Shukravaha and Artavavaha Srotas mentioned in Samhita.

Teacher shall allot at least two activities from each topic to every scholar to assess anatomical basis of diseases related to Mutravaha, Shukravaha and Artavavaha Srotas studenta will give their reflection.

1. Clinical/surgical correlates of Shukravaha Srotas (2hour)

Evaluation of disorders, like; Klaivya, Sukrameha, Vrushanshosha, Arsha, Asthila and Vriddhi etc.

2. Clinical/surgical correlates of Artavaha Srotas (1hour)

Evaluation of disorders, like; Artavakshaya, Asrigdhara, Garbhasaya Arbuda, Yoni Vyapad, PCOS, infertility, prolapse and UTI etc.

3. Clinical/surgical correlates of Mutravaha Srotas (2hour)

Evaluation of disorders, like; Ashmari, Mutrakricha, Mutraghat etc.

Modular Assessment

Assessment method

Hour

Instructions—Conduct a structured modular assessment. The assessment will be for 75 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C.

6

1. Practical Enact- Dissection of Urogenital System (25Mark)

Students will perform a detailed dissection of the urogenital system, identifying and demonstrating the structural organization of the kidneys, ureters, urinary bladder, urethra,

2. Practical Enact- Dissection of Genital tract (25Mark)

Students will perform a detailed dissection of the male/ female reproductive organs. In males, they will expose the testes, epididymis, vas deferens, seminal vesicles, prostate, and penis; while in females, they will dissect the ovaries, fallopian tubes, uterus, vagina, and associated ligaments. Students will trace the urinary and genital tracts, observe the blood and lymphatic supply, and study the spatial relationships with pelvic and abdominal viscera.

3. QUIZ (25Mark)

This quiz activity is designed to assess students conceptual understanding of the Mutravaha, Shukravaha, and Artavavaha Srotas in relation to their anatomical structure sthana, shloka etc.

or

Any practical in converted form can be taken for assessment. (40Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (35Mark)

Paper No : 3 Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa						
Semester No : 3						
Module 15 : Urdhvajatrugata evum Prishthagata Asthi- Peshi Sharir (Osteology and Myology of Head, Neck and Back)						
Module Learning Objectives (At the end of the module, the students should be able to) Analyze the role of bones and muscles in providing various movements around joints. Analyze the role of bones and muscles in distribution of weight in lower part of body. Demonstrate structure of bones and muscles of axial skeleton.						
M 15 Unit 1 osteology and myology of skull 15.1.1. Axial skeleton- Normas of Skull 15.1.2. Individual bones of Face and Cranium 15.1.3. Muscles of Cranial Vault and Mastication and Facial Expression References: 11,12,13,14,15,16,19						
3A	3B	3C	3D	3E	3F	3G
CO4	Analyze formation of cranium and cranial cavity as cranial extension of vertebral column and vertebral cavity. Relate features of interior of cranium to the corresponding brain structures.	1	Lecture	CAN	Knows-how	L_VC
CO4	Demonstrate individual bones of cranium and facial skeleton and compare foetal and adult skull with demonstration of origin, insertion, function and nerve supply of muscles of face and mastication.	8	Practical Training 15.1	PSY-MEC	Shows-how	D-M,DSN
CO1,CO4	Evaluate and interpret structural disorders of cranium and facial bones; Identify and analyze medicolegal and age related changes in cranial bones and facial skeleton and	6	Experiential-Learning 15.	CE	Does	CBL,L_VC

	evaluate clinical correlates of muscles of face and head.		1			
CO4	Analyze accommodative changes in formation of facial skeleton to harbour sensory organs, pneumatic nature of bones of facial skeleton and intimate relation of facial muscles with emotions.	3	Lecture	CAN	Knows-how	L&PPT,IBL
M 15 Unit 2 Osteology and myology of cervical region 15.2.1. Cervical Vertebrae 15.2.2. Muscles of Neck 15.2.3. Anterior and lateral vertebral muscles of Neck References: 11,12,13,14,15,16,19						
3A	3B	3C	3D	3E	3F	3G
CO4	Analyze muscles of neck in two broad groups; muscles supporting functions of viscera and muscles supporting skeleton.	1	Lecture	CAN	Knows-how	L&PPT
CO4	Demonstrate the general features of vertebrae and analyze segmented nature of vertebral column as key feature to facilitate; multiple range of movements, absorption of shock and attachment to axial groups of muscles while protecting spinal cord.	4	Practical Training 15.2	CE	Knows-how	DSN,D
CO4	Evaluate and interpret structural disorders of cervical vertebrae; and evaluate clinical correlates of muscles of neck.	10	Experiential-Learning 15.2	CE	Does	CD,CBL
CO4	Analyze bifid spine, foramen transversarium, thicker intervertebral discs, structure of atlas and axis to underline uniqueness of cervical vertebrae.	1	Lecture	CAN	Knows-how	L&GD
M 15 Unit 3 Osteology and myology of lumbar and sacral region 15.3.1. Thoracic vertebrae 15.3.2. Lumbar, Sacral and Coccygeal Vertebrae 15.3.3. Muscles of vertebral column References: 11,12,13,14,15,16,19						
3A	3B	3C	3D	3E	3F	3G

CO4	Analyze general features of vertebrae and analyze segmented nature of vertebral column as key feature to facilitate; multiple range of movements, absorption of shock and attachment to axial groups of muscles while protecting spinal cord.	2	Lecture	CAN	Knows-how	L&PPT
CO4	Evaluate and interpret structural disorders of thoracic, lumbar, sacral and coccyx vertebrae; and evaluate clinical correlates of muscles of back region.	10	Experiential-Learning 15.3	CE	Knows-how	CBL,D-BED
CO4	Identify, demonstrate and differentiate thoracic, lumbar, sacral and coccyx vertebrae and demonstrate origin, insertion, function and neurovascular supply of muscles of chest and back.	3	Practical Training 15.3	PSY-MEC	Shows-how	D
CO4	Analyze role of bones and muscles of rib cage in protecting and facilitating function of thoracic viscera while supporting pectoral girdles.	2	Lecture	CAN	Knows-how	L&PPT,LS
CO4	Dissect the muscles of back region.	5	Practical Training 15.4	PSY-MEC	Shows-how	DSN

Practical Training Activity

Practical Training 15.1 : Dissection of head.

Dissection of head -

Scholar should perform dissection of face region to expose muscles of face and trace their neuromuscular supply on cadaver or by 3D virtual dissector to identify muscles and their neurovascular supply.

Scholar should further open the cranial cavity to carefully take out the brain while observing relation of various brain structures, like; duramater, lobes, cranial nerve etc.

Scholar should observe the interior of cranium to observe bony landmarks and their contents.

Practical Training 15.2 : Practical study of cervical vertebrae on original specimen or 3D virtual dissector.

Practical study of cervical vertebrae -

Scholar should study features of all cervical vertebrae on the original specimens of cervical vertebrae preferably. scholar should attempt to identify specific features of each cervical vertebra and differentiate them from general features.

Scholar should expose muscles of neck and their neurovascular supply and expose trachea, larynx and oesophagus to observe their relations. Scholar should also expose cervical extension of autonomic nervous system.

Scholar should expose cervical vertebral column to view its features and intervertebral disc.

Practical Training 15.3 : Practical study of thoracic, lumbar, sacral and coccyx vertebrae.

Practical study of thoracic, lumbar, sacral and coccyx vertebrae (3hour)

Scholar should study features of all thoracic, lumbar, sacral and coccyx vertebrae on the original specimens preferably. scholar should attempt to identify specific features of each vertebra and identify cardinal features. Scholar should attempt to differentiate all thoracic vertebrae from each other and lumbar vertebra from each other in the same way.

Scholar should attempt to study vertebral column after exposure of muscles of back.

Scholar should cut through the lamina of vertebrae to expose spinal cord to observe spinal cord/nerves and vascular supply.

Practical Training 15.4 : Dissection of muscles of back region.

Dissection of muscles of back region

Scholar should follow the dissector to dissect muscles of back region taking care of basic rules of dissection. Scholar shall follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Rehearse neurovascular supply before attempting to dissect. carefully dissect the back to identify erector spinae, spinotransverse, interspinalis, intertransversi groups of muscles to understand their function.

Experiential learning Activity

Experiential-Learning 15.1 : Clinical correlation of skull and facial muscles.

Student should be encouraged to attend the orthopaedic OPD and IPD and OT's. Every student should be given separate assignment from each activity. Scholar should follow specific conditions of disorders of bones of skull and muscles of face. scholar should present the findings for discussion in the class.

1. Clinical correlates of skull (3hour)

Disorders of bones of skull - craniosynostosis, hemifacial microsomia (goldenhar syndrome), mandibulofacial dysostosis (treacher collins syndrome); forensic applications of skull bone -determination of sex,age and race.

2. Clinical correlates of facial muscles (3hour)

Facial nerve injuries, facial reconstruction and superimposition

Experiential-Learning 15.2 : Clinical correlates of cervical vertebrae and muscles of neck.

Student should be encouraged to attend the orthopaedic OPD and IPD and OT's. Every student should be given separate assignment from each activity. Scholar should follow specific conditions of disorders of cervical vertebrae and muscles of neck. scholar should present the findings for discussion in the class and gives own reflection.

Clinical correlates of cervical vertebrae and muscles of neck - cervical spondylosis, herniated discs,cervical radiculopathy, cervical spine stenosis, cervical fracture, cervical

dystonia, whiplash injuries, vertebral artery issues scholar should attempt to identify structural basis of these disorders.

Experiential-Learning 15.3 : Clinical correlates of thoracic, lumbar, sacral and coccyx vertebrae and muscles of back region.

Student should be encouraged to attend the orthopaedic OPD and IPD and OT's. Every student should be given separate assignment from each activity. Scholar should follow specific conditions of disorders of thoracic, lumbar, sacral and coccyx vertebrae and muscles of back region scholar should present the findings for discussion in the class.(2hour)

Clinical correlates of thoracic, lumbar, sacral and coccyx vertebrae and muscles of back region - spondylosis, herniated disc, spinal stenosis, scoliosis, lordosis, ankylosing spondylitis, radiculopathy, degenerative disc disease, osteoporosis etc. Scholar should attempt to identify structural basis of disorders.(3hour)

Evaluate the clinical and anatomical correlation of procedures like traction and physiotherapy in relation to Lumbar, Sacral and Coccygeal vertebral disorders.(5hour)

Modular Assessment

Assessment method

Hour

Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C.

1.OSPE - Osteology of the Axial Skeleton (25Mark)

OSPE station assesses students' observation, classification, and anatomical reasoning skills in osteology.

Students will be provided with individual bones such as cervical, thoracic, and lumbar vertebrae, sternum, and ribs. They will be asked to identify the bone type, side determination, and key anatomical landmarks such as the vertebral foramen, transverse process, body, costal groove, manubrium, and sternal angle. Structured questions will assess their ability to differentiate between vertebrae types based on structural features and explain their biomechanical roles. Additional components may include image-based identification and clinical correlations like scoliosis or herniated disc.

2.OSPE - Myology of the Axial Skeleton (25Mark)

OSPE station will evaluate students' understanding and application of the myology related to the axial skeleton. Using charts, models, or prosected specimens, students will identify key muscles such as the erector spinae group, rectus abdominis, intercostal muscles, diaphragm, and suboccipital muscles. Each task will require students to state the muscle's origin, insertion, nerve supply, and action. Applied questions may focus on the functional roles of these muscles in breathing, posture, or spinal movement, and common clinical issues like muscle strain or respiratory dysfunction. This station ensures assessment of both structural knowledge and functional application in axial muscle anatomy.

or

Any practical in converted form can be taken for assessment.(25Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)

4

Module 16 : Shakhagata Asthi evum Peshi Sharir (osteology and Myology of Upper and Lower limbs)**Module Learning Objectives****(At the end of the module, the students should be able to)**

Analyze, perform and demonstrate bone structure through attachment of muscles.

Role of muscles in locomotion of body parts.

M 16 Unit 1 Osteology and myology of shoulder and arm
16.1.1. Bones and muscles of Shoulder
16.1.2. Bones and muscles of Arm**References:** 11,12,13,14,15,16,19

3A	3B	3C	3D	3E	3F	3G
CO4	Analyze structure of clavicle, scapula and humerus in relation to different attachments.	1	Lecture	CAN	Knows-how	L&PPT
CO4,CO6	Dissect and demonstrate structural features of the bones of shoulder, scapular and arm region (clavicle, scapula and humerus) and demonstrate origin, insertion and action of muscles of shoulder, scapular and arm region on cadaver or 3D virtual dissector.	6	Practical Training 16.1	PSY-MEC	Shows-how	DL,DSN
CO4	Evaluate and interpret structural disorders of bones of shoulder, scapular and arm region (clavicle, scapula and humerus) by study of original bone specimens or 3D virtual dissector; and evaluate clinical correlates of muscles of shoulder, scapular and arm region.	9	Experiential-Learning 16.1	CE	Does	X-Ray,PB L,D-BED
CO4	Analyze role of structural features of bones converging on shoulder, back and arm region (clavicle, scapula and humerus) in providing substratum for muscles for fixidity and stability to upper limb.	1	Lecture	CAN	Knows-how	BL

CO4	Analyze all possible movements of upper limb at shoulder region by depicting role of muscles in each possible movement.	1	Lecture	CAN	Knows-how	L&GD
M 16 Unit 2 Osteology and myology of forearm and hand 16.2.1. Bones and muscles of Forearm and Hand 16.2.2. Bones and muscles of Forearm and Hand References: 11,12,13,14,15,16,19						
3A	3B	3C	3D	3E	3F	3G
CO4	Analyze features of bones of forearm (Radius, and Ulna) and hand (carpal, metacarpal, phalanges) in relation to different attachment.	1	Lecture	CAN	Knows-how	L&PPT
CO4,CO6	Dissect and demonstrate structural features of the bones of forearm (Radius, and Ulna) and hand (carpal, metacarpal, phalanges) by study of original bone specimens or 3D virtual dissector. Dissect muscles of forearm (Radius, and Ulna) and hand (carpal, metacarpal, phalanges) on cadaver or 3D virtual dissector and demonstrate origin, insertion and actions.	6	Practical Training 16.2	PSY-MEC	Shows-how	DSN,D
CO4	Evaluate and interpret structural disorders of forearm (Radius, and Ulna) and hand (carpal, metacarpal, phalanges) by study of original bone specimens or 3D virtual dissector; and evaluate clinical correlates of muscles of shoulder, scapular and arm region.	10	Experiential-Learning 16.2	CE	Does	CBL,SIM ,PBL
CO4	Discuss and analyze group of muscles responsible for movements at elbow, wrist, metacaro-phalangeal and interphalangeal joints.	1	Lecture	CAN	Knows-how	C_L
CO4	Analyze the mechanisms that facilitate larger range of movement on the expense of strength in upper limb.	1	Lecture	CAN	Knows-how	L&GD
M 16 Unit 3 Osteology and myology of hip and thigh 16.3.1. Bones and Muscles of Hip 16.3.2. Bones and Muscles of Thigh References: 11,12,13,14,15,16,19						

3A	3B	3C	3D	3E	3F	3G
CO4	Analyze features of hip bone and femur in relation to different bony attachments; and compare hip bone and femur with corresponding features of scapula, clavicle and humerus.	1	Lecture	CAN	Knows-how	L&PPT
CO4,CO6	Dissect and demonstrate structural features of the hip bone and femur and origin, insertion and action of muscles of gluteal and thigh regions on cadaver or 3D virtual dissector.	6	Practical Training 16.3	PSY-MEC	Shows-how	DL,DSN
CO4	Evaluate and interpret structural disorders of hip bone and femur by study of original bone specimens or 3D virtual dissector; and evaluate clinical correlates of muscles of gluteal and thigh regions.	9	Experiential-Learning 16.3	CE	Does	CBL,TBL,X-Ray
CO4	Analyze all possible movements of lower limb at hip region; and depict role of each muscle/muscle group, attached to hip bone and femur, in each possible movement.	1	Lecture	CAN	Knows-how	DIS
CO4	Analyze different groups of muscles of thigh region bringing specific movements.	1	Lecture	CAN	Knows-how	IBL,SDL

M 16 Unit 4 Osteology and myology of leg and foot16.4.1. Bones and Muscles of Leg

16.4.2. Bones and Muscles of Foot

References: 11,12,13,14,15,16,19

3A	3B	3C	3D	3E	3F	3G
CO4	Analyze specific features of bones of leg (tibia and fibula) and foot (tarsals, metatarsal and phalanges) in relation to different attachments.	1	Lecture	CAN	Knows-how	L&PPT
CO4,CO6	Dissect and demonstrate structural features of the bones of leg (tibia and fibula) and foot (tarsals, metatarsal and phalanges) by study of original bone specimens or 3D virtual dissector and demonstrate origin, insertion and action of muscles of leg and foot regions.	6	Practical Training 16.4	PSY-MEC	Shows-how	DL,DSN
CO4	Evaluate and interpret structural disorders of the bones of leg (tibia and fibula) and foot	10	Experiential-	CE	Does	BS,CBL

	(tarsals, metatarsal and phalanges) by study of original bone specimens or 3D virtual dissector; and evaluate clinical correlates of muscles of leg and foot regions.		Learning 16.4			
CO4	Analyze incorporation of strengthon the expense of mobility in loewer limb.	1	Lecture	CAN	Knows-how	L_VC,RP
CO4	Discuss the function of different groups of muscles in leg and foot region.	1	Lecture	CC	Knows-how	C_L

M 16 Unit 5 Comparative osteology and myology of limbs; Asthi and bones16.5.1. Comparison of bones and muscles of upper and lower appendicular skeleton.
16.5.2. Analysis of Ayurvedokt Asthi Sharir in context of modern Anatomy

References: 11,12,13,14,15,16,19

3A	3B	3C	3D	3E	3F	3G
CO4	Compare shape, size and orientation of bones of upper appendicular skeleton with corresponding bones of lower limb.	1	Lecture	CC	Knows-how	L&PPT
CO4	Demonstrate homology in upper and lower appendicular skeleton by doing comparative study of corresponding bones of upper and lower limb by original bones or 3D virtual dissector. Demonstrate similarity in function of different muscular groups of corresponing regions of upper limb and lower limb.	6	Practical Training 16.5	CAP	Knows-how	D-M,PAL
CO4	Evaluate homology in upper and lower appendicular skeleton along with muscular differentiation as necessary consequences of human evolution.	1	Experiential-Learning 16.5	CAN	Knows-how	Mnt,IBL
CO4	Compare different musle groups of upper and lower appendicular skeleton.	1	Lecture	CC	Knows-how	L
CO4	Analyze concept of Asthi and Peshi in Ayurveda.	1	Lecture	CAN	Knows-how	SDL,C_L

Practical Training Activity

Practical Training 16.1 : Dissection of shoulder, scapular and arm region.

1. Practical study of clavicle, scapula and humerus (2hour)

Scholar should study features of bones of clavicle, scapula and humerus on the original specimens preferably. scholar should attempt to identify specific features of each bone and identify cardinal features.

2. Dissection of muscles of shoulder, scapular and arm region (4hour)

Scholar should follow the dissector to dissect in a sequential manner taking care of basic rules of dissection. Scholar shall follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Reherse neurovascular supply before attempting to dissect. carefully dissect groups of muscles to understand their function.

After dissection student may be given assignment like model preparation/ presentations/ regarding line incision/ dissection etc.

Practical Training 16.2 : Dissection of bones and muscles of forearm (Radius, and Ulna) and hand (carpal, metacarpal, phalanges).

1. Practical study of radius, ulna, carpals, metacarpals and phalanges (3hour)

Scholar should study features of radius, ulna, carpals, metacarpals and phalanges bones on the original specimens preferably. scholar should attempt to identify specific features of each bone and identify cardinal features.

2. Dissection of muscles of forearm and hand (3hour)

Scholar should follow the dissector to dissect in a sequential manner taking care of basic rules of dissection. Scholar shall follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Reherse neurovascular supply before attempting to dissect. carefully dissect groups of muscles to understand their function.

Practical Training 16.3 : Dissection of gluteal and thigh region.

1. Practical study of hip bone and femur (3hour)

Scholar should study features of hip bone and femur on the original specimens preferably. scholar should attempt to identify specific features of each bone and identify cardinal features.

2. Dissection of muscles of gluteal and thigh regions (3hour)

Scholar should follow the dissector to dissect in a sequential manner taking care of basic rules of dissection. Scholar shall follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Reherse neurovascular supply before attempting to dissect. carefully dissect groups of muscles to understand their function.

student may be given assignment like presentations/ regarding line incision/ dissection

Practical Training 16.4 : Dissection of leg and foot region.

1. Practical study of tibia, fibula, tarsals, metatarsal and phalanges (2hour)

Scholar should study features of bones on the original specimens preferably. scholar should attempt to identify specific features of each bone and identify cardinal features.

2. Dissection of muscles of leg and footgions (4hour)

Scholar should follow the dissector to dissect in a sequential manner taking care of basic rules of dissection. Scholar shall follow basic principle of observation and exploration before initiating dissection. Observe shape, size, position and relations of the structure to be dissected. Reherse neurovascular supply before attempting to dissect. carefully dissect groups of muscles to understand their function.

Practical Training 16.5 : Comparative study of upper and lower appendicular musculoskeleton.

Teacher shall demonstrate key features of one set of bone for example to the scholars.

1. Comparative study of bones of upper and lower limb - Scholar shall study borders, surfaces, tubercles, lines, fossae, sulci etc of humerus carefully on the original specimen. Identify the corresponding points of femur by taking care of orientation of femur with respect to humerus and relate them. record observations and discuss with peers. repeat the same with other bones.

2. Comparative study of muscles of upper and lower limb - Scholar shall study muscles on the cadaver or by 3D virtual dissector. scholar shall identify identical groups of muscles then compare attachments. Scholar shall record the observation and discuss with peers.

Experiential learning Activity

Experiential-Learning 16.1 : Clinical correlates of bones and muscles of shoulder, scapular and arm region.

Student should be encouraged to attend the orthopaedic OPD and IPD and OT's. Every student should be given seperate assignment from each activity. Scholar should follow specific conditions of disorders of clavicle, scapula and humerus and muscles of shoulder, scapular and arm region. scholar should presnt the findings for discussion in the class.

Clinical correlates of clavicle, scapula and humerus and muscles of shoulder, scapular and arm region

1. Student should be asked to interpret diagnosis on X-Ray, CT scan and MRI imaging in the various disorders of shoulder.

2. Nerve examination - tendon reflexes of biceps, triceps and brachioradialis, brachial plexus injuries like (erd-duchenne palsy, klumpke palsy, injuries of long tharacic, axillary nerve)

3. Muscle examination - poland syndrome, popeye syndrome, winged scapula, dropped shoulder

4. Bone examination - fractures of clavicle, scapula and humerus.

Experiential-Learning 16.2 : Clinical correlates of bones of forearm (Radius, and Ulna) and hand (carpal, metacarpal, phalanges).

Student should be encouraged to attend the orthopaedic OPD and IPD and OT's. Every student should be given separate assignment from each activity. Scholar should follow specific conditions of bony and muscular disorders of forearm and hand. scholar should present the findings for discussion in the class.

1. Clinical correlates of bones of forearm (Radius, Ulna) and hand (carpal, metacarpal, phalanges) - (2hour)

Identify the common diseases related to muscles of forearm. Demonstrate the X-ray, CT scan and MRI images of muscle of forearm in various disorders. Evaluate the effect of procedure like physiotherapy, exercise and massage therapy in relation to various disorders of muscles of forearm.

Student should be asked to interpret diagnosis on X-Ray, CT scan and MRI imaging in the various disorders of Injuries of forearm and hand. (sprain, strain, fractures, tennis elbow, golfer's elbow, carpal tunnel syndrome etc.) case based learning in physiotherapy exercises and yogasanas in the disorder of forearm and hand.

2. Nerve examination (2hour) - Radial, ulnar and median nerve injuries.

3. Muscle examination (2hour) - Tennis elbow, mallet finger, boutonniere deformity, trigger finger

4. Bone examination (2hour) - Monteggia's fracture, Galeazzi's fracture, Colles' fracture, Smith's fracture, Bennett's fracture etc.

5. Vascular examination (2hour) - Radial pulse.

Experiential-Learning 16.3 : Clinical correlates of gluteal and thigh regions.

Student should be encouraged to attend the orthopaedic OPD and IPD and OT's. Every student should be given separate assignment from each activity. Scholar should follow specific conditions of bony and muscular disorders of gluteal and thigh regions. scholar should present the findings for discussion in the class.

Clinical correlates of gluteal and thigh regions -

1. Nerve examination - femoral and sciatic nerve injuries, obturator nerve injury

2. Muscle examination - rupture of rectus femoris, gluteal tendinopathy, muscle strain and piriformis syndrome.

3. Bone examination - fractures of femur.

Experiential-Learning 16.4 : Clinical correlates of leg and foot regions.

Student should be encouraged to attend the orthopaedic OPD and IPD and OT's. Every student should be given separate assignment from each activity. Scholar should follow specific conditions of bony and muscular disorders of leg and foot regions. scholar should present the findings for discussion in the class.

Clinical correlates of leg and foot regions -

1. Nerve examination - sciatic nerve injuries, common peroneal nerve injury tibial nerve injury

2. Muscle examination - rupture of tendocalcaneus, plantaris tendon, dislocation of peroneal tendons, patellar and achilles tendon reflexes, plantar fasciitis

3. Bone examination - fractures of tibia and fibula, patellar dislocations, fractures of talus calcaneum and metatarsals, calcaneal spur,

4. Vascular examination - examination of popliteal and dorsalis pedis arteries, arterial occlusive disease of leg, varicose veins, venous cutdowns.

Experiential-Learning 16.5 : Correlates of upper and lower appendicular musculoskeleton.

Teacher shall allot separately to every scholar at least two activities from each topic (bones and muscles) to do comparative study of corresponding bones and muscle-

groups of upper and lower limb. Scholar shall use data resources, original specimens, cadaveric exposure to identify causes behind functional differentiation. Scholar shall record the observation and discuss with peers.

Modular Assessment

Assessment method	Hour
Instructions—Conduct a structured modular assessment. The assessment will be for 75 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1.OSPE - Osteology of the Limbs (25Mark) In this OSPE station, students will examine bones from both upper and lower limbs—such as the humerus, radius, ulna, femur, tibia, fibula, scapula, and pelvic bone. Students will be asked to identify key anatomical landmarks, determine the side of the bone, and classify it based on its structure and function. Tasks will include differentiation between bones of similar shape, understanding of ossification centres, bone development, and clinical correlations like fractures (e.g. Colle’s fracture),x-ray images, case scenario. 2.OSPE -Myology of the Limbs (25Mark) At the myology station, students will be presented with models or cadaveric specimens showing muscles of the upper and lower limbs, such as biceps brachii, triceps brachii, deltoid, quadriceps femoris, hamstrings, and gastrocnemius. Student will be asked to identify muscle, and provide details of origin, insertion, action. Functional tasks will include explaining movements like elbow flexion, knee extension, or shoulder abduction, along with relevant clinical scenarios such as foot drop or wrist drop. Students may also be tested using x ray image-based spotters or palpation-based identification in a structured format or problem base scenario. 3.Practical (25Mark) Student will recite the muscle attachment with bone,action of muscles,blood supply, nerve supply and Role of muscles in locomotion of body parts with demonstration or Any practical in converted form can be taken for assessment.(40Mark) and Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (35Mark)	6

Semester No : 4

Module 17 : Asthi-sandhi sharir (Arthrology)

Module Learning Objectives**(At the end of the module, the students should be able to)**

Role of ligaments, muscle and bone in providing multidirectional movements.
 Perform and demonstrate dissection of joints.

M 17 Unit 1 Joints of vertebral column17.1.1. Sacro-coccygeal joint

17.1.2. Intervertebral and Zygapophysial joints

17.1.3. Atlanto-occipital joint and Atlanto-axial Joint

17.1.4. Temporomandibular Joint

References: 11,12,13,14,15,16,19,20,22,23,24,52,53

3A	3B	3C	3D	3E	3F	3G
CO4	Analyze ligaments of the joints of axial skeleton to identify their role in permitting movement in specific directions only and assess cumulative action.	3	Lecture	CAN	Knows-how	L&PPT
CO4,CO6	Dissect the structure and differentiate between intervertebral joints, zygapophyseal joints, craniovertebral joints (atlanto-occipital and atlantoaxial joints, lumbosacral joint, sacrococcygeal joint) with the help of cadaveric dissection or 3D virtual dissection, and conduct and demonstrate the movements of joints of vertebral bodies. Demonstrate the structure of temporo-vertebral joint and ability to assess joint mobility and stability in normal condition.	6	Practical Training 17.1	PSY-ADT	Does	D,DSN
CO4	Evaluate structural abnormalities and disorders of intervertebral joints, zygapophyseal joints, craniovertebral joints (atlanto-occipital and atlantoaxial joints, lumbosacral joint, sacrococcygeal joint and temporo-vertebral joint.	8	Experiential-Learning 17.1	CE	Does	X-Ray,D-M

M 17 Unit 2 Joints of upper limb17.2.1. Sternal joints

17.2.2. Shoulder joint
 17.2.3. Elbow joint
 17.2.4. Wrist joint
 17.2.5. Joints of hand

References: 11,12,13,14,15,16,19,20,22,23,24,52,53

3A	3B	3C	3D	3E	3F	3G
CO4	Analyze different types of movements executed at shoulder, elbow and wrist joints in relation to ligaments of repective joints; and discuss inverse relation of stability and flexibility of movement in these joints.	1	Lecture	CAN	Knows-how	L&PPT
CO4,CO6	Dissect and demonstrate structure of shoulder, elbow and wrist joints with their movements Dissect and demonstrate the joints of hand; and ability to show complex movements of hand. Dissect and demonstrate the movements of sternal joints and; and show accomodative movements in sternal joints to facilitates movements of upper limb and thoracic viscera.	6	Practical Training 17.2	PSY-MEC	Shows-how	DSN,DL
CO4	Evaluate structural abnormalities and disorders of shoulder, elbow, wrist joints, joints of hand, sternal joints.	9	Experiential-Learning 17.2	CE	Does	CD,CBL, SIM
CO4	Analyze the collective role of joints of hand to bring complex movements in hand.	1	Lecture	CAN	Knows-how	SY,LS
CO4	Analyze sternal joints as outcome of union of ribs.	1	Lecture	CAN	Knows-how	L&GD,E DU

M 17 Unit 3 Joints of lower limb17.3.1. Hip joint

17.3.2. Knee joint
 17.3.3. Ankle joint
 17.3.4. Joints of foot

17.3.5. Analysis of Ayurvedokt Sandhi Sharir in context of modern anatomy

References: 11,12,13,14,15,16,19,20,22,23,24,52,53

3A	3B	3C	3D	3E	3F	3G
CO4	Analyze change in biomechanics of hip joint due to change of bipedal stance from quadrupedal stance in humans.	2	Lecture	CAN	Knows-how	L&PPT
CO4,CO6	Dissect and demonstrate structure and biomechanics of hip joint with the help of muscles, ligaments and bones around the joint. Dissect and demonstrate the structural complexity of knee joint; and demonstrate biomechanics (mobility and stability of joint in maintenance of centre of mass and mobility) of the joint with the help of articular surfaces, passive stabilizers and muscles. Dissect and demonstrate the structure and movements of joints of foot and ankle; and demonstrate the role of muscles, tendons, fasciae, ligaments and bones in executing complex movements in foot.	8	Practical Training 17.3	PSY-MEC	Shows-how	DSN,SIM
CO4	Evaluate structural abnormalities and disorders of hip joint,knee joint, joints of foot and ankle..	9	Experiential-Learning 17.3	CE	Does	CBL,PBL ,SIM
CO4	Analyze structural strength and stability of the joint by discussing biomechanics of the joint and ligaments of knee joint.	1	Lecture	CAN	Knows-how	DIS
CO4	Explain ligaments of joints of ankle and foot ; and role of arches of foot in biomechanics of foot (standing, walking, jumping and running).	1	Lecture	CC	Knows-how	L_VC,GB L

Practical Training Activity

Practical Training 17.1 : Dissection of joints of axial skeleton.

Teacher shall demonstrate key features of articular surfaces and ligaments of joint structure to the scholars. Teacher should also encourage the scholars to relate joint structure with surrounding musculature and neurovascular supply.

Dissection of joints of axial skeleton

Scholars should specifically concentrate on observation of ligament of joints regarding their attachments. Scholar should assess the directions of attachments around the joint. scholar should assess those direction where movement is restricted. After dissection student may be given assignment like model preparation/ presentations/ regarding line incision/ dissection, chart of articulation surfaces, quiz on action of joint and muscle associated with it.

Practical Training 17.2 : Dissection of joints of upper limb.

Teacher shall demonstrate key features of articular surfaces and ligaments of joint of upper limb and sternum to the scholars. Teacher should also encourage the scholars to relate joint structure with surrounding musculature and neurovascular supply.

1. Dissection of shoulder, elbow and wrist joints (2hour)

Scholars should specifically concentrate on observation of ligament of joints regarding their attachments. Scholar should assess the directions of attachments of ligaments around the joint. scholar should assess those direction where movement is restricted. After dissection student may be given assignment like model preparation/ presentations/ regarding line incision/ dissection, chart of articulation surfaces, quiz on action of joint and muscle associated with it.

2. Dissection of joints of hand(2hour)

Scholars should specifically concentrate on observation of simplicity in attachment of ligaments of joints. Scholar should assess the directions of attachments around the joints of hand in totality to understand overall movement and restriction. After dissection student may be given assignment like model preparation/ presentations/ regarding line incision/ dissection, chart of articulation surfaces, quiz on action of joint.

3. Dissection of joints of sternum (2hour)

Students should carefully open the joint space to understand its structure. After dissection student may be given assignment like model preparation/ presentations/ regarding line incision/ dissection, chart of articulation surfaces, quiz on action of joint.

Practical Training 17.3 : Dissection of hip joint. knee joint and joints of foot and ankle.

Teacher shall demonstrate key features of articular surfaces and ligaments of joint of lower limb to the scholars. Teacher should also encourage the scholars to relate joint structure with surrounding musculature and neurovascular supply.

1. Dissection of hip joint (3hour)

Scholars should specifically concentrate on observation of ligament of joints regarding their attachments. Scholar should assess the directions of attachments of ligaments around the joint. scholar should assess those directions where movement is restricted. After dissection student may be given assignment to study biomechanics of hip joint.

2. Dissection of knee joint (3hour)

Scholars should specifically concentrate on observation of complexity of articular surfaces of multiple bones, bursae and ligaments. Scholar should assess the directions of attachments around the joints of hand in totality to understand overall movement and restriction. After dissection student may be given assignment on biomechanics of knee joint.

3. Dissection of joints ankle and foot (2hour)

students should carefully open the joint spaces to understand their structure. After dissection student may be given assignment on biomechanics of foot.

Experiential learning Activity

Experiential-Learning 17.1 : Clinical correlates of joints of axial skeleton.

Teacher shall allot separately to every scholar atleast two activities to evaluate structural abnormalities and disorders of axial skeleton. scholar shall use data resources, original specimens, cadaveric exposure to identify causes behind the disorders.

1. Observe cases related to vertebral diformities/disorders, like; Abnormal curves of vertebral clumn (kyphosis, lordosis), herniated intervertebral discs, dislocations of vertebral columnspondylolisthesis, spinal cord injuries(2hour)
2. Assess and evaluate the efficacy of yoga, physiotherapy and various therapies in spine related disorders.(2hour)
3. Identify the normal and abnormal X-ray, CT scan and MRI related to craniovertebral joints related disorders.(2hour)
4. student will do case study related to disorders of temporo-vertebral joint and craniovertebral joints. Identify age related changes using X-ray, MRI and CT scan. Identify morbid anatomical changes in various disorders temporo-vertebral joint.(2hour)

Experiential-Learning 17.2 : Clinical correlataes of shoulder, elbow and wrist joints,joints of hand, sternal joints.

Teacher shall allot separately to every scholar atleast two activities from each topic to evaluate structural abnormalities and disorders of joints of upper limb. scholar shall use data resources, original specimens, cadaveric exposure to identify causes behind the disorders.

1. Clinical correlataes of shoulder, elbow and wrist joints(4hour)
 - a. Shoulder joint - dislocationis, rotator cuff tendinitis, superspinatus tendon rupture.
 - b. Elbow joint - dislocations, olecranon bursitis.
 - c. Wrist joint - falls.
2. Clinical correlataes of of joints of hand - osteoathritis, ganglion cysts, swan neck deformity of hand, boutonniere deforminty.(3hour)
3. Clinical correlataes of sternal joints - dislocations of sternoclavicular joint, acromioclavicular dislocations.(2hour)

Experiential-Learning 17.3 : Clinical correlataes of hip joint, knee joint, joints of foot and ankle.

Teacher shall allot separately to every scholar atleast two activities from each topic to evaluate structural abnormalities and disorders of joints of lower limb. scholar shall use data resources, original specimens, cadaveric exposure to identify causes behind the disorders.

1. Clinical correlataes of hip joint (3hour)
congenital and traumatic dislocations of hip, trendelenberg's sign of hip stability
2. Clinical correlataes of knee joint (3hour)
synovial membrane knee injuries, ligamentous injuries, meniscal injuries, pneumoarthrography of knee joint, arthroscopy.
3. Clinical correlataes of joints of foot and ankle (3hour)
acute sprains of medial and lateral ankle, dislocations of ankle, hellux rigidus,bursitis,, bunion bursa, pes planus, pes cavus, calcaneal spur etc.

Modular Assessment	
Assessment method	Hour
Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1.Practical Performance- Dissection of Joints (25Mark) To assess students ability to identify, dissect, and describe various types of joints (synovial, fibrous, and cartilaginous) and their structural components. student will Perform dissection of at least one synovial joint (e.g. shoulder, elbow, knee, hip or any other),Identify and demonstrate the, articular surfaces, joint capsule, ligaments, menisci (if any), and synovial membrane. Describe the type of joint, the bones involved, and its structural classification. student will be evaluated on the basis of Accuracy in Dissection technique,skill and clarity of exposure. 2.OSPE - Joint Movements,Clinical Application(25Mark) To assess students understanding of the types of movements at major joints and their clinical relevance. OSPE Station, Instructions for Students- At an OSPE station, observe the model or video of a joint (e.g. knee or shoulder) performing specific movements Identify the type of joint, axes of movement, and muscles involved.Respond to clinical questions. OSPE Stations will be arrange for • Demonstrate the Flexion, extension, abduction, adduction, rotation at given joints. • Label the major ligaments or structures of a joint on a model/image. • Identify Clinical condition related to movement loss (e.g. frozen shoulder, anterior cruciate ligament injury) and describe the anatomical basis. Student will assess on the basis of checklist Identification of movement types , Correlation with anatomical structures, Application in clinical context or Any practical in converted form can be taken for assessment.(25Mark) and Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)	4
Module 18 : Udar evum Vaksha Peshi Sharir (Myology of Abdomen and thorax) and AsthiBhagna (Fractures))	
Module Learning Objectives (At the end of the module, the students should be able to) Perform action and demonstrate muscles of Abdomen and Lower Limbs.	

Analyze anatomical cause of fractures and specific regions where frequent fracture occur and .

M 18 Unit 1 Osteology and myology of thorax and abdomen
 18.1.1. Bones and Muscles of Thorax
 18.1.2. Muscles of Abdomen

References: 11,12,13,14,15,16,19

3A	3B	3C	3D	3E	3F	3G
CO4	Analyze importance of rib cage in protection and function of thoracic viscera.	1	Lecture	CAN	Knows-how	L&PPT
CO4,CO6	Dissect and demonstrate the bones and muscles of rib cage and abdominal muscles with the help of cadaveric dissection or 3D virtual dissector.	10	Practical Training 18.1	PSY-MEC	Shows-how	DSN
CO4	Evaluate structural abnormalities and disorders of rib cage and abdominal muscles.	6	Experiential-Learning 18.1	CAP	Knows-how	D-BED,C BL,DIS
CO4	Analyze homology of sternum and rectus abdominis muscle of abdomen. Analyze homology of intercostal muscles (external, internal and innermost) and abdominal muscles (external oblique, internal oblique and transverse abdominis) in relation to receding of ribs. Analyze relation of receded lumbar ribs and development of abdominal muscles with development of digestive viscera.	3	Lecture	CAN	Knows-how	L&GD

M 18 Unit 2 Fractures of head, neck, vertebral column and chest
 18.2.1. Fractures of bones of Head and Neck
 18.2.2. Fractures of bones of Vertebral Column
 18.2.3. Fractures of bones of Chest

References: 11,12,13,14,15,16,19,20,21

3A	3B	3C	3D	3E	3F	3G
CO4	Classify and analyze injuries of cervical, thoracic and lumbar spines and thoracic cage on the basis of pathological anatomy; and relate them with mechanism of injury.	2	Lecture	CAN	Knows-how	L&PPT
CO4,CO8	Demonstrate the fractures of skull, vertebral column and thoracic cage with the help of X-rays graph or 3D dissector.	5	Practical Training 18.2	PSY-MEC	Shows-how	D,X-Ray
CO4	Evaluate fractures of skull, Fractures of cervical Vertebral column Fractures of thoracic and lumbar Vertebral column,Fractures of rib cage - fractures of ribs, fractures of sternum and Minor fractures of Vertebral column	10	Experiential-Learning 18.2	CE	Knows-how	PL,X-Ray,IBL
CO4	Classiy and analyze Asthibhagna (fractures) and Sandhivishlesh (dislocations) as mentioned in Ayurveda.	1	Lecture	CAN	Knows-how	LS,L&PPT

M 18 Unit 3 Fractures of limbs18.3.1. Fractures of bones of Upper Limb

18.3.2. Fractures of bones of Lower Limb

References: 11,12,13,14,15,16,19,20,21

3A	3B	3C	3D	3E	3F	3G
CO4	Describe the common characteristics features of muscles of leg with their origin, insertion,nerve supply and action.	3	Lecture	CC	Knows-how	L&PPT
CO4,CO8	Demonstrate the fractures of shoulder and arm, elbow and forearm, wrist and hand with the help of X-rays images or 3D dissector. Demonstrate the fractures of pelvis and hip, thigh and knee, leg and ankle, and foot with the help of X-rays images or 3D dissector.	5	Practical Training 18.3	CAP	Knows-how	X-Ray,D-M,LRI
CO4	Evaluate the fractures of shoulder and arm, elbow and forearm, pelvis and hip, thigh and knee, leg and ankle.	10	Experiential-Learning 18.3	CE	Knows-how	CD,X-Ray,C_L

Practical Training Activity

Practical Training 18.1 : Dissection of thoracic cage, abdominal muscles.

Teacher shall demonstrate key features of thoracic cage and abdominal muscles to the scholars. teacher shall assign atleast two topics from each activity seperately to every scholar. Teacher should also encourage the scholars to relate thoracic cage and abdominal muscles with suorrounding neurovascular supply.

1. Dissection of thoracic cage -

Scholars should specifically concentrate on observation of thoracic cage in relation to neurovascular supply. Scholar should assess the directions of fibres of intercostal muscles. Scholar shall record the observations and present in the class as audiovisual presentation.(5hour)

2. Dissection of abdominal muscles -

Scholars should specifically concentrate on observation of abdominal muscles in relation to neurovascular supply. Scholar should assess the directions of fibres of abdominal muscles. Scholar shall record the observations and discuss with peers.(5hour)

Practical Training 18.2 : Practical study of fractures of skull, spines vertebral column and rib cage.

Teacher shall demonstrate key features of key clinical and radiological features of fractures to the scholars. teacher shall assign atleast one topic from each activity seperately to every scholar. Scholar can take the help of data resources and study normal x-rays on the assigned topics.

1. Fractures of skull -All fracture of skull

2. Fractures of cervical Vertebral column - wedge compression fractures of vertebral bodies, burst fractures of vertebral bodies, extension subluxations, flexion subluxation, dislocations and fracture dislocations.

3. Fractures of thoracic and lumbar Vertebral column - wedge compression of fractures of vertabral body, burst fractures of vertebral body, distraction fracture of vertebral body, dislocation and fracture-dislocations.

4. Fractures of rib cage - direct fractures

5.Minor fractures of Vertebral column - fall on the 'tail'.

Practical Training 18.3 : Practical study of normal x-ray images of upper limb and lower limb..

Teacher shall demonstrate key features of clinical and radiological features of fractures of upper limb and lower limb to the scholars. teacher shall assign atleast five topisc from each activity seperately to every scholar. Scholar can take the help of data resources and study normal x-rays images on the assigned topics.

A. Practical study through x-ray images of upper limb -

1. Practical study through x-ray images of shoulder and arm - fractures of shoulder girdle , injuries of shoulder and related joints, fractures of humarus,

2. Practical study through x-ray images of elbow and forearm - injuries of elbow, fractures of olecranon and coronoid process, fratures of head of radius fractures of upper end of ulna, fractures of shaft of forearm bones,fractures of lower end of radius.

3. Practical study through x-ray images of wrist and hand - injuries of the carpus, injuries of the metacarpal bones and phalangees

B. Practical study through x-ray images of lower limb -

1. Practical study through x-ray images of Pelvis and hip bone - isolated fractures of hip bone with no disruption of pelvis ring, fractures with disruption of pelvic ring, dislocation and fracture dislocation of hip
2. Practical study through x-ray images of thigh and knee - fractures of proximal femur, fractures of shaft of femur, supracondylar fractures of femur, fractures of femoral condyles, fractures and dislocations of patella, injuries of ligaments of knee
3. Practical study through x-ray images of leg and ankle - fractures of condyles of tibia, fractures of shaft of tibia and fibula alone and in combination, fractures and fracture-dislocations of ankle, rupture of lateral ligament of ankle and rupture of tendocalcaneus.
2. Practical study through x-ray images of foot - fractures of tarsus, fractures of metatarsal bones, fractures of phalanges of toes.

Experiential learning Activity

Experiential-Learning 18.1 : Clinical/surgical correlates of rib cage and abdominal muscles.

Teacher shall allot separately to every scholar at least two activities to evaluate structural abnormalities and disorders of rib cage and abdominal muscles. scholar shall use data resources, original specimens, cadaveric exposure to identify causes behind the disorders. Scholars should be encouraged to attend clinical and surgical OPD/IPD to identify relevant disorders.

1. Clinical/surgical correlates of rib cage -(3hour)

Rib and costal cartilage identification, thoracic cage distortion, traumatic injuries (flail chest, pneumothorax), abnormal cervical rib identification, age related changes in rib cage, fractures of ribs.

2. Clinical/surgical correlates of abdominal muscles -(3hour)

Patent urachus, abdominal respiration, surgical incisions of abdominal wall (midline, pararectus, transrectus, McBurney's transverse), abdominal herniae (inguinal, umbilical, epigastric, incisional, spigelian), paracentesis of abdomen.

scholar shall record observations and present in the class in the form of audiovisual presentation.

Experiential-Learning 18.2 : Clinical/surgical co-relates of fractures

Teacher shall demonstrate key features of key clinical and radiological features of fractures to the scholars. teacher shall assign at least one topic from each activity separately to every scholar. Scholar can take the help of data resources and study normal and abnormal x-rays on the assigned topics. Teacher should also encourage the scholars to relate fractures with surrounding musculature and neurovascular supply.

1. Fractures of skull -

2. Fractures of cervical Vertebral column - wedge compression fractures of vertebral bodies, burst fractures of vertebral bodies, extension subluxations, flexion subluxation, dislocations and fracture dislocations. Scholar should look for different kinds of fractures in cases of; fractures atlas, fracture and dislocation of atlanto-axial joints, intraspinal displacement of soft tissue and whip lash injury (soft tissue strain).

3. Fractures of thoracic and lumbar Vertebral column - wedge compression of fractures of vertebral body, burst fractures of vertebral body, distraction fracture of vertebral body, dislocation and fracture-dislocations. Scholar should look for different kinds of fractures in cases of; Hyperflexion injuries (localized kyphosis, anterior collapse of

vertebral bodies,, dislocation of adjacent vertebral joints), hyperextension.

4. Fractures of rib cage - fractures of ribs, fractures of sternum.

5. Minor fractures of Vertebral column - injuries (minor) minor fractures of sacrum, coccyx and transverse processes.

Scholar shall identify causes and consequences of the allotted cases and prepare case studies to be presented in the class.

Experiential-Learning 18.3 : Clinical/surgical correlates of fractures of shoulder and arm, elbow and forearm, pelvis and hip, thigh and knee, leg and ankle.

Teacher shall demonstrate key features of clinical and radiological features of fractures of upper and lower limb to the scholars. teacher shall assign atleast five topics from each activity seperately to every scholar. Scholar can take the help of data resources and study normal and abnormal x-rays on the assigned topics. Teacher should also encourage the scholars to relate fractures with surrounding musculature and neurovascular supply.

A. Fractures of upper limb -

1. Fractures of shoulder and arm - fractures of shoulder girdle , injuries of shoulder and related joints, fractures of humerus,

2. Fractures of elbow and forearm - injuries of elbow, fractures of olecranon and coronoid process, fractures of head of radius fractures of upper end of ulna, fractures of shaft of forearm bones, fractures of lower end of radius.

3. Fractures of wrist and hand - injuries of the carpus, injuries of the metacarpal bones and phalanges

B. fractures of lower limb -

1. Fractures of Pelvis and hip bone - isolated fractures of hip bone with no disruption of pelvis ring, fractures with disruption of pelvic ring, dislocation and fracture dislocation of hip

2. Fractures of thigh and knee - fractures of proximal femur, fractures of shaft of femur supracondylar fractures of femur fractures of femoral condyles fractures and dislocations of patella, injuries of ligaments of knee

3. Fractures of leg and ankle - fractures of condyles of tibia, fractures of shaft of tibia and fibula alone and in combination, fractures and fracture-dislocations of ankle, rupture of lateral ligament of ankle and rupture of tendocalcaneus.

2. Fractures of foot - fractures of tarsus, fractures of metatarsal bones, fractures of phalanges of toes.

Scholar should record their finding and present them in the form of audiovisual presentation.

Modular Assessment

Assessment method

Hour

Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C.

1. Practical Identification (25Mark)

Students will rotate through stations, each lasting five minutes. At every station, students will be presented with radiographic images will be required to identify anatomical structures, fracture types, or radiological features, followed by brief clinical reasoning. The stations will cover the following types of

4

question

- Identify fracture lines on a radiograph and name the bones involved.
- Identify a fracture on a lateral X-ray and describe its key characteristics.
- Point out a fracture on a chest X-ray and explain the potential risks to underlying organs.
- Identify and Differentiate between fractures on wrist radiographs.
- Locate a fracture on a X-ray and classify the type of fracture.

2. Structured Viva Voce (25Mark)

At least 5 Structured oral questions will be asked on topic of muscle, fractures , each carrying 4 marks, with an additional 5 mark for overall clarity and presentation. Topics include anatomical structure involved and how the structure affect in management.

or

Any practical in converted form can be taken for assessment.(25Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)

Semester No : 5

Module 19 : Marma Sharir

Module Learning Objectives

(At the end of the module, the students should be able to)

Describe and demonstrate the Marma in terms of trauma, prognosis and component structures forming Marma.
Analyze clinical and surgical aspects of Marma.

M 19 Unit 1 Classification of Marma19.1.1. General descriptions and classification of Marma

19.1.2. Marma based on Abhigata (parinam)

19.1.3. Marma Based on Rachana (constituents)

19.1.4. Marma Based on Pramana (Size)

References: 34,35,36,37,38,39

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Analyze and interpret the purpose of classification of Marma and its relevance in diagnosis and treatment.	1	Lecture	CAN	Knows-how	L&PPT
CO1,CO3	Demonstrate constitution of each Marma along with most important structures involved in their formation with the help of cadaveric dissection or 3D virtual dissector. Demonstrate Classification of Marma on the basis of Prognosis and extent of injury to each Marma as per Ayurvedic description; and justify prognosis mentioned in description of Marma in light of principles of diagnosis and consequent prognosis mentioned in contemporary science.	6	Practical Training 19.1	CAN	Knows-how	PER,D
CO1,CO3	Evaluate structural disorders of each Marma and prognosis in injuries of Marma.	8	Experiential-Learning 19.1	CE	Knows-how	CBL,DIS, SIM,PBL
CO1,CO3	Analyze classification of Marma on the basis of Abhighata (trauma) in contemporary sciences by comparing trauma of ancient time with modern era. Analyze classification of Marma on the basis of Rachana (constituent tissues) in contemporary sciences by relating with tissues of contemporary science. Analyze classification of Marma on the basis of Pramana (size and extent) in contemporary sciences.	3	Lecture	CAN	Knows-how	L&GD

M 19 Unit 2 Marma of Bahu and Sakthi19.2.1. Marma of Bahu (upper limb)
19.2.2. Marma of Sakthi (lower limb)

References: 34,35,36,37,38,39

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Analyze vital points (Marma) of upper limb (Bahu) and lower limb (Sakthi) on the basis	2	Lecture	CAN	Knows-	L&PPT

	of description of each Marma by relating with general structures, clinical/surgical features, location, tissue description, prognosis etc.				how	,PAL
CO1,CO3	Demonstrate location, structure and prognosis of vital points (Marma) of upper limb (Bahu) and lower limb (Sakthi) with the help of cadaveric dissection or 3D virtual dissector.	6	Practical Training 19.2	PSY-MEC	Shows-how	SIM,DSN ,D
CO1,CO3	Evaluate clinical/surgical disorders of injury to Marma of Bahu (upper limb) and Sakthi (lower limb).	8	Experiential-Learning 19.2	CE	Does	IBL,CBL

M 19 Unit 3 Marma of Prishtha, Udara and Urah19.3.1. Udaragata marma (Marma of abdomen and pelvis) and Prishtha (back)

19.3.2. Marma of Urah (Thorax Marma)

19.3.3. Prana, Pranayama and Marma

References: 34,35,36,37,38,39

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Analyze Marma of Udar (Abdomen, pelvis and perineum), Urah (chest) and Prishtha (back) on the basis of description of each Marma by relating with general structures, clinical /surgical features, location, tissue description, prognosis etc.	3	Lecture	CAN	Knows-how	L&PPT
CO1,CO3	Demonstrate location, structure and prognosis of Marma of Udar (Abdomen, pelvis and perineum), Prishtha (back) and Urah (chest) with the help of cadaveric dissection or 3D virtual dissector.	6	Practical Training 19.3	PSY-MEC	Shows-how	DL,DSN, SIM
CO1,CO3	Evaluate clinical/surgical disorders of injury to Marma of Udar (Abdomen, pelvis and perineum), Prishtha (back) and Urah (chest).	7	Experiential-Learning 19.3	CE	Knows-how	D-BED,S IM,CBL

M 19 Unit 419.4.1. Urdhajatrugata Marma

19.4.2. Asana and Marma

19.4.3. Marma Chikitsa

References: 34,35,36,37,38,39

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Analyze Urdhvajatrugata (head and neck) Marma on the basis of description of each Marma by relating with general structures, clinical/surgical features, location, tissue description, prognosis etc.	3	Lecture	CAN	Knows-how	L&PPT ,L_VC
CO1,CO3	Demonstrate location, structure and prognosis of Marma of Urdhvajatrugata (head and neck) region with the help of cadaveric dissection or 3D virtual dissector.	3	Practical Training 19.4	PSY-MEC	Shows-how	PBL,DSN
CO1,CO3	Evaluate clinical/surgical disorders of injury to Urdhvajatrugata Marma (Marma of head and neck region).	4	Experiential-Learning 19.4	CE	Does	CBL
CO1,CO3	Analyze role of Yogasana, Pranayam and Marma Chikitsa procedure in eliciting positive anatomical, physiological and psychological responses in the body.	1	Lecture	CAN	Knows-how	L&GD
CO1,CO3	Demonstrate the ability to apply Yogasana, Pranayam and Marma Chikitsa procedures in OPD/IPD of hospital.	3	Practical Training 19.5	PSY-MEC	Shows-how	D
CO1,CO3	Evaluate application of Yogasana, Pranayam and Marma Chikitsa procedure on Marma.	4	Experiential-Learning 19.5	CE	Does	PL

M 19 Unit 5 Marma Chikitsa and other Parasurgical procedures related to Marma19.5.1. Parasurgical measures related to Marma
19.5.2. Marma therapy and its relevance with respect to acupressure, Vyadhakarma , acupuncture, meridian points, Varman Chikitsa and Kalaripattu

References: 34,35,36,37,38,39

3A	3B	3C	3D	3E	3F	3G
CO1,CO3	Explore relevance of therapies, like; acupressure, spinal manipulations, trigger points etc. in Marma Chikitsa.	1	Lecture	CC	Knows-how	L&PPT

CO1,CO3,CO7	Demonstrate the procedures of Agnikarma, Kshara Karma and Jalaukavacharana in relation to Marma.	6	Practical Training 19.6	PSY-MEC	Shows-how	D,IBL
CO1,CO3	Evaluate the effect of Agnikarma therapy, Kshara Karma and Jalaukavacharana on disorders of Marma.	8	Experiential-Learning 19.6	CE	Does	PrBL,PBL,CBL
CO1,CO3,CO7	Analyze Parasurgical procedures of Ayurveda, like; Agnikarma, Kshara Karma and Jalaukavacharana in relation to Marma.	1	Lecture	CAN	Knows-how	SDL,PAL,LS

Practical Training Activity

Practical Training 19.1 : Classification of Marma on the basis of structure and on the basis of Prognosis.

1. Classification of Marma on the basis of structure (3hour)

Teacher should explain the structure of basic tissues of the body with prominent examples and allot atleast two topics for activity. Scholar should categorize the important anatomical structures under different tissues. Scholar should relate categories of tissues with types of Marma on the basis of structure. Scholar should apply the observation to justify structural constitution of allotted Marma and present observation before teacher.

2. Classification of Marma on the basis of Prognosis (3hour)

Teacher should explain basic principles of prognosis to the students in relation to injuries (trauma) to vital structures of the body and allot atleast two topics for activity. Scholar should explore the data resources on trauma of various region to relate with description mentioned in Ayurveda. Scholar should apply the observation to justify prognosis mentioned in Ayurvedic text. Student should present observations in front of teacher.

Practical Training 19.2 : Surface Demarcation and dissection of each Marma of Bahu (upper limb) and Sakthi (lower limb).

Marma of Bahu (upperlimb) (3hours)

Teacher shall explain method of interpreting the classical description of Marma to the scholars by taking one example from Bahu region and allot atleast two topics. Scholar should utilize the knowledge of principles of structural and prognostic classification to interpret the Marma. Scholar should match the observations with classical description at the time of dissection and justify structure of Marmas of Bahu.

Marma of Sakthi (lower limb) (3hours)

Teacher shall explain method of interpreting the classical description of Marma to the scholars by taking one example from Sakthi region and allot atleast two topics. Scholar should utilize the knowledge of principles of structural and prognostic classification to interpret the Marma of Sakthi. Scholar should match the observations with classical description at the time of dissection and justify structure of Marmas of Sakthi.

Practical Training 19.3 : Surface Demarcation and dissection of each Marma of Udar (Abdomen, pelvis and perineum) , Prishtha (back) and Urah (chest).

Marma of Udar (Abdomen, pelvis and perineum) and Prishtha (back) (4 hour)

Teacher shall explain method of interpreting the classical description of Marma to the scholars by taking one example from Udar/Prishtha region and allot atleast two topics. Scholar should utilize the knowledge of principles of structural and prognostic classification to interpret the Marma of Udar/Prishtha region. scholar should match the observations with classical description at the time of dissection and justify structure of Marmas of Udar/Prishtha region.

Marma of Urah (chest) (2hour)

Teacher shall explain method of interpreting the classical description of Marma to the scholars by taking one example from Urah region and allot atleast two topics. Scholar should utilize the knowledge of principles of structural and prognostic classification to interpret the Marma of Urah region. scholar should match the observations with classical description at the time of dissection and justify structure of Marmas of Urah region.

Practical Training 19.4 : Surface Demarcation and dissection of each Marma of head and neck region.

Marma of head and neck region

Teacher shall explain method of interpreting the classical description of Marma to the scholars by taking one example from Marma of head and neck region and allot atleast two topics. Scholar should utilize the knowledge of principles of structural and prognostic classification to interpret the Marma of head and neck region. Scholar should match the observations with classical description at the time of dissection and justify structure of Marmas of head and neck region.

Practical Training 19.5 : Performance of Yogasana, Pranayam and Marma Chikitsa procedure.

Performance of Yogasana, Pranayam and Marma Chikitsa procedure -

Teacher shall explain the classical description of Yogasana, Pranayam and Marma Chikitsa to the scholars by taking one example from any of them and allot atleast two topics. Scholar should perform allotted procedure on subjects under the guidance of teacher. Scholar shall record the observations and present before the teacher.

Practical Training 19.6 : Practice of Agnikarma, Kshara Karma and Jalaukavacharana in disorders of Marma.

1. Practice of Agnikarma in Marma disorders (2 hour)

Teacher should demonstrate the principles of Agnikarma in front of scholars. Scholar should perform the procedure of Agni karma under the guidance of teacher and record the case for submission to teacher.

2. Practice of Kshara Karma in Marma disorders (2 hour)

Teacher should demonstrate the principles of Ksharakarma in front of scholars. Scholar should perform the procedure of Viddhakarma under the guidance of teacher and record the case for submission to teacher.

3. Practice of Jalaukavacharana in Marma disorders (2 hour)

Teacher should demonstrate the principles of Jalaukavacharana in front of scholars. Scholar should perform the procedure of Jalaukavacharana under the guidance of teacher and record the case for submission to teacher.

Experiential learning Activity

Experiential-Learning 19.1 : Clinical correlates of structural disorders and prognosis in disorders of Marma.

1. Clinical correlates of structural disorders of Marma (4hour)

Teacher shall allot atleast two activities from the topic to scholar. Scholar should identify the suitable case of structural disorder of the region mentioned as one of the Marma. Scholar should attempt to match the clinical/surgical features of the disorders on the allotted case. Scholar shall record the finding and present them in the class by audiovisual presentation.

2. Prognosis in disorders of Marma (4hour)

Teacher shall allot atleast two activities from the topic to scholar. Scholar should identify the suitable case of Marma injury from OPD/IPD of hospital. Student should attempt to match the prognosis of case as per description of Marma. Scholar shall record the findings and place them for discussion with peers.

Experiential-Learning 19.2 : Clinical correlates of injuries to Marma of Bahu (upper limb), Sakthi (lower limb).

1. Clinical correlates of injuries to Marma of Bahu (upper limb) (4hours)

Teacher shall allot atleast two activities from the topic to scholar. Scholar should identify the suitable case of injuries to Marma of Bahu in the OPD/IPD of hospital. Scholar should attempt to match the clinical/surgical features of the injury on the allotted case. Scholar shall record the finding and present them in the class by audiovisual presentation gives their reflection about how Marma sharir is basic for the treatment purpose.

2. Clinical correlates of injuries to Marma of Sakthi (lower limb) (4hours)

Teacher shall allot atleast two activities from the topic to scholar. Scholar should identify the suitable case of injuries to Marma of Sakthi in the OPD/IPD of hospital. Scholar should attempt to match the clinical/surgical features of the injury on the allotted case. Scholar shall record the finding and present them in the class for group discussion and give their reflection about how Marma sharir is basic for the treatment purpose.

Experiential-Learning 19.3 : Clinical correlates of injuries to Marma of Udar (Abdomen, pelvis and perineum), Prishtha (back) and Urah (chest).

1. Clinical correlates of injuries to Marma of Udar (Abdomen, pelvis and perineum) and Prishtha (back) (3hour)

Teacher shall allot atleast two activities from the topic to scholar. Scholar should identify the suitable case of injuries to Marma of Udar or Prishtha in the OPD/IPD of hospital. Scholar should attempt to match the clinical/surgical features of the injury on the allotted case. Scholar shall record the finding and present them in the class by audiovisual presentation.

2. Clinical correlates of injuries to Marma of Urah (chest) (3hour)

Teacher shall allot atleast two activities from the topic to scholar. Scholar should identify the suitable case of injuries to Marma of Urah in the OPD/IPD of hospital. Scholar

should attempt to match the clinical/surgical features of the injury on the allotted case. Scholar shall record the finding and present them in the class for group discussion.

Experiential-Learning 19.4 : Clinical correlates of injuries to Urdhvajatrugata Marma (Marma of head and neck region).

1. Clinical correlates of injuries to Urdhvajatrugata Marma (Marma of head and neck region) - Teacher shall allot atleast two activities from the topic to scholar. Scholar should identify the suitable case of injuries to Urdhvajatrugata Marma in the OPD/IPD of hospital. Scholar should attempt to match the clinical/surgical features of the injury on the allotted case. Scholar shall record the finding and present them in the class by audiovisual presentation.

Experiential-Learning 19.5 : Clinical effect of Yogasana, Pranayam and Marma Chikitsa procedure on Marma.

Clinical effect of Yogasana, Pranayam and Marma Chikitsa procedure on Marma -

Teacher shall allot atleast two activities from the topic to scholar. Scholar should identify the suitable case of Marma disorder. Student should attempt any of the therapy (Yogasana, Pranayam or Marma Chikitsa) on the case. Scholar shall record the findings and present for group discussion in the class.

Experiential-Learning 19.6 : Clinical/surgical correlates of Agnikarma in Marma disorders.

Clinical/surgical correlates of Kshara Karma in Marma disorders

Clinical/surgical correlates of Jalaukavacharana in Marma disorders.

1.Clinical/surgical correlates of Agnikarma in Marma disorders (3hour)

Teacher shall allot atleast two activities from the topic to scholar. Scholar should identify the suitable case, like in disorders of head and Adhimantha Agni Karma should be performed in the regions of eyebrows, forehead and temple. Agni Karma should also be attempted in Vata Vridhi of skin, muscles, blood vessels, ligaments, joints and bones in specific cases. Agni Karma should also be attempted in cases of Granthi, Arsha, Arbuda, Bhagandar, Apchi, Shalipad, Charamkeel, Tilkalak, Antravridhi etc. Scholar should carry out/assist the procedure in the OPD/IPD setup. Scholar shall record the finding and present them in the class by audiovisual presentation.

2.Clinical/surgical correlates of Kshara Karma in Marma disorders (3hour)

Teacher shall allot atleast two projects from the topic to scholar. Scholar should identify the suitable case of Marma disorder in the OPD/IPD of hospital for Ksharakarma. Scholar should attempt Kshara Karma in cases of; Kushtha, Kitibha, Dadrumanadal, Kilas, Bhagandar, Arbud, Arsha, Dushtavrana, Nadi, Charmakeel, Tilkalka, Nyaccha, Vyanga, Mashak, Krimi and Visha etc. as per procedure. Scholar should carry out/assist the procedure in the OPD/IPD setup. Scholar shall record the finding and present /publish

3.Clinical/surgical correlates of Jalaukavacharana in Marma disorders (2hour)

Teacher shall allot atleast two projects from the topic to scholar. Scholar should identify the suitable case of blood letting in the OPD/IPD of hospital for Jalaukavacharana. Blood-letting can also be attempted with Alabu and Shringa. Scholar should carry out/assist the procedure in the OPD/IPD setup. Scholar shall record the finding and present /publish

Modular Assessment

Assessment method	Hour
Instructions—Conduct a structured modular assessment. The assessment will be for 75 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1.DOAP (25Mark) Demonstration The teacher will use human models or cadaveric specimens to demonstrate the location of at least any 10 Marmas like Shankha, Sthapani, Hridaya, Guda, Ansa, Aplapa, Katikataruna, etc. Explain the Ayurvedic classification and the modern anatomical correlation,location and anatomical structures. Discuss clinical cases or injuries involving those Marmas. Observation Students will observe and record the Marma location, structure involved, type of Marma, and clinical relevance .They will mark the Marma locations on peer models or anatomical diagrams.Observe location and clinical importance Assistance Under guidance, students will locate Marma points on each other using surface anatomy landmarks.Faculty will correct landmark errors and ensure understanding of depth Performance Each student will independently identify and mark locations on a mannequin or peer.Students will explain the clinical outcome of injury Marma during a interaction. 2.Case-Based Analytical Questions (25Mark) Teacher will construct the Case base analytical questions on the basis of case scenario. Assessment will be done on the basis of following criteria. • Identify the anatomical region of marma • List the underlying anatomical structures at risk during surgery, • Classify the Marma as per Ayurveda, • Analyze the clinical consequences if this Marma is damaged during surgery, • Suggest surgical precautions from both Ayurveda and modern perspectives. 3.Project based assesment (25Mark) The scholar shall complete the mini-project on <i>Marma Sharir</i> procedures (Agnikarma/ Ksharakarma/ Jalaukavacharana) by identifying suitable cases, assisting in the procedures under supervision, and maintaining detailed documentation. They should Standardize the procedure, record pre- and post-procedure findings, include follow-up observations, and support their work with audiovisual documentation. The project must be compiled in a structured format with introduction, methodology, results, discussion, and conclusion along with proper references, graphs wherever applicable. Finally, the scholar will present /publish the completed project.	6

or
Any practical in converted form can be taken for assessment.(40Mark)
and
Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (35Mark)

Module 20 : Radiology and anatomical application in viddha chikitsa

Module Learning Objectives

(At the end of the module, the students should be able to)

Analyze and diagnose the tissue disorders with the help of imaging techniques.
Analyze the anatomical aspects of Viddha Chikitsa.

M 20 Unit 1 Avedhya Siras20.1.1. Concept of Vedhya and Avedhya Sira
20.1.2. Avedhya Siras of the body..

References: 34,35,36

3A	3B	3C	3D	3E	3F	3G
CO3,CO7	Analyze the concept of Siravedhana in Ayurveda. Classify Avedhya Siras of body and analyze the relation of Avedhya Siras with Marmas of body.	4	Lecture	CAN	Knows-how	L
CO7	Demonstrate surface demarcation of Viddha points of Madhya Sharir for blood letting as per classical description and ability to relate them in contemporary science.	7	Practical Training 20.1	PSY-GUD	Shows-how	D
CO7	Evaluate the clinical and surgical utility of knowledge of Avedhya Sira while performing parasurgical procedures.	10	Experiential-Learning 20.1	CE	Knows-how	CBL,RLE

M 20 Unit 2 Vedhya Siras20.2.1. Vedhya Siras of the body.

References: 34,35,36

3A	3B	3C	3D	3E	3F	3G
CO7	Analyze the choice of Viddhasthan in context of Vedhya Siras of the body.	1	Lecture	CAN	Knows-how	L
CO7	Demonstrate exact location of Vedhya Siras on the surface of live body or cadaver and ability to compare the location of Vedhya Siras and Avedhya Siras.	7	Practical Training 20.2	CK	Knows-how	D
CO7	Evaluate the clinical and surgical utility of knowledge of Vedhya Sira while performing parasurgical procedures; and evaluate the consequences of Durviddha (blood letting with wrong procedur) Sira.	8	Experiential-Learning 20.2	CK	Knows-how	L&PPT
CO7	Analyze relation of Vedhya Siras with Marmas of body.	2	Lecture	CAN	Knows-how	L_VC,DI S

M 20 Unit 3 Radiological anatomy20.3.1. Principles of Radiology and New Imaging Techniques

20.3.2. Radiology of Limbs

20.3.3. Radiology of Thorax

20.3.4. Radiology of Abdomen and Pelvis

20.3.5. Radiology of Head and Neck

References: 25,26

3A	3B	3C	3D	3E	3F	3G
CO8	Analyze anatomical focus of key imaging modalities (X-ray, CT scan, MRI, ultrasound, PET/MRI).	1	Lecture	CAN	Knows-how	L&PPT , L_VC,X-Ray
CO7	Demonstrate use of various imaging modalities (X-ray, CT scan, MRI, ultrasound, PET/MRI) in cardiology, neurology, orthopaedics, cancer detection and staging and	6	Practical Training 20.3	CAP	Knows-how	DL,X-Ray

	obstetrics and gynaecology.					
CO8	Evaluate choice of various imaging modalities (X-ray, CT scan, MRI, ultrasound, PET/MRI) in disorders of cardiology, neurology, orthopaedics, cancer detection and staging and obstetrics and gynaecology etc.	8	Experiential-Learning 20.3	CE	Does	X-Ray,CBL
CO8	Analyze specific use of diagnostic imaging (in cardiology, neurology, orthopaedics, cancer detection and staging, obstetrics and gynaecology) with special focus on anatomy.	2	Lecture	CAN	Knows-how	L&GD,X-Ray
Practical Training Activity						
Practical Training 20.1 : Practical demonstration of Avedhya Siras of the body.						
Avedhya Siras of the body Teacher should demonstrate the concept of Avedhya Siras to the students. Scholar should identify the position of all 98 Avedhya Siras (Sushruta Samhita) on the body and mark them on the cadaver or live body after understanding description in literature. Scholar may be given assignment like model preparation/ presentations/ regarding Avedhya Siras.						
Practical Training 20.2 : Practical demonstration of Vedhya Siras of lower limb, upper limb, back, head and neck.						
Teacher should demonstrate the concept of Vedhya Siras to the students. Scholar should identify the position of all (about 26) Vedhya Siras (Sushruta Samhita) on the body and mark them on the cadaver or live body after understanding description in literature. Scholar may be given assignment like model preparation/ presentations/ regarding Vedhya Siras.						
Practical Training 20.3 : Practical study of an X-ray (of bone), an echocardiograph, MRI of brain, an obstetrics ultrasound						
Practical study of an X-ray (of bone), an echocardiograph, MRI of brain, an obstetrics ultrasound Teacher should demonstrate fundamental principles of various diagnostic imaging techniques. Scholar should be allotted atleast two normal cases from each imaging technique. Scholar should procure the images from hospital or various data resources. Scholar should study and interpret the image in anatomical language. Scholar should demonstrate the image in front of teacher in the class..						
Experiential learning Activity						
Experiential-Learning 20.1 : Clinical/surgical correlates of Avedhya Sira.						

Clinical/surgical correlates of Avedhya Sira Teacher should separately allot atleast one topic from Limbs, two topics from trunk and three topics from head region to every student for evaluation of Avedhya Sira. Scholar should consult the data resources to understand importance of specific Sira and deduce possible clinical manifestation in case the Sira is cut. Scholar shall record the findings and present in the class for audiovisual presentation.	
Experiential-Learning 20.2 : Clinical surgical co-relates of Vedhya Siras	
Clinical surgical co-relates of Vedhya Siras Teacher should demonstrate Vedhana of Sira to scholar in IPD setup. Teacher should allot atleast three cases separately to every student for Siravedhana. Scholar should perform siravedhana under guidance in shalya IPD. Scholar should perform Siravedhan of Vedhya Siras in following clinical conditions as indicated in classical text. 1. Vedhya Siras of lower limb - Padadaaha, Harsha, Avabahuka, Chipp, Visarpa, Vatarakta, Vicharchika, Padadari, Vatakantaka, Kroshtaka Sheersha Kanja, Pangu Vatavedana, Gridhrasi, Vishvachi, Apachi, Galganda. 2. Vedhya Siras of upper (Bahu) limb - Pleea Roga, Yakrit Udar, Kaphodar, Kasa, Shvasa 3. Vedhya Siras of back and chest (Prishtha and Vaksha) - Pravahika, Shoola, Parikartaka, Upadansha, Shukra Roga, mMtravridhi, Jalodara, Antravridhi, Parshvashoola, Bahushosha, Avabahuka, Trityak Jvara, Chaturthaka Jvara, 4. Vedhya Siras of head and neck (Urdhvajatru) - Apasamara, Unmada, Jihva Roga, Danta Roga, Mukha Roga, Karna Roga, Talu Roga, Nasa Roga, Peenasa, Timira, Akshipaka, Shiroroga, Adhimantha, Jatrudhva Granthi.	
Experiential-Learning 20.3 : Clinical correlates of diagnostic imaging.	
Clinical correlates of diagnostic imaging - Scholar should procure atleast 8 abnormal cases of each learnt imaging technique. Scholar should do comparative study of the features available in abnormal Image with normal image. Scholar should identify differences and interpret them in term of diagnostic features. Scholar should also procure various images from data resources to learn to interpret them in relation to different disorders.	
Modular Assessment	
Assessment method	Hour
Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1. Practical -Radiography Interpretation Skills (25Mark) This assessment evaluates the student's understanding of imaging techniques and their ability to interpret radiographs • Identify and describe anatomical features on standard radiographs of thorax/ limbs/ vertebral column	4

- Compare radiographic techniques X-ray vs CT vs MRI in terms of diagnostic accuracy and safety
- Explain the basic principles behind radiographic image formation

2. Practical Case Taking assessment -Viddha Chikitsa (25Mark)

Students will be assessed through a practical case-taking activity focused on the anatomical and clinical application of Viddha Chikitsa. The student will

- Describe the anatomical basis and rationale for site selection in Viddha Chikitsa
- Correlate the selected site with Sira and Marma, and explain its relationship to modern vascular and nervous structures.
- Analyze a clinical case where Viddha Chikitsa is indicated, detailing the location, anatomical structures involved, expected outcomes, and precautions taken during the procedure.

or

Any practical in converted form can be taken for assessment.(25Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)

Semester No : 6

Module 21 : Pramana Sharir (Anthropometry)

Module Learning Objectives

(At the end of the module, the students should be able to)

Interpret and apply measurement techniques to evaluate the parameters of body in terms of length and breadth.
Develop qualitative measurement techniques in research and diagnosis of diseases.

M 21 Unit 1 Anthropometry - general description

21.1.1. Somatometry and osteometry

21.1.2. Anthropometric landmarks and measurement of length, breadth, girth and skin fold parameters of the body.

21.1.3 Instrumentation in anthropometry.

References: 31,32,33

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO4	Differentiate anthropometry (somatometry) and osteometry and analyze their descriptive nature in studying human evolution and development.	1	Lecture	CAN	Knows-how	L&GD
CO1,CO2	Demonstrate anthropometric landmark on the surface of cadaver or live body and use specific instruments for different anthropometric measurements on live body.	8	Practical Training 21.1	PSY-MEC	Shows-how	D
CO1,CO2	Evaluate the choice of specific anthropometric landmark for specific body measurements and use of different anthropometric instrument for anthropometric measurements.	10	Experiential-Learning 21.1	PSY-MEC	Shows-how	PER,C_L, DSN,D,D IS
CO1,CO2	Analyze the importance of anthropometric (somatic) landmarks in measurement of length, breadth, girth and skin fold parameters of the body.	1	Lecture	CAN	Knows-how	SDL
CO1,CO4	Describe the development of instrumentation in the anthropometry.	1	Lecture	CAP	Knows-how	L&GD

M 21 Unit 2 Anthropometry of Head, neck and limbs
 21.2.1. Measurements of head and face
 21.2.2. Measurements of upper extremities.
 21.2.3. Measurements of lower extremities.

References: 31,32,33

3A	3B	3C	3D	3E	3F	3G
CO1,CO4,CO9	Analyze anthropometric measurements of head and face; upper and lower extremities and other somatic surface anthropometric measurements.	3	Lecture	CAN	Knows-how	TUT,L
CO1,CO4,CO9	Demonstrate anthropometric measurements of upper and lower extremities; other somatic surface; and head and face.	8	Practical Training 21.2	PSY-GUD	Shows-how	D
CO8,CO9	Evaluate the use of different anthropometric measurements on volunteer with specific indices.	9	Experiential-Learning 21.	PSY-MEC	Shows-how	PL,SIM

			2			
M 21 Unit 3 Metric and non-metric measurements; Anguli and Anjali Pramana 21.3.1. Infant and adult anthropometry 21.3.2. Anguli and Anjali Pramana in Ayurveda 21.3.3. Anthroposcopy References: 31,32,33,54						
3A	3B	3C	3D	3E	3F	3G
CO1,CO4,CO9	Differentiate Infant and adult anthropometry with justification.	1	Lecture	CAP	Knows-how	L&GD
CO1,CO2	Evaluate the clinical significance of Anjali Pramana and Anguli Pramana for determining normal body lengths of body parts and volume of Dhatus.	4	Experiential-Learning 21.3	PSY-ADT	Does	D,DIS,PL
CO1	Compare Anguli and Anjali Pramana with linear and volumetric measurements, respectively and discuss use of pramana in Ayurveda.	1	Lecture	CAP	Knows-how	DIS,L&P PT
CO1	Analyze anthroposcopy as non-metric visual observation of physical traits; derive its parlance with physical traits mentioned in relation to Prakriti.	2	Lecture	CAN	Knows-how	TBL
CO1,CO2	Demonstrate Anguli and Anjali Pramana in context of contemporary sciences.	2	Practical Training 21.3	PSY-MEC	Shows-how	D
CO1,CO2	Demonstrate anthroposcopy in relation to qualitative traits mentioned in ayurveda.	2	Practical Training 21.4	PSY-MEC	Shows-how	
CO1,CO2	Evaluate scope of anthroscopy in relation to qualitative traits (like Prakriti) mentioned in Ayurveda.	3	Experiential-Learning 21.4	CE	Does	CBL,PBL
Practical Training Activity						

Practical Training 21.1 : Anthropometric landmarks.

Anthropometric instruments.

Teacher should demonstrate the general use of different instruments, like; craniometer, slide calipers, anthropometer and stadiometer for linear measurements; tape for girth measurements; goniometer for angular measurements; skinfold calipers to measure skin fold. Teacher should allot atleast one activity from each topic to scholar.

1. Anthropometric landmarks (3hour)

Scholar should mark the anthropometric landmark on the live body or cadaver. Student can choose to create a landmark by own ingenuity.

2. Anthropometric instruments (5hour)

Scholar should use any one anthropometric instrument, like; spreading calipers, pelvimeters, sliding calipers, stadiometer, goniometer. student should make use of instrument to prepare an anthropometric index by use of anthropometric landmarks created by the self. Scholar shall record findings of the result to show to teacher.

Practical Training 21.2 : Anthropometric measurements of upper and lower limbs, trunk, head and face.

Teacher should demonstrate the general use of different instruments, like; craniometer, slide calipers, anthropometer and stadiometer for linear measurements; tape for girth measurements; goniometer for angular measurements; skinfold calipers to measure skin fold. Teacher should allot atleast one activity from each topic to scholar.

1. Anthropometric measurements of upper and lower limbs (2hour)

Scholar should demonstrate the use of instrument to measure atleast two parameter between two anthropometric landmarks of upper and lower limb each by the use of appropriate instrument.

2. Anthropometric measurements of trunk (3hour)

Scholar should demonstrate the use of instrument to measure atleast two parameter between two anthropometric landmarks of trunk by the use of appropriate instrument.

3. Anthropometric measurements of head and neck (3hour)

Scholar should demonstrate the use of instrument to measure atleast two parameter between two anthropometric landmarks of head and face by the use of appropriate instrument.

Practical Training 21.3 : Anguli and anjali Pramana.

Anguli and anjali Pramana - Scholar can be asked to perform following activities to measure length by Anguli Pramana and volume by Anjali Pramana.

a. Anjali Pramana - Ask the student to cup both hands together (as in offering water to deity); Fill the cupped palms with water up to the brim; Pour this water into a measuring cylinder or graduated container to find the volume (in mL) ; Record the volume – This is "1 Anjali" for that individual ; Repeat the same for other students and compare the results. Prepare Observation Table and discuss.

b. Anguli Pramana - Measure the width of the middle phalanx of the student's middle finger using a ruler or caliper; Use this measurement to assess different parts of the body as per classical texts (e.g., height = 96 Anguli, head = 12 Anguli, etc.) ; Use this method to measure: Height of the student in Anguli; Head length and breadth; Face,

nose, and other relevant body parts; Compare with classical values mentioned in Ayurvedic texts like "Charaka Samhita" or "Sushruta Samhita".

Practical Training 21.4 : Anthroposcopy, the morphological measurements.

Anthroposcopy, the morphological measurements -

Scholar can select any facial structure (like nose) of the body. Scholar should attempt to observe the form, shape, size etc. of nose by visual observation in atleast 20 adults. Scholar should prepare a chart of different types of noses on the basis of visual observation. Scholar shall present the findings in the form of audiovisual presentation.

Experiential learning Activity

Experiential-Learning 21.1 : Anthropological co-relates of anthropometric landmarks.

Research application of anthropometric instruments.

1. Anthropological co-relates of anthropometric landmarks -(5hour)

Scholar should attempt to mark anthropological landmarks on different individual and measure distance between two landmarks in each of the individual. Scholar should derive the result that variation in results of measurements is unique to each individual. Scholar should record the results and submit them for presentaion in the form of audiovisual presentation.

2. Research application of anthropometric instruments -(5hour)

Student should prepare a research note for calculation of a body index with unique anthropometric landmarks. Scholar should identify appropriate instrument for measurement. Scholar should record the observation and use the findings in clinical/ research application.

Experiential-Learning 21.2 : Anthropological co-relates of anthropometric landmarks and Preparation of indices.

1. Anthropological co-relates of anthropometric landmarks -(3hour)

Scholar should attempt to mark anthropological landmarks on different individual and measure distance between two landmarks in each of the individual. Scholar should derive the result that variation in results of measurements is unique to each individual

2. Preparation of indices of upper and lower extremities; trunk/ whole body; and head and face -(6hour)

a. Preparation of indices of upper and lower extremities -

Scholar should be allotted multiple topics from the activity. Scholar should be encouraged to apply research acumen to prepare unique indicis. Scholar can be allotted any of the topic, like; upper limb length index, arm and forearm length indicis, hand index, forearm girth index, forearm proportion index, thigh length index, crural length index, foot length index, lower leg-foot index etc.

b. Preparation of indices of trunk/ whole body -

Scholar should be allotted multiple topics from the activity. Scholar should be encouraged to apply research acumen to prepare unique indicis. Scholar can be allotted any of the topic, like; trunk-height index, relative sitting height index, relative span index, biacromial index, relative chest girth index, thoracic index etc,

c. Preparation of indicis of head and face -

Scholar should be allotted multiple topics from the activity- Scholar should be encouraged to apply research acumen to prepare unique indicis. Scholar can be allotted any of the topic, like; cephalic index, length height index, cephalic modulus, mean index of height, fronto-parietal index, morphological facial index, physiognomic face index, nasal index, interorbital index, lip index, relative chin height index etc.

Scholar should record the results and submit them for presentation in the form of audiovisual presentation.

Experiential-Learning 21.3 : Application of Anjali and Anguli Pramana.

1. Application of Anjali and Anguli Pramana -

a. Anguli Pramana - Scholar should take atleast two topics for this activity. Scholar should attempt to relate relative measurements of specific body parts in relation to different Prakriti type and try to find the difference in mean lengths.

b. Anjali Pramana - Scholar should compare the average Dhatu volumes of the body mentioned in Ayurveda with tissue volumes determined with the help of instruments. Scholar should record the observations and derive the correlation between the two activities in normal healthy individuals. Scholar should also conduct similar exercise in the patients suffering from that specific tissue disease. Scholar shall record the difference in terms of Kshaya and Vriddhi.

Experiential-Learning 21.4 : Clinical correlates of anthroposcopy

Clinical correlates of anthroposcopy

Scholar shall classify one trait (like shape) from structure of the body (eye) by visual observation. Shapes can be taken as long, broad, small, big etc. Scholar shall also record Prakriti of those individuals also. Scholar shall assess the correlation of shape of the body structure with various Prakriti types. Scholar can further evaluate the vulnerability of different shapes (of the body structure) to diseases in accordance with Prakriti.

Modular Assessment

Assessment method	Hour
Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1. Simulation-Based Anthropometry Assessment (25Mark) Students will perform anthropometric measurements (e.g arm span, height, circumference etc.) using models or peers in a simulation setup. The assessment	4

includes correct technique, identification of landmarks, interpretation of measurements, and relevance to clinical and constitutional (Prakriti) evaluation, Selection of landmarks and accuracy of measurement, Clinical application and interpretation of results

2. Self-Assessment on Anguli Pramaan (25Mark)

Each student will measure Anguli Pramaan of 10 volunteers with swaanguli pramana technique and document proportions of their body (e.g height, width etc). Student will Compare findings with classical Ayurvedic references, Reflect on analysis and findings. state wheather the it is usefull in diagnosis of health status or diseases.

or

Any practical in converted form can be taken for assessment.(25Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)

Paper No : 4 Tantrika Indriya Granthi Jara Sharir evum Yogasana						
Semester No : 3						
Module 22 : Brain						
Module Learning Objectives (At the end of the module, the students should be able to)						
Demonstrate and identify the internal and external structure of brain by performing dissection on the cadaver.						
M 22 Unit 1 Hindbrain and Midbrain 22.1.1. Brain stem (Medulla ,Pons and Mid brain) 22.1.2. Cerebellum						
References: 11,12,13,14,15,16,27,28,29,30,55						
3A	3B	3C	3D	3E	3F	3G
CO5	Analyze structures of cranial nerve nuclei and tracts of medulla oblongata; structure of ventral and dorsal pons in relation to tracts; and structure of cranial nerve nuclei,crura and tegmentum of midbrain. Relate them with their functions.	1	Lecture	CAN	Knows-how	L&GD
CO5	Demonstrate features of brain stem and different part of cerebellum by conducting cadaveric dissection or 3D virtual dissection; and relate gross structures with internal structure.	6	Practical Training 22.1	PSY-MEC	Shows-how	BL,DSN, D-M
CO5	Evaluate normal functions of brain stem (medulla, pons and midbrain) to understand structural basis of abnormalities of brain stem lesions. Evaluate normal functions of cerebellum to understand structural basis of abnormalities of cerebellar lesions.	8	Experiential-Learning 22.1	CE	Does	PBL,CD

CO5	Analyze structure of reticular formation to understand its ancient origin.	1	Lecture	CAN	Knows-how	L&GD
CO5	Analyze structure of cerebellum and discuss cerebellum as important part of circuitary linking sensory and motor areas of brain; and its role in function of coordinated movements.	1	Lecture	CAN	Knows-how	L_VC

M 22 Unit 2 Forebrain22.2.1. Cerebrum, Diencephalon and Basal nuclei

References: 11,12,13,14,15,16,27,28,29,30,55

3A	3B	3C	3D	3E	3F	3G
CO5	Analyze the structural basis of functions of diencephalon through study of thalamic, epithalamic and hypothalamic nuclei and pineal body. Analyze structural basis of basal ganglia to analyze its primary function ie. ability to execute wanted movements and inability to execute unwanted movement. Analyze structural basis of Brodmann's functional areas of cerebrum.	5	Lecture	CAN	Knows-how	L&GD,BL
CO5	Evaluate normal functions of diencephalon and understand structural basis of abnormalities of lesions of diencephalon Evaluate normal functions of basal ganglia; and understand structural basis of abnormalities of lesions of basal ganglia. Evaluate normal functions of cerebrum; and understand structural basis of abnormalities of cerebral lesions.	10	Experiential-Learning 22.2	CE	Knows-how	JC,CBL
CO5	Demonstrate features of Diencephalon by conducting cadaveric dissection or 3D virtual dissection; and describe its relations with adjacent structures of brain. Demonstrate sulci and gyri, sensory and motor areas of cerebrum in relation to their functions. Identify and demonstrate different parts of basal ganglia by gross cadaveric dissection or 3D virtual dissection.	10	Practical Training 22.2	PSY-MEC	Shows-how	DL,DSN

M 22 Unit 3 Meninges and ventricular system22.3.1. Meninges of brain

22.3.2. Ventricular system of brain

References: 11,12,13,14,15,16,27,28,29,30

3A	3B	3C	3D	3E	3F	3G
CO5	Analyze structural basis of formation, circulation and and drainage of cerebrospinal fluid.	1	Lecture	CAN	Knows-how	L&GD,L &PPT
CO5	Demonstrate features of ventricular system of brain by conducting cadaveric dissection or 3D virtual dissection; and describe its paraventricular relations..	2	Practical Training 22.3	PSY-ADT	Does	D,DSN
CO5	Evaluate normal functions of ventricular system of brain ; and disorders of ventricular system of brain.	4	Experiential-Learning 22.3	CE	Does	Mnt,CBL, JC,PBL
CO5	Analyze structural basis of duramater responsible for protection and drainage of blood from brain.	1	Lecture	CAN	Knows-how	IBL,TUT
CO5	Dissect and demonstrate the duramater.	2	Practical Training 22.4	PSY-MEC	Shows-how	DSN,D
CO5	Evaluate normal functions of duramater; and understand structural basis of dural disorders.	4	Experiential-Learning 22.4	CE	Knows-how	SIM,JC,C BL

Practical Training Activity

Practical Training 22.1 : Dissection of brain stem.
Dissection of cerebellum.

1. Dissection of brain stem -(3hour)

Student should conduct the dissection of brain stem on specimen of brain extracted by cadaveric dissection. Student can also study the features of brain stem on 3D virtual dissector and demonstrate the features to undergraduate students in front of teacher. Scholar should use various data resources to acquire transverse sections of brain stem at

different levels of medulla, pons or midbrain.

2. Dissection of cerebellum -(3hour)

Student should conduct the dissection of cerebellum on specimen of brain extracted by cadaveric dissection. Student can also study the features of cerebellum on 3D virtual dissector and demonstrate the features to undergraduate students in front of teacher. Scholar should use various data resources to acquire sections of cerebellum displaying magnifies structure of peduncle, nuclei and cortex.

Practical Training 22.2 : Dissection and practical study of diencephalon.

Dissection and practical study of basal ganglia.

Dissection and practical study of cerebrum.

1. Dissection and practical study of diencephalon(4hour)

Scholar should conduct the dissection of diencephalon on specimen of brain extracted by cadaveric dissection. Scholar can also study the features of diencephalon on 3D virtual dissector and demonstrate the features to undergraduate students in front of teacher.

2. Dissection and practical study of basal ganglia (2hour)

Scholar should conduct the dissection of basal ganglia on specimen of brain extracted by cadaveric dissection. Scholar can also study the features of basal ganglia on 3D virtual dissector and demonstrate the features to undergraduate students in front of teacher.

3. Dissection and practical study of cerebrum (4hour)

Scholar should conduct the dissection of cerebrum on specimen of brain extracted by cadaveric dissection. Scholar can also study the features of cerebrum on 3D virtual dissector and demonstrate the features to undergraduate students in front of teacher. Scholar should attempt to further dissect specimen of cerebrum to see internal structure and relation with diencephalon and basal ganglia.

Practical Training 22.3 : Dissection of ventricular system of brain.

Dissection and practical study of ventricular system of brain -

Scholar should conduct the dissection of ventricular system of brain on specimen of brain extracted by cadaveric dissection. Scholar can also study the features of ventricles on 3D virtual dissector and demonstrate the features to undergraduate students in front of teacher. Scholar should prepare the specimen by cutting sagittal section of cerebrum and brain stem and identify parts of ventricles of brain.

Practical Training 22.4 : Demonstrate features of duramater; and its relation with arachnoid mater and piamater.

Dissection and demonstration to undergraduate students

Scholar should conduct the dissection of duramater on specimen of brain extracted by cadaveric dissection. Scholar can also study the features of duramater on 3D virtual dissector and demonstrate the features to undergraduate students in front of teacher. Scholar should attempt to see folds of duramater and their attachments and identify dural venous sinuses.

Experiential learning Activity

Experiential-Learning 22.1 : Functional and clinical correlates of brain stem (medulla, pons and midbrain).
Functional and clinical correlates of cerebellum.

1. Clinical correlates of brain stem (medulla, pons and midbrain) -(4hour)

Every scholar should be allotted one case from each activity separately. Scholar should attempt to study cases of brainstem lesion with the help of various data resources, like; unilateral lesions (ipsilateral cranial nerve palsy), contralateral loss of power and sensation, ipsilateral in-coordination of limbs.

a. midbrain lesions - oculomotor nerve palsy, pinealoma.

b. pontine lesions - acoustic neuroma, abducens and facial nerve lesion, trigeminal nerve lesion.

c. medullary lesions - bulbar palsy, glossopharyngeal, vagal and hypoglossal nerve lesions, accessory nerve lesions.

d. other syndromes - focal brain stem syndrome, bilateral destructive lesions of brain stem

2. Functional and clinical correlates of cerebellum - (4hour)

Every scholar should be allotted one case from each activity separately. Scholar should attempt to study cases of cerebellar lesion with the help of various data resources.

a. Scholar should perform simple exercises, like, lifting the book, standing from sitting position, walking, kicking etc. to observe co-ordinated movement of muscles and joints. Scholar should attribute various parts of the action to different parts of constitution of cerebellum.

b. Scholar should study the unilateral and bilateral lesions of the cerebellum through case studies available on various data resources to identify the structural basis of consequent abnormalities.

Experiential-Learning 22.2 : Clinical correlates of diencephalon, basal ganglia, cerebrum.

1. Clinical correlates of diencephalon -(4hour)

Every scholar should be allotted two cases from each activity separately. Scholar should attempt to study cases of lesions of diencephalon with the help of various data resources. Scholar should study lesions (anterior, medial, lateral thalamus; hypothalamus) through case studies available on various data resources to identify the structural basis of consequent abnormalities.

2. Clinical correlates of basal ganglia -(2hour)

Every scholar should be allotted two cases from each activity separately. Scholar should attempt to study cases of lesions of basal ganglia with the help of various data resources. Scholar should study lesions of basal ganglia (parkinson's disease) through case studies available on various data resources to identify its structural basis.

3. Clinical correlates of cerebrum - (4hour)

Every scholar should be allotted one case from each activity separately. Scholar should attempt to study cases of lesions of cerebrum with the help of various data resources. Scholar should study lesions of cerebrum (large focal, acute focal and bilateral parietal lesions of association areas of neocortex; parietal-temporal cortical lesions; anterior superior parietal lobe lesions; anterior temporal neocortex lesions; lesions of frontal, parietal and temporal cortical regions; focal lesions of language area, prefrontal association cortex lesion; limbic allocortex lesion, corpus callosum lesion) through case studies available on various data resources to identify its structural basis.

Experiential-Learning 22.3 : Clinical correlates of ventricles of brain.

Clinical correlates of ventricles of brain -

Every scholar should be allotted one case from each activity separately. Scholar should attempt to study cases of disorders of ventricular system of brain (like hydrocephalus) with the help of various data resources. Scholar should study abnormalities through case studies available on various data resources to identify the structural basis of consequent abnormalities.

Experiential-Learning 22.4 : Clinical correlates of duramater abnormalities.

Clinical correlates of duramater abnormalities

Every scholar should be allotted one case from each activity separately. Scholar should attempt to study cases of duramater abnormalities (like subdural haematoma) with the help of various data resources to identify the structural basis of consequent abnormalities.

Modular Assessment**Assessment method****Hour**

Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C.

1.OSPE -Performing Brain Dissection (25Mark)

Students will actively perform dissection of the brain /demonstrate dissection steps on a virtual platform. Teacher will use the checklist for Assessment as

- Proper technique of hemispheric separation and identification of cerebral lobes
- Exposure and identification of deep structures such as thalamus, hypothalamus, and basal nuclei.
- Clear demonstration of ventricular system and explanation of CSF flow
- Clear demonstration of related cranial nerve, arteries and veins
- Identification of midbrain, pons, and medulla with functional correlation

Handling and safety of specimens, including respect for cadaver

2.OSCE (25Mark)

Students will rotate through 3 Objective Structured Clinical Examination (OSCE) stations designed to evaluate clinical reasoning and application of neuroanatomical knowledge.(For example 3 cases/simulated cases are given below or any other related cases can be used)

Station 1.Parkinsonism Case -A standardized patient (real/simulated) presents with tremors, bradykinesia, and rigidity. Students will be assess on the basis of following checklist.

- Take focused neurological history related to basal ganglia dysfunction

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- Perform a brief neurological examination to demonstrate tremor type and gait analysis
- Identify the lesion area

Station 2 Meningitis Case - A standardized patient (real/simulated) presents with fever, neck rigidity, photophobia, and altered sensorium. Students will be assess on the basis of following checklist.

- Correlate symptoms with inflammation of the meninges and CSF flow obstruction
- Recommend imaging and lumbar puncture findings

Station 3 - Stroke Assessment - A standardized patient (real/simulated) presents with Scenario sudden onset of right-sided hemiparesis and facial droop. Students will be assess on the basis of following checklist.

- Take a focused neurological history from a standardized patient
- Identify the site of lesion based on symptoms.

or
Any practical in converted form can be taken for assessment.(25Mark)
and
Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)

Module 23 : Spinal cord and spinal nerves

Module Learning Objectives

(At the end of the module, the students should be able to)

Perform and demonstrate dissection of spinal cord to understand clinical anatomy.

M 23 Unit 1 General structure of spinal cord23.1.1. Internal structure of spinal cord.
23.1.2. Reflex arc.

References: 11,12,13,14,15,16,27,28,29,30

3A	3B	3C	3D	3E	3F	3G
CO5	Analyze structural basis of sensory, motor and autonomic nuclei of spinal grey columns.	2	Lecture	CAN	Knows-how	L&PPT
CO5	Dissect and demonstrate features of spinal cord by conducting cadaveric dissection or 3D virtual dissection; and describe its relations to sensory and motor nuclei.	3	Practical Training 23.1	PSY-MEC	Shows-how	DSN,D
CO5	Evaluate segmental arrangement of motor neurons in spinal cord in context of innervation to muscles of trunk and appendicular skeleton in relation to lower motoneuronal disorders.	3	Experiential-Learning 23.1	CE	Does	D,JC,LS, CBL
CO5	Discuss structure of reflex arc to analyze structural basis of spinal reflexes.	1	Lecture	CAN	Knows-how	L&GD
CO5	Demonstrate structural basis of reflex arc by conducting cadaveric dissection or 3D virtual dissection; and describe its relations to spinal reflexes	1	Practical Training 23.2	PSY-MEC	Shows-how	SIM
CO5	Evaluate role of reflex arc in understanding normal and abnormal spinal reflexes.	3	Experiential-Learning 23.2	CE	Does	CBL

M 23 Unit 2 Tracts of spinal cord 23.2.1. Ascending and descending tracts of spinal cord
23.2.2. Intersegmental tracts of spinal cord

References: 11,12,13,14,15,16,27,28,29,30

3A	3B	3C	3D	3E	3F	3G
CO5	Analyze structural features of ascending tracts of spinal cord and analyze the sensory functions of constituent tracts. Analyze structural features of descending tracts of spinal cord and analyze the motor functions of constituent tracts.	2	Lecture	CAN	Knows-how	PER,L&GD
CO5	Dissect and demonstrate structural features of ascending, descending and propriospinal	6	Practical	PSY-	Shows-	D,DSN

	pathways by dissection of spinal cord or 3D virtual dissection; and describe their functions.		Training 23.3	MEC	how	
CO5	Evaluate structural basis of clinical disorders of ascending, descending and propriospinal pathways.	10	Experiential-Learning 23.3	CE	Does	PL,CBL
CO5	Determine structural basis of propriospinal pathways.	1	Lecture	CAP	Knows-how	L&PPT

M 23 Unit 3 Spinal nerves23.3.1. Spinal nerves.

23.3.2. Brachial plexus.

23.3.3. Lumbosacral Plexus.

References: 11,12,13,14,15,16,27,28,29,30

3A	3B	3C	3D	3E	3F	3G
CO5	Analyze structural basis of radicular and referred pain in spinal nerve.	1	Lecture	CAN	Knows-how	BS,DIS,L &GD
CO5	Conduct dissection of brachial plexus or 3D virtual dissection; and demonstrate muscular and cutaneous distribution of its branches. Conduct dissection of lumbosacral plexus or 3D virtual dissection; and demonstrate muscular and cutaneous distribution of its branches.	10	Practical Training 23.4	PSY-MEC	Shows-how	D,DSN
CO5	Evaluate disorders of upper limb due to brachial plexus lesions and disorders of lower limb due to lesions of lumbosacral plexus.	10	Experiential-Learning 23.4	CAN	Shows-how	CBL,SIM
CO5	Describe formation of brachial plexus, lumbosacral plexus to analyze its sensory and motor distribution.	3	Lecture	CAN	Knows-how	L&PPT

Practical Training Activity

Practical Training 23.1 : Dissection of spinal cord.

Dissection of spinal cord -

Teacher should demonstrate key features of spinal cord to the scholar before dissection. Scholar should perform the dissection of spinal cord after exposure from dorsal side of vertebral column. Scholar should keenly observe features of spinal cord at different level and demonstrate the formation of quada equina. Scholar should use the extracted specimen of spinal cord to cut sections of spinal cord at different levels to observe nuclei of the spinal cord.

Practical Training 23.2 : Practical study of reflex arc.

Practical study of reflex arc -

Schoar shall use the model of reflex arc to study different structures forming reflex arc. Scholar should observe those structures on dissected specimen of spinal cord. Scholar shall perform various reflexes, like; golgi tendon reflex (weightlifter attempting to lift too heavy weight etc.); flexor reflex (pulling hand away from hot stove etc.); crossed extensor reflex (stepping on nail reflex etc.); and stretch reflex (maintaining balance while shivering, shivering to warm muscles etc.) in front of teacher.

Practical Training 23.3 : Practical study of spinal cord and tracts.

Dissection of spinal cord to see tracts -

Teacher should demonstrate key features of tracts of spinal cord to the scholar before dissection. Scholar should observe models of cut sections of spinal cord at different levels to observe dorsal, ventral and intersegmental columns of white matter of the spinal cord. Scholar should demonstrate the position of columns to teacher and explain tracts of spinal cord.

Practical Training 23.4 : Dissection of brachial plexus.

Dissection of lumbosacral plexus.

1. Dissection of brachial plexus -(5 hour)

Scholar should observe structure and distribution of nerves of brachial plexus at the time of dissection of upper limb. Carefully observe the formation of brachial plexus in the neck region and observe distribution of all branches with the help of textual references and do dermatome and myotome mapping of the nerves. Record observation and share with peers to find variations.

2. Dissection of lumbosacral plexus - (5hour)

Scholar should observe structure and distribution of nerves of lumbosacral plexus at the time of dissection of lower limb. Carefully observe the formation of lumbosacral plexus and observe distribution of all branches with the help of textual references to do dermatome and myotome mapping of the nerves. Record observation and share with peers to find variations.

Experiential learning Activity

Experiential-Learning 23.1 : Clinical co-relates of neuronal arrangement in spinal cord.

Clinical co-relates of neuronal arrangement in spinal cord -

Teacher should allot atleast two cases to every scholar. Scholar can examine the patients of specific disorders in the IPD/OPD of hospital. Scholar can also take help of data resources to evaluate the clinical consequences of disorders of motor neurons of spinal cord, like; spinal muscular atrophy with respiratory distress, (SMARD 1), like; spinal muscular atrophy, congenital SMA with arthrogryposis, progressive bulbar palsy, progressive muscular atrophy, kennedy's disease, post polio syndrome etc. Scholar should record the findings and present thecases in the form of audiovisual presentation in the class.

Experiential-Learning 23.2 : Clinical correlates of reflex arc.

Clinical correlates of reflex arc -

Teacher should allot atleast two cases to every scholar. Scholar can observe the patients of specific disorders in the IPD/OPD of hospital. Scholar can also take help of data resources to evaluate the clinical consequences of disorders of motor neurons of spinal cord, like; stretch reflex disorders (guillain barre's syndrome, diabetic neuropathy, poliomyelitis, musccular dystrophy, myasthenia gravis etc); flexor reflex disorders (amyotropic lateral sclerosisor ALS, multiple sclerosis or MS, periphral neuropathies, sensory neuropathy of freidrich's ataxia etc.); deep tendon reflexes (knee reflexes, biceps, triceps, knee, abdominal and plantar reflexes etc.). Scholar should record the findings to place for group discussion.

Experiential-Learning 23.3 : Clinical correlates of of ascending, descending and propriospinal pathways.

Clinical correlates of of ascending, descending and propriospinal pathways -

Teacher should allot atleast two cases to every scholar. Scholar can observe the patients of specific disorders in the IPD/OPD of hospital. Scholar can also take help of data resources to evaluate the clinical consequences of spinal cord lesions, like; extradural lesions, intradural lesions and intramedullary lesions.

Scholar shall consult data resources to find cases of spinal cord lesions in different regions like; upper cervical, lower cervical, thoracic and lumbarregions. Scholar should record the findings and present thecases in the form of audiovisual presentation in the class

Scholar will take the case of vatavyadhi and analyze the cases on basis of anatomical structure invoved in it.

Experiential-Learning 23.4 : Clinical correlates of structural deformities of brachial plexus.

Clinical correlates of structural deformities of lumbosacral plexus.

Scholar will learn dermatome mapping and apply it in clinical setttings

1. Clinical correlates of structural deformities of brachial plexus -

Scholar should be allotted atleast two cases for this activity. Scholar will take case scenario/ simulated patient/cases of muscle paralysis or loss of sensation in region of upper

limb, like; Erb's palsy, klumpks paralysis and various nerve palsies of brachial plexus etc. Scholar should record the findings and present in the form of audiovisual presentation.

2. Clinical correlates of structural deformities of lumbosacral plexus -

Scholar should be allotted atleast two cases for this activity. Scholar will take case scenario/ simulated patient/cases of muscle paralysis or loss of sensation in region of lower limb, like; various nerve palsies of nerves of lumbosacral plexus etc. Scholar should record the findings and present in the form of audiovisual presentation.

Modular Assessment

Assessment method

Hour

Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C.

4

1.360-Degree Evaluation - Spinal Cord Dissection (25Mark)

The student will receives Multi-source feedback from Faculty/Teachers, Peers/Classmates, Self (Self-assessment), Support Staff (like lab technicians),for Spinal Cord Dissection, so that can assess practical skill, communication skill, Team work and collaboration,Ethics and Professionalism

2.360-Degree Evaluation- Spinal nerves clinical applicationv (25Mark)

The student will receives Multi-source feedback from Faculty/Teachers, Peers/Classmates, Self (Self-assessment), Support Staff (like lab technicians), Patients/Simulated Patients (in clinical application) for Spinal nerves clinical application, so that can assess practical skill, communication skill, Team work and collaboration, clinical application, Ethics and Professionalism

or

Any practical in converted form can be taken for assessment.(25Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)

Semester No : 4

Module 24 : Cranial Nerves

Module Learning Objectives

(At the end of the module, the students should be able to)

Demonstrate the superficial origins, course and distribution of cranial nerve through cadaveric dissection.

Analyze the function of cranial nerves.

M 24 Unit 1 Cranial nerve nuclei24.1.1. Deep origin of cranial nerves
24.1.2. Examination of cranial nerves

References: 11,12,13,14,15,16,27,28,29,30

3A	3B	3C	3D	3E	3F	3G
CO5	Analyze cranial nerve nuclei to describe structural basis of cranial nerve function.	2	Lecture	CAN	Knows-how	L
CO5	Demonstrate the deep origin of cranial nerves; and explain general distribution, general function and developmental origin of the nerves.	5	Practical Training 24.1	CAP	Knows-how	D
CO5	Assess the patency of cranial nerve nuclei by examination of cranial nerves.	4	Experiential-Learning 24.1	CE	Does	PAL,CBL

M 24 Unit 2 Description of cranial nerves - nose and eyes24.2.1. Olfactory and Optic nerves
24.2.2. Oculomotor, trochlear and Abducens nerves

References: 11,12,13,14,15,16,27,28,29,30

3A	3B	3C	3D	3E	3F	3G
CO5	Describe origin and course of the olfactory tracts to analyze olfactory senses as the most primitive sense. Describe origin and course of optic nerve; and analyze gradual development of retinal cells from single neurosensory cell type.	2	Lecture	CAP	Knows-how	L
CO5	Demonstrate nasal origin of olfactory nerve and its relation with limbic system of brain. Demonstrate structure of retinal cells as primary site for perception of vision and origin	6	Practical Training 24.2	PSY-MEC	Shows-how	D,DSN

	of optic nerve as extension of brain system (optic tract). Demonstrate nervous control of nerves of extra-ocular muscles (oculomotor, trochlear and abducent) in relation to gaze.					
CO5	Evaluate the structural basis of clinical manifestation in olfactory nerve lesions. Evaluate the structural basis of clinical manifestation in optic nerve lesions. Evaluate the structural basis of clinical manifestation in lesions of oculomotor, trochlear and abducent nerve.	9	Experiential-Learning 24.2	CE	Knows-how	CBL,PL
CO5	Describe nerves supplying to extraocular muscles (oculomotor, trochlear and abducent); and analyze co-emergence of these cranial nerve with development of gaze (vision).	2	Lecture	CC	Knows-how	DIS,L

M 24 Unit 3 Description of cranial nerves - face and ear
 24.3.1. Trigeminal nerve
 24.3.2. Facial and Vestibulo-cochlear nerves

References: 11,12,13,14,15,16,27,28,29,30

3A	3B	3C	3D	3E	3F	3G
CO5	Describe origin and distribution of branches of Ophthalmic nerve; and justify that ophthalmic is smallest of the three branches of trigeminal nerve but has most extensive supply. Describe distribution of mandibular nerve and differentiate embryological origin of Ophthalmic, maxillary and mandibular branches of trigeminal nerve. Analyze distribution of mandibular nerve and its role in mastication. Analyze nervous control of facial expressions. Discuss embryological similarity in origin of auditory senses, olfactory senses and visual senses. Analyze course and distribution of vestibulocochlear nerve.	2	Lecture	CAN	Knows-how	L&PPT
CO5	Demonstrate origin and distribution of Ophthalmic nerve, maxillary nerve and mandibular nerve in relation to its supply to upper, middle and lower thirds of face through cadaveric dissection. Demonstrate origin and distribution of facial nerve in relation to its supply to muscles of	7	Practical Training 24.3	PSY-MEC	Shows-how	DSN,D

	facial expression through cadaveric dissection. Demonstrate origin and distribution of vestibulocochlear nerve in relation to auditory senses through cadaveric dissection.					
CO5	Evaluate structural basis of disorders of ophthalmic nerve, maxillary nerve and mandibular nerve. Evaluate structural basis of disorders of facial nerve. Evaluate structural basis of disorders of vestibulocochlear nerves.	9	Experiential-Learning 24.3	CE	Knows-how	PER,CBL
M 24 Unit 4 Description of cranial nerves - IX to XII 24.4.1. Glossopharyngeal nerve and Vagus nerve 24.4.2. Spinal Accessory and Hypoglossal nerves References: 11,12,13,14,15,16,27,28,29,30						
3A	3B	3C	3D	3E	3F	3G
CO5	Analyze functions of glossopharyngeal nerve by describing its origin and distribution. Describe origin, course and distribution of vagus nerve; analyze its thoracic and abdominal visceral supply in spite of being cranial nerve. Describe origin and distribution of spinal accessory nerve; and analyze its craniospinal origin. Describe origin and distribution of hypoglossal nerve; analyze hypoglossal nerve as nerve of pre-cervical and occipital somites and having functional alignment with nerves supplying to extra-ocular muscles (oculomotor, trochlear and abducent).	3	Lecture	CAN	Knows-how	L&PPT
CO5	Demonstrate origin and distribution of glossopharyngeal nerve, vagus nerve, spinal accessory nerve and hypoglossal nerve in relation to their supply by cadaveric dissection or 3D virtual dissector.	7	Practical Training 24.4	PSY-ADT	Shows-how	DSN,D,SIM
CO5	Evaluate glossopharyngeal nerve, vagus nerve, spinal accessory nerve and hypoglossal nerve.	8	Experiential-Learning 24.4	CE	Knows-how	CD,CBL
M 24 Unit 5 Sympathetic and parasympathetic ganglia of cranial nerves 24.5.1. Parasympathetic ganglia associated with cranial nerves.						

24.5.2. Sensory ganglia associated with cranial nerves.

References: 11,12,13,14,15,16,27,28,29,30

3A	3B	3C	3D	3E	3F	3G
CO5	Analyze structure and general plan of distribution of parasympathetic ganglia; describe parasympathetic ganglia of cranial nerves and justify their location. Analyze structure and general plan of distribution of sensory ganglia; justify their location in relation to function.	4	Lecture	CAN	Knows-how	L&PPT
CO5	Demonstrate parasympathetic ganglia (Ciliary ganglia, Submandibular ganglia, Pterygopalatine ganglia, Otic ganglia and sensory ganglia (Trigeminal ganglion, Geniculate ganglion, Superior and Inferior ganglia of the glossopharyngeal nerve, Superior and Inferior ganglia of vagus nerve, vestibular and spiral ganglia of Vestibulocochlear nerve) associated with cranial nerves in relation to their location and function.	5	Practical Training 24.5	PSY-MEC	Shows-how	D,DSN
CO5	Evaluate disorders of parasympathetic ganglia (Ciliary ganglia, Submandibular ganglia, Pterygopalatine ganglia, Otic ganglia and sensory ganglia and sensory ganglia (Trigeminal ganglion, Geniculate ganglion, Superior and Inferior ganglia of the glossopharyngeal nerve, Superior and Inferior ganglia of vagus nerve, vestibular and spiral ganglia of Vestibulocochlear nerve) associated with cranial nerves in relation to their location and function.	9	Experiential-Learning 24.5	CE	Knows-how	CBL,PER

Practical Training Activity

Practical Training 24.1 : Practical study of cranial nerves.

Practical study of cranial nerves -

Teacher should explain general formation and development of cranial nerve nuclei. Scholar should trace the deep origin of cranial nerve from different cranial nerve nuclei with the help of images from data resources or 3D virtual dissector. Scholar should attempt to interpret general distribution of the cranial nerve fibers in relation to their afferent/efferent, somatic/visceral or general/special functions.

Scholar should prepare the chart to depict general functions of cranial nerve in relation to cranial nerve nuclei.

Practical Training 24.2 : Exposure of olfactory nerve, optic nerve, oculomotor, trochlear and abducent by cadaveric dissection.

1. Exposure of olfactory nerve by cadaveric dissection -(2hour)

Scholar should attempt dissection of olfactory nerve during exposure of roof of nasal cavity. Scholar should also take the help of virtual 3D dissector to plan the dissection.

2. Exposure of optic nerve by cadaveric dissection -(2hour)

Expose of optic nerve at the time of dissection of interior of cranium and should be followed with exposure of eye ball.

3. Exposure of oculomotor, trochlear and abducent by cadaveric dissection -(2hour)

Expose extraocular nerve at the time of dissection of interior of cranium, and along with extra-ocular muscles at the time of dissection of eye ball.

Practical Training 24.3 : Dissection of Ophthalmic nerve, maxillary nerve and mandibular nerve, facial nerve, vestibulocochlear nerve

1. Dissection of Ophthalmic nerve, maxillary nerve and mandibular nerve (3hour)

Scholar should attempt the dissection of these nerve at the time of opening of calvaria to expose brain and observe intracranial course and exit through cranial foramina.

These nerve should be followed upto face to track their course under skin /inside muscles.

2. Dissection of facial nerve (3hour)

Intracranial course should be tracked in posterior cranial fossa and exit through facial canal. Finally nerve should be traced behind and below ear to observe intramuscular course through different branches.

3. Dissection of vestibulocochlear nerve(3hour)

Intracranial course should be tracked in posterior cranial fossa along with facial nerve and exit through facial canal. Further it should be followed inside temporal bone along with dissection of internal ear.

Practical Training 24.4 : Dissection and practical study of glossopharyngeal nerve, vagus nerve, spinal accessory nerve and hypoglossal nerve.

Dissection and practical study of glossopharyngeal nerve, vagus nerve, spinal accessory nerve and hypoglossal nerve -

Teacher should demonstrate a preliminary view regarding key features of the dissection of these nerves, Scholar should identify all nerves in close association with medulla of brain in posterior cranial fossa. Follow the nerves as they exit cranial cavity to expose their course and distribution.

Study the specimen of brain to see the superficial origin of nerves or use a model for the purpose. Scholars can take help of 3D dissector for cadaveric dissection. Scholars shall share their findings related to ease of dissection etc with peers.

Practical Training 24.5 : Dissection of parasympathetic ganglia and sensory ganglia associated with cranial nerves.

Practical study and exposure of parasympathetic ganglia and sensory ganglia associated with cranial nerves.- Locate ganglia with the help of textual description in relation to their nerves and dissect to expose their locations.

A. Location of Parasympathetic ganglia -

1. Ciliary ganglion - Associated with the oculomotor nerve (III), it is involved in pupillary constriction and accommodation of the lens.
2. Pterygopalatine ganglion - Associated with the facial nerve (VII), it provides parasympathetic innervation to the nasal cavity, palate, and lacrimal gland.
3. Otic ganglion - Associated with the glossopharyngeal nerve (IX), it provides parasympathetic innervation to the parotid gland.
4. Submandibular ganglion - Associated with the facial nerve (VII), it provides parasympathetic innervation to the submandibular and sublingual salivary glands.

B. Location of Sensory Ganglia -

1. Trigeminal ganglion - Located on the trigeminal nerve (V), it has three divisions: ophthalmic, maxillary, and mandibular.
2. Geniculate ganglion - Found on the facial nerve (VII), it is involved in taste sensation.
3. Superior and Inferior ganglia of glossopharyngeal - Located on the glossopharyngeal nerve (IX), they are involved in taste, touch, and general sensation from the posterior tongue and pharynx.
4. Superior and Inferior ganglia of vagus - Found on the vagus nerve (X), they are involved in taste, touch, and general sensation from the larynx, pharynx, and thoracic and abdominal viscera.
5. vestibular and spinal ganglia - Vestibulocochlear nerve (VIII):
Has two divisions: the vestibular ganglion (related to balance) and the spiral ganglion (related to hearing).

Experiential learning Activity

Experiential-Learning 24.1 : Clinical correlates of cranial nerve nuclei.

Clinical correlates of cranial nerve nuclei - Teacher shall allot atleast four cases of cranial nerve examination to every scholar separately. Scholar should identify the cases from data resources and record their findings to share with peers.

1. Examination of olfactory nerve - The chosen odor should be presented approximately 30 cm from the open nostril. The patient is instructed to sniff and identify the odor. They should be given adequate time to respond. The process is repeated for the other nostril, using the same odor.
2. Examination of optic nerve - Examination of its function involves assessing visual acuity, visual fields, pupillary responses, and evaluating the optic nerve head using ophthalmoscopy.
3. Examination of oculomotor nerve - The examination of oculomotor nerve (CN III) function assesses its control over eye movements and pupillary constriction. This involves observing eye movements in different directions, testing the pupillary light reflex, and assessing accommodation (focusing on near and far objects).
4. Examination of trochlear nerve - The trochlear nerve (CN IV), responsible for innervating the superior oblique muscle, is examined by assessing eye movements, particularly the "down and in" direction, as this motion relies heavily on the superior oblique. Testing involves having the patient follow a target (like a penlight) with their eyes, without moving their head, while observing for any limitations in movement or double vision (diplopia).
5. Examination of trigeminal nerve - The trigeminal nerve (CN V) examination assesses both sensory and motor functions. Sensory testing involves evaluating light touch, pain, and temperature sensation on the face, while motor testing focuses on the muscles of mastication. The corneal reflex, an involuntary blink in response to corneal stimulation, is also assessed.
6. Examination of abducens nerve - The abducens nerve (also known as cranial nerve VI) is primarily assessed by evaluating eye movements. Specifically, the examiner

observes if the patient can move their eye outward, away from the nose. This is usually done by having the patient follow a target (like a finger or pen) as it moves in an "H" or "figure-eight" pattern, while keeping their head still. Double vision (diplopia) or an inability to move the eye fully outward are signs of potential abducens nerve dysfunction.

7. Examination of facial nerve - A facial nerve examination assesses the function of the Facial nerve, which controls facial expressions and some sensory functions. The examination involves observing facial symmetry, testing muscle strength through various movements, and assessing reflexes. It can also involve testing taste sensation and reflexes related to the facial nerve.

8. Examination of vestibulo-cochlear nerve - The vestibulocochlear nerve (CN VIII) is responsible for hearing and balance, and its examination involves assessing both the auditory and vestibular components. Auditory assessment includes tests like the whisper test, Rinne test, and Weber test, while vestibular assessment may involve balance tests and evaluation for nystagmus.

9. Examination of glossopharyngeal nerve - The gag reflex of the mouth is tested, the patient is asked to swallow or cough, and speech difficulties are evaluated as part of the clinical tests performed to detect if the glossopharyngeal nerve has been injured.

10. Examination of vagus nerve - The vagus nerve, also known as cranial nerve X, can be assessed by examining its effects on various functions, including speech, swallowing, and the gag reflex. Specifically, doctors check for hoarseness, dysphagia, and palatal asymmetry when evaluating the vagus nerve. Additionally, the gag reflex and swallowing can be assessed, and heart rate and blood pressure can be evaluated to monitor heart.

11. Examination of spinal accessory nerve - The spinal accessory nerve (also known as cranial nerve XI) is assessed by examining the function of the sternocleidomastoid (SCM) and trapezius muscles, which it innervates. To test these muscles, you would observe for muscle wasting, ask the patient to rotate their head against resistance (SCM), and shrug their shoulders against resistance (trapezius).

12. Examination of hypoglossal nerve - The hypoglossal nerve (CN XII) examination focuses on assessing tongue movement and strength, as it primarily controls tongue muscles. The examination involves observing the tongue's appearance, checking for deviation, atrophy, and fasciculations, and testing its ability to protrude, move side-to-side, and resist pressure.

Experiential-Learning 24.2 : Clinical correlates of olfactory nerve lesions.

Clinical correlates of optic nerve lesions.

Clinical correlates of lesions of oculomotor, trochlear and abducent nerve.

1. Clinical correlates of olfactory nerve lesions (3hour)

Every scholar should be allotted atleast two case from the activity. Scholar can take help of data resources to collect the cases for study of olfactory nerve lesions. Scholar should observe clinical manifestations, like; complete loss of smell (anosmia), decreased ability to smell (hyposmia), distorted sense of smell (parosmia), and the perception of smells that aren't actually present (dysosmia or phantosmia). Scholar should record the finding of cases and share with peers.

2. Clinical correlates of optic nerve lesions (3hour)

Every scholar should be allotted atleast two case from the activity. Scholar can take help of data resources to collect the cases for study of optic nerve lesions. Scholar should observe disorders, like; Optic Neuritis, Optic Nerve Atrophy, Anterior Ischemic Optic Neuropathy (AION), Optic Nerve Tumors, Papilledema, Optic Nerve Coloboma, Optic Nerve Drusen, Infectious Optic Neuropathies.

3. Clinical correlates of lesions of oculomotor, trochlear and abducent nerve (3hour)

Every scholar should be allotted atleast two cases from the each activity. Scholar can take help of data resources to collect the cases for study of lesions of oculomotor (Aneurysms, Tumors, Ischemia, Inflammation, Trauma, Congenital Conditions), trochlear (Trochlear Nerve Schwannoma, Metastatic Disease, Cranial Dysinnervation Syndrome, Trochlear Nerve Palsy) and abducent (6th nerve palsy) nerve lesions. Scholar should observe disorders and record the findings to be presented in class.

Experiential-Learning 24.3 : Clinical correlates of ophthalmic nerve, maxillary nerve and mandibular nerve.

Clinical correlates of facial nerve.

Clinical correlates of vestibulocochlear nerves.

1. Clinical correlates of Ophthalmic nerve, maxillary nerve and mandibular nerve(3hour)

Scholar should be allotted atleast one case from each activity, Scholar should search the data base or select patients for the disorder of; Ophthalmic nerve (trigeminal neuralgia, neuropathic ocular pain, and Horner's syndrome), maxillary nerve (trigeminal neuralgia, maxillary sinusitis, and tumors affecting the nerve's path) and mandibular nerve (Trigeminal Neuralgia, Temporomandibular Disorders, Mandibular Nerve Injury, tumors, Neurological Diseases). Scholar should record the findings and present the cases in the form of audiovisual presentations.

2. Clinical correlates of facial nerve (3hour)

Scholar should be allotted atleast one case from each activity, Scholar should search the data base or select patients for the disorder of; (Bell's Palsy, Ramsay Hunt Syndrome, Hemifacial Spasm, Facial Paralysis Related to Tumors, Facial Synkinesis, Bilateral Facial Nerve Palsy, Facial Nerve Trauma). Scholar should record the findings and present the cases in the form of audiovisual presentations.

3. Clinical correlates of vestibulocochlear nerves (3hour)

Scholar should be allotted atleast one case from each activity, Scholar should search the data base or select patients for the disorder of; (Vertigo, Tinnitus, Hearing Loss, Nystagmus, Balance Problems, Motion Sickness, Auditory Neuropathy). Scholar should record the findings and present the cases in the form of audiovisual presentations.

Experiential-Learning 24.4 : Clinical correlates of glossopharyngeal nerve, vagus nerve, spinal accessory nerve and hypoglossal nerve.

Clinical correlates of glossopharyngeal nerve, vagus nerve, spinal accessory nerve and hypoglossal nerve -

1. Clinical correlates of glossopharyngeal nerve (2hour)

Scholar should be allotted atleast two clinical cases from the OPD/IPD of hospital or Scholar can consult data resources to select cases. Scholar can take cases on any disorder of Glossopharyngeal nerve lesion, like; Dysphagia (Difficulty swallowing), Dysgeusia (Taste disturbances), Decreased or absent gag reflex, Glossopharyngeal neuralgia (GPN), Parotid gland dysfunction, Hoarseness or voice changes, Fainting or dizziness, Carotid artery or jugular vein damage etc. Scholar should attempt to identify structural basis of disorders.

2. Clinical correlates of vagus nerve(2hour)

Scholar should be allotted atleast two clinical cases from the OPD/IPD of hospital or Scholar can consult data resources to select cases. Scholar should can take cases on any disorder of vagus nerve lesion, like; Dysphagia and Dysarthria, Palatal and Pharyngeal Paralysis, Autonomic Dysfunction, Gastroparesis, Vasovagal Syncope, oesophageal

Motility Disorders. Scholar should attempt to identify structural basis of disorders.

3. Clinical correlates of spinal accessory nerve (2hour)

Scholar should be allotted atleast two clinical cases from the OPD/IPD of hospital or student can consult data resources to select cases. Scholar can take cases on any disorder of accessory nerve lesion, like; Spinal Accessory Nerve Palsy (SANP), difficulty with shoulder elevation, Jugular Foramen Syndrome (Vernet's Syndrome), Collet-Sicard Syndrome, Villaret Syndrome, Traumatic Injury, Idiopathic Spinal Accessory Neuropathy. Scholar should attempt to identify structural basis of disorders.

4. Clinical correlates of hypoglossal nerve(2hour)

Scholar should be allotted atleast two clinical cases from the OPD/IPD of hospital or Scholar can consult data resources to select cases. Scholar can take cases on any disorder of hypoglossal nerve lesion, like; tongue paralysis etc.

Experiential-Learning 24.5 : Clinical correlates of parasympathetic ganglia and of sensory ganglia cranial nerves.

Clinical correlates of parasympathetic ganglia and of sensory ganglia cranial nerves -

Scholar should be allotted atleast five clinical cases from the OPD/IPD of hospital or Scholar can consult data resources to select cases. Scholar should appreciate that clinical features of disorders of nerve root ganglion would closely mimic those of disorders of associated nerves. Various diagnosis methods can be used to identify exact location of lesion. Scholar should look for certain cases that can damage ganglia. like; Vascular Stroke (particularly affecting the brainstem where cranial nerve nuclei are located); Trauma (Skull fractures, especially those involving the base of the skull, can damage cranial nerves); Viral infections (shingles); Tumors (Growth of tumors can compress and damage cranial nerves); Autoimmune disorders (multiple sclerosis and sarcoidosis); Iatrogenic (Accidental damage during surgery or other medical procedures).

Scholar should record the findings and present them in the form of audiovisual presentation.

Modular Assessment

Assessment method

Instructions—Conduct a structured modular assessment. The assessment will be for 75 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C.

1.OSCE (25Mark)

Station 1- Olfactory Nerve- Student will test the sense of smell using non-irritant substances (e.g coffee)

Assessment will done on the basis of checklist Proper explanation to patient, Use of each nostril separately, Interpretation of anosmia

Station 2 - Optic Nerve- Student will Perform a visual acuity and visual field test using a Snellen chart and confrontation method.

Assessment will done on the basis of checklist Accuracy in procedure, with optic nerve pathology and structural deformity.

Station 3 - Facial Nerve-Student will Ask patient to smile, close eyes, puff cheeks, raise eyebrows.

Assessment will done on the basis of checklist Observation of asymmetry, Differentiation between upper and lower motor neuron lesion

(like wise any three cranial nerve can be used for the assessment purpose)

Hour

6

2. Practical Performance - Cervical Plexus (25 Mark)

Students will perform the dissection of cervical plexus and demonstrate identification and tracing of cervical plexus components on a cadaver. Student will

- Identify major branches
- Explain anatomical relations and area of sensory supply
- Correlate clinical scenarios such as regional nerve blocks or referred pain

3. Practical Performance - Lumbar plexus (25 Mark)

Students will perform the dissection of Lumbar plexus and demonstrate identification and tracing of Lumbar plexus components on a cadaver. Student will

Identify major branches

Explain anatomical relations and area of sensory supply

Correlate clinical scenarios such as sciatica

or

Any practical in converted form can be taken for assessment. (40 Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (35 Mark)

Semester No : 5

Module 25 : Autonomic nervous system and Endocrinology

Module Learning Objectives

(At the end of the module, the students should be able to)

Identify and demonstrate structure and functions of Autonomic nervous System through cadaveric dissection to analyse their function.

Demonstrate the structure of different endocrine glands to analyse their functions.

M 25 Unit 1 Autonomic nervous system - classification

25.1.1. Sympathetic Nervous system

25.1.2. Parasympathetic Nervous System

25.1.3. Chromaffin system

References: 11,12,13,14,15,16,27,28,29,30

3A	3B	3C	3D	3E	3F	3G
CO5	Describe formation and migration of neural crest cells and the formation of ganglia of autonomic nervous system (sympathetic, parasympathetic, enteric and supramedullary). Describe structure and location of constituents of sympathetic nervous system in relation to 'fight or flight' response. Describe structure and location of constituents of parasympathetic nervous system in relation to 'rest and digest' response. Describe location of chromaffin system and its similarity and dissimilarity with sympathetic nervous system.	2	Lecture	CC	Knows-how	L&GD
CO5	Demonstrate sympathetic and parasympathetic nervous system during cadaveric dissection with the help of 3D virtual dissector.	3	Practical Training 25.1	PSY-MEC	Shows-how	DSN,D
CO5	Evaluate structural basis of disorders related to sympathetic and parasympathetic nervous system.	6	Experiential-Learning 25.1	CE	Knows-how	PBL,CBL

M 25 Unit 2 Autonomic plexuses 25.2.1. Autonomic plexuses, and visceral afferent pathways

25.2.2. Enteric nervous system

References: 11,12,13,14,15,16,27,28,29,30

3A	3B	3C	3D	3E	3F	3G
CO5	Describe location, structure, links of autonomic plexuses along with their role in co-ordinating functions of sympathetic and parasympathetic nervous system; and similarity between Shadchakra and autonomic plexuses.	2	Lecture	CC	Knows-how	PAL,L_V C
CO5	Demonstrate autonomic plexuses by cadaveric dissection or 3D virtual dissector.	5	Practical	PSY-	Shows-	DSN,D

			Training 25.2	MEC	how	
CO5	Evaluate structural basis of disorders of autonomic plexuses.	4	Experiential-Learning 25.2	CE	Knows-how	CBL
CO5	Describe location and course of visceral afferent pathways and analyze their role in co-ordination between brain and viscera. Describe location of enteric nervous system (ENS) and its structural links with brain in formation of gut-brain axis.	1	Lecture	CC	Knows-how	L&GD
M 25 Unit 3 Endocrine glands related to brain; suprarenal glands 25.3.1. Pituitary gland 25.3.2. Pineal gland 25.3.3. Suprarenal glands References: 11,12,13,14,15,16,27,28,29,30						
3A	3B	3C	3D	3E	3F	3G
CO5	Describe structure and location of hypothalamus and pituitary glands and analyze hypothalamus pituitary pathways. Describe structure and location of pineal gland and analyze neural pathways for melatonin production. Describe structure and location of Suprarenal glands and analyze hypothamic-pituitary-adrenal-axis (HPA axis).	2	Lecture	CC	Knows-how	L&GD
CO5	Demonstrate structure and location of hypothalamus, pituitary glands, pineal gland and suprarenal gland with the help of cadaveric dissection or 3D virtual dissector.	6	Practical Training 25.3	PSY-MEC	Shows-how	DSN,D
CO5	Evaluate structural basis of the disorders of hypothalamus, pituitary glands, pineal gland and suprarenal glands.	10	Experiential-Learning 25.3	CE	Knows-how	CBL,DIS,CD,JC
M 25 Unit 4 Endocrine glands of branchial arches 25.4.1. Thyroid gland						

25.4.2. Parathyroid glands

25.4.3. Thymus gland

References: 11,12,13,14,15,16,27,28,29,30

3A	3B	3C	3D	3E	3F	3G
CO5	Describe location of thymus glands, thyroid glands and parathyroid glands in relation to their formation in pharyngeal arches.	1	Lecture	CC	Knows-how	L
CO5	Demonstrate structure and location of thymus, thyroid and parathyroid glands with the help of cadaveric dissection or 3D virtual dissector.	6	Practical Training 25.4	PSY-MEC	Shows-how	DSN,D
CO5	Evaluate structural basis of disorders of thymus, thyroid and parathyroid glands.	6	Experiential-Learning 25.4	CE	Knows-how	CBL,DIS
CO5	Describe structure and location of thymus gland and analyze its role in T-lymphocyte maturation.	1	Lecture	CC	Knows-how	L&GD
CO5	Describe structure and location of thyroid glands and analyze its feedback loop pathways with hypothalamus-pituitary in production of hormones; and describe the structure and location of parathyroid gland with its connections with subfornical organ (SFO) of central nervous system in regulation of parathyroid hormones.	1	Lecture	CC	Knows-how	L&GD

Practical Training Activity

Practical Training 25.1 : Dissection of constituents of sympathetic and parasympathetic nervous system.

1. Practical study and exposure of constituents of sympathetic and parasympathetic nervous system -(2hour)

Observe sympathetic trunk with ganglia on either side of vertebral column inside the ribs. Sympathetic ganglia can be observed at the root of ventral vessels of abdominal aorta.

Parasympathetic ganglia are seen in relation with cranial nerve 3, 5, 9 and 10 during the dissection and exposure of cranial nerves.

2. Other activities - (1hour)

- a. Controlled activation by ice water test - Submerge your hand in a bucket of ice water for a short period. As the cold becomes uncomfortable, you might notice an increased heart rate, heightened alertness, and potentially shallow breathing – classic fight-or-flight responses.
- b. Breathing and mindfulness - Practice slow, deep breaths, inhaling through the nose and exhaling slowly through the mouth and repeat for several minutes.

Practical Training 25.2 : Dissection of autonomic plexuses.

Demonstrate practical study and exposure of autonomic plexuses -
Autonomic plexuses can be easily observed at the root of coeliac mesentery, superior mesentery, inferior mesentery, bifurcation of aorta, junction of external-internal iliac arteries. Plexuses are observed as thick fibrous coat all along the aorta. Scholar should attempt to see axons with the help of magnifying glass.

Practical Training 25.3 : Dissection of hypothalamus, pituitary glands, pineal gland and suprarenal gland.

Practical study and exposure of hypothalamus, pituitary glands, pineal gland and suprarenal gland.
1. Practical study and exposure of hypothalamus, pituitary glands and pineal gland -(3hour)
Scholar should expose these glands at the time of dissection of diencephalon. Scholar should observe the sagittal section of diencephalon in relation to cerebral hemisphere.
2. Practical study and exposure of suprarenal gland -(1hour)
Scholar should identify suprarenal glands at the time of dissection of kidneys just above their superior pole.

Practical Training 25.4 : Dissection of thymus, thyroid and parathyroid glands.

Practical study and exposure of thymus, thyroid and parathyroid glands.
1. Practical study and exposure of thymus -(2hour)
Scholar shall observe the thymus at the time of exposure of mediastinum. Thymus lies generally in the upper part of the chest, behind the sternum and between the lungs. It lies in front of the heart and great vessels. It can also extend into the lower neck sometimes. Its size is small as it shrinks after puberty.
2. Practical study and exposure of thyroid gland -(2hour)
Scholar shall observe the thyroid gland in the lower front part of the neck, below the Adam's apple at the time of dissection of neck. It is a butterfly-shaped and lies in front of the trachea partially wrapped around it.
3. Practical study and exposure of parathyroid glands -(2hour)
Scholar shall observe the parathyroid glands as four glands, one pair on each side of the thyroid gland. They are found on the posterior surface of the thyroid lobes, with the superior glands located higher up and the inferior glands lower down.

Experiential learning Activity

Experiential-Learning 25.1 : Clinical correlates of sympathetic and parasympathetic nervous system.

Disorders related to sympathetic and parasympathetic nervous system -

1. Disorders related to sympathetic nervous system (3hour)

Every Scholar should be separately allotted two cases, like; Diabetic Autonomic Neuropathy, Horner's Syndrome, Multiple System Atrophy, Anxiety Disorders and Chronic Stress, Dysautonomia, Reflex Sympathetic Dystrophy (RSD)/Complex Regional Pain Syndrome (CRPS). Scholar should consult patients in OPD/IPD or consult data resources and record their findings.

2. Disorders related to parasympathetic nervous system (3hour)

Every Scholar should be separately allotted two cases, like; Sexual Dysfunctio, Gastrointestinal Issues, Urinary Retention, Horner Syndrome, Priapism, Orthostatic Hypotension, Exercise Intolerance, Cholinergic Toxicity, Autonomic Neuropathy, Irritable Bowel Syndrome, Anxiety Disorders, Epilepsy etc. student should consult patients in OPD/IPD or consult data resources and record their findings.

Experiential-Learning 25.2 : Clinical correlates of disorders of autonomic plexuses.

Clinical correlates of disorders of autonomic plexuses

Every Scholar should be separately allotted two cases, like; Orthostatic Hypotension, Postprandial Hypotension, Multiple System Atrophy (MSA), Pure Autonomic Failure, Postural Orthostatic Tachycardia Syndrome (POTS), Autonomic Neuropathies, Familial Dysautonomia, Harlequin Syndrome, Autonomic Dysreflexia. Scholar should examine patients in OPD/IPD or consult data resources and record their findings.

Experiential-Learning 25.3 : Clinical correlates of disorders of hypothalamus, pituitary glands, pineal gland and suprarenal glands.

Clinical correlates of disorders of hypothalamus, pituitary glands, pineal gland and suprarenal glands.

1. Clinical correlates of disorders of hypothalamus -(3hour)

Every Scholar should be separately allotted two cases, like; Diabetes Insipidus, Prader-Willi Syndrome, Hypothalamic Obesity, Syndrome of Inappropriate Antidiuretic Hormone (SIADH), Functional Hypothalamic Amenorrhea. Scholar should examine patients in OPD/IPD or consult data resources and record their findings.

2. Clinical correlates of disorders of pituitary glands - (3hour)

Every Scholar should be separately allotted two cases, like; Acromegaly/Gigantism, Cushing's Disease/Syndrome, Prolactinoma, Hypopituitarism/Panhypopituitarism, Diabetes Insipidus, Non-functional pituitary adenomas, Craniopharyngiomas, Rathke's Cleft Cysts, Pituitary Apoplexy, Sheehan's Syndrome. Scholar should examine patients in OPD/IPD or consult data resources and record their findings.

3. Clinical correlates of disorders of pineal gland - (2hour)

Every Scholar should be separately allotted two cases, like; Pineal Tumors, Pineal Cysts, Pineal Calcification, Melatonin Dysfunction. Scholar should examine patients in OPD/IPD or consult data resources and record their findings.

4. Clinical correlates of disorders of suprarenal glands - (2hour)

Every Scholar should be separately allotted two cases, like; Addison's Disease (Primary Adrenal Insufficiency), Cushing's Syndrome, Pheochromocytoma, Congenital Adrenal Hyperplasia, Primary Aldosteronism (Conn's Syndrome), Adrenal Hemorrhage (Waterhouse-Friderichsen Syndrome), Adrenal Cancer. Scholar should examine

patients in OPD/IPD or consult data resources and record their findings.

Experiential-Learning 25.4 : Clinical correlates of disorders of thymus, thyroid and parathyroid glands.

Clinical correlates of disorders of thymus, thyroid and parathyroid glands.

1. Clinical correlates of disorders of thymus - (2hour)

Every Scholar should be separately allotted two cases, like; Genetic Disorders (DiGeorge Syndrome, Autoimmune Polyendocrine Syndrome Type 1 (APS1)); Thymic Tumors(Thymomas, Thymic Carcinoma:); Autoimmune Diseases(Myasthenia Gravis (MG), Pure Red Cell Aplasia (PRCA),Hypogammaglobulinemia); Other Disorders(Graft-versus-host disease (GVHD), Mediastinal Masses); Thymic Involution. Scholar should consult patients in OPD/IPD or consult data resources and record their findings.

2. Clinical correlates of disorders of thyroid glands - (2hour)

Every Scholar should be separately allotted two cases, like; Hyperthyroidism, Hypothyroidism, Hashimoto's thyroiditis, Goiter, Thyroid nodules, Thyroid cancer. Student should examine patients in OPD/IPD or consult data resources and record their findings.

3. Clinical correlates of disorders of parathyroid glands - (2hour)

Every Scholar should be separately allotted two cases, like; hyperparathyroidism, hypoparathyroidism. Scholar should examine patients in OPD/IPD or consult data resources and record their findings.

Modular Assessment

Assessment method

Hour

Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C.

1. Practical performance and identification (25Mark)

- Identify key autonomic structures in a cadaveric dissection.
- Identify sympathetic trunk and ganglia (cervical, thoracic, lumbar)
- Show parasympathetic craniosacral outflow pathways (e.g vagus nerve)
- Demonstrate enteric plexuses in gut wall, Locate visceral afferent fiber .
- Correlate each identified structure with its function

2. Simulated patient -case base assessment (25Mark)

Student will observe a simulated patient with the following symptoms -Loss of peripheral vision, Lethargy and menstrual irregularities, Low TSH and ACTH levels.

On the basis of symptoms student will answer the following question

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- Identify the anatomical location and relations of the pituitary gland.
- Explain how an enlarging pituitary tumour may compress adjacent structures.
- Suggest the imaging technique of choice and describe what you expect to see.
- Analyse and interpret the Laboratory report on hormonal status

(Similarly Addison's diseases, Cushing's syndrome or other simulated patient can be used for assessment)

or

Any practical in converted form can be taken for assessment.(25Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)

Module 26 : Gyanendriya Sharir(Sense Organs)

Module Learning Objectives

(At the end of the module, the students should be able to)

Demonstrate the structure of Gyanendriya Sharir (Sense Organs) by cadaveric dissection and analyze their applied aspects.

M 26 Unit 1 Sense organs - eye26.1.1. Microstructure of eye.

26.1.2. Visual apparatus.

26.1.3. Visual pathways.

References: 11,12,13,14,15,16,17,18,27,28,29,30

3A	3B	3C	3D	3E	3F	3G
CO5	Analyze microstructure of retina of eye ball, its light sensitivity and ability to convert perceived light signals into electrical signals.	1	Lecture	CAN	Knows-how	L_VC
CO5	Demonstrate various structures of eye ball and structures of extraocular apparatus by	9	Practical	PSY-	Shows-	DSN,SIM

	cadaveric dissection or with the help of 3D virtual dissector.		Training 26.1	MEC	how	
CO5	Evaluate the structural basis of disorders of vision.	10	Experiential-Learning 26.1	CE	Knows-how	CBL,JC
CO5	Analyze visual pathways with the help of cellular composition of its constituent structures.	2	Lecture	CAN	Knows-how	L&GD
CO5	Analyze gradual development of human eye from primitive eye.	1	Lecture	CAN	Knows-how	L&PPT,LS

M 26 Unit 2 Sense organs - ear26.2.1. Microstructure of Ear.

26.2.2. Peripheral auditory system.

26.2.3. Central auditory pathways.

References: 11,12,13,14,15,16,27,28,29,30

3A	3B	3C	3D	3E	3F	3G
CO5	Analyze microstructure of vestibular apparatus and mechanism of maintenance of balance and spatial orientation of the body.	2	Lecture	CAN	Knows-how	L&GD
CO5	Demonstrate the structure of ear by cadaveric dissection or with the help of 3D dissector.	9	Practical Training 26.2	PSY-MEC	Shows-how	DSN,D
CO5	Evaluate structural basis of disorders of hearing.	10	Experiential-Learning 26.2	CE	Knows-how	CBL
CO5	Analyze microstructure of cochlea and mechanism of peripheral auditory system.	1	Lecture	CAN	Knows-how	L&PPT
CO5	Analyze central auditory pathways for understanding and interpreting sound.	1	Lecture	CAN	Knows-	L

					how	
M 26 Unit 3 Sense organs - nose and tongue 26.3.1. Structure of nose and olfactory apparatus. 26.3.2. Olfactory pathways 26.3.3. Structure of tongue and Gustatory apparatus. 26.3.4. Gustatory pathways. References: 11,12,13,14,15,16,27,28,29,30						
3A	3B	3C	3D	3E	3F	3G
CO5	Analyze gross and microstructure of olfactory apparatus; and olfactory pathways to understand mechanism of smell.	2	Lecture	CAN	Knows-how	L
CO5	Demonstrate external and internal features of the nose, nasal cavities and tongue by cadaveric dissection or with the help of 3D virtual disector.	9	Practical Training 26.3	PSY-MEC	Shows-how	D,DSN
CO5	Evaluate structural basis of clinical disorders of olfaction and taste.	10	Experiential-Learning 26.3	CE	Knows-how	PBL,CBL
CO5	Analyze gross and microstructure of gustatory apparatus; and Gustatory pathways to understand mechanism of taste.	2	Lecture	CAN	Knows-how	L&GD
M 26 Unit 4 Sense organs - skin 26.4.1. Structure Skin and appendeges. 26.4.2. Gyanendriya in Ayurveda References: 11,12,13,14,15,16,27,28,29,30,40,41,42						
3A	3B	3C	3D	3E	3F	3G
CO5	Demonstrate skin and skin appendeges with the help of models and 3D virtual dissector or films availabe in data resources.	3	Practical Training 26.4	PSY-MEC	Shows-how	D,DSN
CO5	Analyze microstrucrue of various skin receptors to analyze sensory mechanisms in skin.	2	Lecture	CAN	Knows-	BL,L&G

	Analyze dorsal column-medial lemniscus pathway (for fine touch, vibration and proprioception) and the spinothalamic pathway (for pain and temperature) to understand mechanism of transmission and interpretation of sensations of skin.				how	D
CO5	Evaluate structural basis of disorders of sensations in skin.	9	Experiential-Learning 26.4	PSY-MEC	Shows-how	CBL,RLE
CO5	Analyze structure basis of Gyanendriya mentioned in Ayurveda.	1	Lecture	CAN	Knows-how	L_VC,DIS

Practical Training Activity

Practical Training 26.1 : Dissection of eye

Dissection of eye - Scholar should conduct the dissection of eye to expose and observe structures of tissues of eye orbit, Structure of extra-ocular apparatus and layers of eye ball or Scholar can use 3D virtual dissector.

Practical Training 26.2 : Dissection of ear.

Dissection of ear -
Scholar should conduct the dissection of ear to expose and observe structures of external, middle and internal ear. Scholar should demonstrate structures of auricle, pinna, external Acoustic meatus, blood supply and nerve supply; Identify and demonstrate middle ear parts and Tympanic membrane, blood supply and nerve supply; demonstrate Utricle, Saccule and Semicircular canals of internal ear..

Practical Training 26.3 : Dissection of nose and tongue.

Dissection of nose and tongue -
1. Dissection of nose -(4hour)
Scholar should demonstrate cartilages of extenal nose, structures of nasal cavity particularly roof, along with neuromuscular innervation.
2. Dissection of tongue -(5hour)
Scholar should expose extrinsic and intrinsic muscles of tongue and taste bud along with neurovascular supply.

Practical Training 26.4 : Practical study of skin.

Practical study of skin - Scholar should study layers of skin and various skin appendeges lik; hair, nails glands etc.and demonstrate to UG students. and take a feedback from

them.

Experiential learning Activity

Experiential-Learning 26.1 : Clinical correlates of disorders of vision.

Clinical correlates of disorders of vision -

Every Scholar should be separately allotted 10 cases, like; Refractive Errors myopia (nearsightedness), hyperopia (farsightedness), astigmatism, Cataracts , Glaucoma, Age-related Macular Degeneration, Diabetic Retinopathy, Amblyopia, Strabismus, Presbyopia etc. Scholar should examine patients in OPD/IPD or consult data resources/research article and record their findings and suggest the possible Ayurvedic remedies on the basis of structure involved with justification.

Experiential-Learning 26.2 : Clinical correlates of disorders of hearing.

Clinical correlates of disorders of hearing

Every Scholar should be separately allotted 5 cases, like; Sensorineural Hearing Loss Conductive Hearing Loss, Mixed Hearing Loss, Auditory Processing Disorder (APD), Sudden Sensorineural Hearing Loss. Scholar should use appropriate clinical examinations to verify the disorder. Scholar should examine patients in OPD/IPD or consult data resources and record their findings.

Experiential-Learning 26.3 : Clinical correlates of disorders of olfaction and taste

Clinical correlates of disorders of olfaction - (5hour)

Every Scholar should be separately allotted two cases, like; Anosmia, Hyposmia, Parosmia, Phantosmia, Hyperosmia Student should examine patients in OPD/IPD or consult data resources and record their findings.

Clinical correlates of disorders of taste-(5hour)

Every Scholar should be separately allotted two cases, like; Dysgeusia, Hypogeusia, Ageusia. Scholar should examine patients in OPD/IPD or consult data resources and record their findings.

Experiential-Learning 26.4 : Clinical correlates of disorders of sensations in skin.

Clinical correlates of disorders of sensations in skin -

Every Scholar should be separately allotted three cases, like; Hyperesthesia, Hypoesthesia, Paresthesia, Numbness, Dysesthesia (burning, tingling, stinging), Burning sensations, Allodynia (Tactile allodynia, Thermal allodynia, Dynamic mechanical allodynia), Formication. Scholar should examine patients in OPD/IPD or consult data resources and record their findings.

Modular Assessment

Assessment method	Hour
Instructions—Conduct a structured modular assessment. The assessment will be for 75 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1.OSPE (25Mark) Student will Perform the dissection of the human eye on cadaver,Teacher will assess the students performance on the basis of checklist,allow 5 mark for each question. • Proper incision over the sclera to open the eye without damage • Identification of cornea and lens,ciliary body, iris • Identification of vitreous humor • Identification of retina and optic disc. • Clinical relevance (e.g cataract, glaucoma) (any other sense organ can be used for OSPE station) 2.Model preparation and demonstration (25Mark) Student will Choose any one of following sense organ to be modelled Eye (with layers ,sclera, choroid, retina, lens, optic nerve),Ear (outer, middle, and inner ear with cochlea, semicircular canals), Nose (nasal cavity, turbinate, olfactory bulb),Tongue (Types of papillae, taste buds, nerve supply),Skin (Touch receptor, layers of skin and tactile corpuscles) Students will prepare a detailed 3D model using clay, thermocol, wire, eco-friendly or recyclable materials. Assessment will be done on the basis of Anatomical accuracy, Labelling and clarity, Explanation, Clinical application. 3.Viva (25Mark) Structured viva will be conducted for students to assess the applied aspect of Gyanendriya sharir in relation with modern anatomy. or Any practical in converted form can be taken for assessment.(40Mark) and Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (35Mark)	6
Semester No : 6	
Module 27 : Jara Sharir (Geriatric anatomy) and Application of anatomy in panchakarma	
Module Learning Objectives	

(At the end of the module, the students should be able to)

Compare Jara Sharir (Geriatric anatomy) from normal anatomy and Apply anatomical fundamentals in Panchakarma in detail.

M 27 Unit 1 cellular aging and age related changes in tissues 27.1.1. Age related changes in epithelial tissue, connective tissue (Bones, cartilages, tendons, ligaments, fascias), muscular tissue and nervous tissue.
27.1.2. Cellular age and life style.

References: 56,57,58,59,60,61

3A	3B	3C	3D	3E	3F	3G
CO1,CO9	Analyze structural changes in the cells with age and discuss cellular senescence. present Ayurvedic perspective of Jara.	1	Lecture	CAN	Knows-how	L&PPT
CO1,CO9	Demonstrate normal features of young cells through study of microstructure of normal cells of epithelial tissue, connective tissue, muscular tissue and nervous tissue.	7	Practical Training 27.1	CAN	Knows-how	DL
CO1,CO9	Evaluate the features of cells of epithelial tissue, connective tissue, muscular tissue and nervous tissue in relation to old age. Discuss progressive weakness of Dhatu mentioned in Ayurveda.	9	Experiential-Learning 27.1	CE	Knows-how	PER,IBL, CBL
CO1,CO9	Analyze the life style related early aging on the basis of cellular aging.	1	Lecture	CAN	Knows-how	L&PPT
CO1,CO9	Analyze changes in microstructure of aged cells in epithelial tissue, connective tissue, muscular tissue and nervous tissue.	1	Lecture	CAN	Knows-how	L&GD,L S,PER
CO1,CO9	Analyze the effect of lifestyle in shaping structural integrity of cell.	1	Lecture	CAN	Knows-how	L&GD
CO1,CO9	Analyze structural bases of mechanism of Panchakarma therapy in promotion of	1	Lecture	CAN	Knows-	L&GD

	longevity by slowing cellular aging.				how	
M 27 Unit 2 Geriatric anatomy of respiratory, cardiovascular, digestive and urogenital systems; and Rasayana 27.2.1. Age related changes in Respiratory and Cardiovascular systems. 27.2.2. Age related changes in Digestive system and Urogenital systems. 27.2.3. Cellular rejuvenation and Rasayana. References: 56,57,58,59,60,61						
3A	3B	3C	3D	3E	3F	3G
CO1,CO9	Analyze the Age-related changes in Respiratory and Cardiovascular systems. Mention effect of Jara on Pranavaha Srotas and Raktavaha Srotas.	1	Lecture	CAN	Knows-how	L&PPT
CO1,CO9	Demonstrate the features of normal young cells of Respiratory system, Cardiovascular systems, digestive system and Urogenital system.	7	Practical Training 27.2	CAN	Knows-how	DL,PER
CO1,CO9	Evaluate the features of cells of Respiratory system, Cardiovascular systems, digestive system and Urogenital system in relation to old age.	9	Experiential-Learning 27.2	CE	Does	PL,PBL,CBL
CO1,CO9	Analyze Age related changes in Digestive and urogenital system.	1	Lecture	CAN	Knows-how	L&PPT, PBL
CO1,CO9	Analyze possible role of Rasayana in affecting structural rejuvenation of cell.	1	Lecture	CAN	Knows-how	SDL,PER
M 27 Unit 3 Geriatric anatomy of nervous system and sense organs; and panchakarma 27.3.1. Age related changes in Nervous system. 27.3.2. Age related changes in Sense organs. 27.3.3. Cellular aging and Panchakarma. References: 56,57,58,59,60,61						
3A	3B	3C	3D	3E	3F	3G

CO9	Analyze the Age related changes in nervous system and sense organs.	1	Lecture	CAN	Knows-how	L&PPT
CO1,CO9	Demonstrate the features of normal young cells of nervous system and sense organs.	6	Practical Training 27.3	CAP	Knows-how	D
CO1,CO9	Evaluate the features of cells of nervous system and sense organs in relation to old age.	8	Experiential-Learning 27.3	CE	Knows-how	DIS,BS,PER
CO1,CO9	Analyze combination of purifying effect of Panchakarma and rejuvenating effect of Rasayana Chikitsa on cellular aging.	1	Lecture	CAN	Knows-how	L&GD,SDL,LS

Practical Training Activity

Practical Training 27.1 : Practical study of features of normal young cells of epithelial tissue, connective tissue, muscular tissue and nervous tissue.

Identification of features of young dividing cells of epithelial tissue, connective tissue, muscular tissue and nervous tissue -

1. Structural features of the young cells (4hour)

Teacher should demonstrate the structure of any cell in relation to their normal function from epithelial tissue, connective tissue, muscular tissue or nervous tissue for sake of example. Teacher should allot atleast two cases seperately to each of the scholar for practical study of structural features and functions of cells from each of the tissue. Scholar should take the help of data resources to study normal features of the cells in relation to their location, associated protein and exposure to wear and tear and role of the protein.

2. Functional features of the young cells (3hour)

Scholar should attempt to know the normal function of these cells by clinical examination of normal young individuals on parameters specific to tissues. Scholar should record the findings.

Scholar should relate the normal functions to normal structural features of the cells of that tissue. Scholar should prepare an audiovisual presentation of the findings.

Practical Training 27.2 : Practical study of features of normal young cells of Respiratory system, Cardiovascular systems, digestive system and Urogenital system.

Identification of features of young dividing cells of Respiratory system, Cardiovascular systems, digestive system and Urogenital system -

1. Structural features of the young cells (4hour)

Teacher should demonstrate the structure of any cell in relation to their normal function from Respiratory system, Cardiovascular systems, digestive system or Urogenital system for sake of example. Teacher should allot atleast two cases seperately to each of the scholar for practical study of anatomical features and function of cells from each

of the system. Scholar should take the help of data resources to study normal features of the cells in relation to their location, associated protein and exposure to wear and tear and role of the protein.

2. Functional features of the young cells (3hour)

Scholar should also attempt to know the normal function of these cells by clinical examination of normal young individuals on parameters specific to systems. Scholar should record the findings.

Scholar should relate the normal functions to normal structural features of the cells of that system. Scholar should prepare an audiovisual presentation of the findings.

Practical Training 27.3 : Practical study of features of normal young cells of nervous .system and sense organs

Identification of features of young dividing cells of nervous system and sense organs -

1. Structural features of the young cells - Teacher should demonstrate the structure of any cell in relation to their normal function from nervous system or sense organs for sake of example. Teacher should allot atleast two cases seperately to each of the scholar for practical study of anatomical features and function of cells from each of the system. Scholar should take the help of data resources to study normal features of the cells in relation to their location, associated protein and exposure to wear and tear and role of the protein.

2. Functional features of the young cells - Scholar should also attempt to know the normal function of these cells by clinical examination of normal young individuals on parameters specific to systems. Scholar should record the findings.

Scholar should relate the normal functions to normal structural features of the cells of that system. Scholar should prepare an audiovisual presentation of the findings.

Experiential learning Activity

Experiential-Learning 27.1 : Clinical features of aged cells of epithelial tissue, connective tissue, muscular tissue and nervous tissue.

Identification of features of aged cells of epithelial tissue, connective tissue, muscular tissue and nervous tissue in relation to old age. -

1. Structural features of the aged cells (4hour)

Teacher should demonstrate the structure of any cell in relation to their normal function from epithelial tissue, connective tissue, muscular tissue and nervous tissue in relation to old age, for sake of example. Teacher should allot atleast two cases seperately to each of the scholar for clinical study of structural features and function of cells from each of the tissue. Scholar should take the help of data resources to study normal features of the aged cells in relation to their location, associated protein and exposure to wear and tear and role of the protein.

2. Functional features of the aged cells (5hour)

Scholar should also attempt to know the normal function of these cells by clinical examination of normal healthy individuals on parameters specific to tissue. Scholar should record the findings. Scholar should also take the help of data resources to study features of aged cells.

Scholar should relate the functions to structural features of the cells, as in aged cells, of that tissue. Student should prepare an audiovisual presentation of the findings.

Experiential-Learning 27.2 : Clinical features of aged cells of Respiratory system, Cardiovascular systems, digestive system and Urogenital system.

Identification of features of aged cells of Respiratory system, Cardiovascular systems, digestive system and Urogenital system - 1. Structural features of the aged cells (4hour) Teacher should demonstrate the structure of aged cell from Respiratory system, Cardiovascular systems, digestive system or Urogenital system. Teacher should allot atleast two cases seperately to each of the scholar for clinical study of structural features and function of cells from each of the system. Scholar should take the help of data resources to study normal features of the aged cells in relation to their location, associated protein and exposure to wear and tear and role of the protein. 2. Functional features of the aged cells(5hour) Scholar should also attempt to know the function of aged cells by clinical examination of normal healthy individuals on parameters specific to systems. Scholar should record the findings.Scholar should also take the help of data resources to study features of aged cells. Scholar should relate the functions to structural features of the cells, as in aged cells, of that system. Scholar should prepare an audiovisual presentation/publication of the findings.	
Experiential-Learning 27.3 : Clinical features of aged cells of nervous system and sense organs.	
Identification of features of aged cells of nervous system and sense organs - 1. Structural features of the aged cells (4hour) Teacher should demonstrate the structure of any aged cell from nervous system or sense organs for sake of example. teacher should allot atleast two cases seperately to each of the scholar for clinical study of structural features and function of cells from each of the system. Scholar should take the help of data resources to study features of the aged cells in relation to their location, associated protein and exposure to wear and tear and role of the protein. 2. Functional features of the aged cells (4hour) Scholar should also attempt to know the normal function of these cells by clinical examination of normal healthy individuals on parameters specific to systems. Scholar should record the findings. Scholar should also take the help of data resources to study features of aged cells. Scholar should relate the functions to structural features of the cells, as in aged cells, of that system. Scholar should prepare an audiovisual presentation of the findings.	
Modular Assessment	
Assessment method	Hour
Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C. 1.Critical Reading of papers (25Mark) Students (1 or 2 students)will be provided with different articles covering topics such as the age-related changes in Tissues, Bones, Joints and Muscles/Respiratory/ Cardiovascular/ Digestive/Urogenital/Nervous systems/Sense organs. Each student or group will critically read the articles, guided by structured questions aimed at identifying key objectives, definitions of degeneration or Jara, and analysis of structural-functional decline as described in the	4

texts.

Students will assess the correlation between Ayurvedic concepts and modern anatomical findings, and evaluate the relevance of these concepts to clinical conditions such as neurodegeneration or age-associated sensory decline also state the strengths and limitations of the papers, identify gaps in knowledge or evidence, and suggest practical applications or therapeutic considerations based on the content.

Teacher will be award the mark on basis of Rubric for comprehension, analytical ability, integration of Ayurvedic and anatomical perspectives, clinical insight, and clarity of expression.

2. Debate (25Mark)

The group debate will have students split into two teams for each topic, one in favour and one against.

Topics will be given in advance for research using Ayurvedic texts and modern studies. (e.g. Rasayana Chikitsa is more effective than modern antioxidants in delaying aging)

On debate day, teams will present opening statements, evidence, rebuttals, and conclusions within allotted time, moderated by faculty.

Assessment will be based on Ayurvedic and scientific knowledge, clarity, logic, and teamwork.

or

Any practical in converted form can be taken for assessment. (25Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)

Module 28 : Anatomical Basis of Physiotherapy and Yogasana

Module Learning Objectives

(At the end of the module, the students should be able to)

Analyze the anatomical aspects of Physiotherapy and Yogasana

M 28 Unit 1 Microanatomy and biomechanics of musculoskeletal system 28.1.1. Microanatomy of muscular tissues.

28.1.2. Microanatomy of skeletal tissues.

28.1.3. Biomechanics of musculoskeletal system.

References: 62,63,64

3A	3B	3C	3D	3E	3F	3G
CO1,CO4	Describe microstructure of muscular tissues (muscles, aponeurosis, fascia), bone, tendon, ligaments and cartilages); and analyze their material properties and mechanical properties. Describe microstructure of skeletal tissues (bone, tendon, ligaments, cartilages); and analyze their material properties and mechanical properties.	2	Lecture	CC	Knows-how	L
CO1,CO4	Demonstrate stiffening and stretching of muscles at various joints of the body; and understand impact of stretching on strength and flexibility of joint.	5	Practical Training 28.1	PSY-MEC	Shows-how	D,SIM
CO1,CO4	Evaluate impact of muscle stretching on range of movement.	8	Experiential-Learning 28.1	CE	Knows-how	CBL,PBL
CO1,CO4	Analyze impact of muscular stretching on biomechanics of musculoskeletal system and impact of stretching of musculoskeletal system on stretch reflex pathways.	2	Lecture	CAN	Knows-how	BL,L_VC
CO1,CO4	Demonstrate closed-pack and loose-packed positions of joints of appendicular skeleton and back; and understand muscular impact of mechanical loading on skeleton at various positions.	4	Practical Training 28.2	PSY-MEC	Shows-how	D

M 28 Unit 2 Musculoskeletal strengthening - Yogasanas and stretch exercises 28.2.1. Yogasanas
28.2.2. Stretch exercises.

References: 62,63,64

3A	3B	3C	3D	3E	3F	3G
CO4,CO9	Analyze Sthairya (stability) of the body as foremost motive of Yogasanas; and biomechanism of stability and steadiness of muscular action.	2	Lecture	CAN	Knows-how	L
CO4,CO9	Demonstrate various postures of Yogasana in relation to stretching of muscles and ligaments of joints.	6	Practical Training 28.3	PSY-MEC	Shows-how	D,W,PrB L

CO4,CO9	Determine the stretch exerted on muscles and joints during performance of Yoagasana in comparison to stretch exercises.	8	Experiential-Learning 28.2	CS	Does	RLE,PrBL
CO4,CO9	Analyze structural basis of Anga-laghava (lightness of body) in context of Yoga and modern anatomy.	1	Lecture	CAN	Knows-how	L_VC
CO4,CO9	Analyze strengthening and stretching of muscles in Yoga. Compare it with strengthening in weight exercises.	1	Lecture	CAN	Knows-how	L&GD

M 28 Unit 3 Application of Yogasanas28.3.1. Postural disorders and Yogasanas.

References: 62,63,64

3A	3B	3C	3D	3E	3F	3G
CO4,CO9	Describe muscles of back, abdomen, pelvis, hip, buttocks; and analyze biomechanics of core strengthening.	2	Lecture	CAN	Knows-how	LS,L&PPT
CO4,CO9	Demonstrate role of muscle groups of back, abdomen, pelvis, hip, buttocks, in maintenance of postures, (standing, sitting, walking, forwrd bending, backward bending etc.).	5	Practical Training 28.4	PSY-MEC	Shows-how	PL,RLE
CO4,CO9	Evaluate postural disorders due to lack of strength of postural muscles.	10	Experiential-Learning 28.3	CE	Does	PrBL,CBL

Practical Training Activity

Practical Training 28.1 : Stretching of muscles of appendicular skeleton and back.

Practical study of stretching of muscles of appendicular skeleton and back -

Scholar should perform various stretching exercises on joints. Students should take note of specific muscles/muscles groups being stretched during various movements. Scholar can perform stretching exercise on volunteer like;

a. Static Stretches - Standing Hamstring Stretch, Quadriceps Stretch, Triceps Stretch, Shoulder Stretch, Calf Stretch, Chest Stretch, Side Stretch, Knee-to-Chest Stretch,

Lower Back Rotational Stretch

b. Dynamic Stretches - Leg Swings, Arm Circles, Torso Twists, Cat-Cow Stretch, Hip Circles, walking Lunges.

Student should record the findings and demonstrate in front of teacher.

Practical Training 28.2 : Practical study of close-packed position and loose-packed positions of the body.

Practical study of close-packed position and loose-packed positions of the body

Scholar shall perform the movements of joints to lock the joint in a position, which is close-packed position. then Scholar should unlock the joint to achieve loose-packed position. Scholar should consult the data resources to know exact loose-packed positions. Scholar shall record the findings and present them before the teacher.

Practical Training 28.3 : Practical study of Yogasanas.

Practical study of Yogasanas - Teacher should demonstrate basic feature of Yoga practice to the scholars before starting practise of Yoga. Scholar should attempt to observe each Asana in context of stretched muscles and position of joints for a particular Yogasana. Scholar should follow rules during performance of Yogasana; like; maintain stability of body, Hold each stretch, Breathe deeply, concentrate on the stretching muscles.

Scholar should choose atleast two Asanas for the study.

Scholar can choose any of the yogasana mentioned in Hathyoga, like; Siddhasana, Padmasana, Simhasana, Bhadrasana, and others like Swastikasana, Gomukhasana, Veerasana, Kurmasana, Kukkutasana, Uttanakoormasana, Dhanurasana, Matsyendrasana, Paschimottanasana, Mayurasana, and Shavasana.

Scholar can also choose Additional Asanas mentioned by shivananda, like; Sirsasana, Sarvangasana, Halasana, Matsyasana, Paschimottanasana, Bhujangasana, Shalabhasana, Dhanurasana, Ardha Matsyendrasana, Kakasana, Pada Hasthasana, and Trikonasana.

Asanas should be practised under supervision of trainer. Scholar shall perform a set of Yogasanas for practise as recommended by trainer. Student should discuss the post Yogasana experience with peers.

Practical Training 28.4 : Practical study of postural muscles.

Practical study of postural muscles -

Scholar should be acquainted with counteraction of antagonist muscles for maintenance of posture. Scholar should be given atleast two movements to study posture. Scholar should practice those movements and observe the muscles, which are participating in those movement Scholar should take note that postural muscles act simultaneously at multiple joint.

Scholar should make list of muscles for each posture and share the findings with peers.

Experiential learning Activity

Experiential-Learning 28.1 : Clinical correlates of disorders of range of movements at various joints.

Clinical correlates of disorders of range of movements at various joints -

Teacher should allot atleast two cases to every scholar seperately for study of range of movement . Scholar can identify the suitable cases of stiffness of joints from OPD/IPD of the hospital. Scholar should locate the specific joints where stiffening is present and should recommend specific stretching exercises for that joint. Scholar shall take the help of data resources to apply the procedure of stretching in specific joints daily atleast for two weeks.

Scholar shall measure the range of movement before stretching exercises as well as after the stretching exercises by the use of goniometer or any other appropriate instrument. Scholar shall record the findings and present them in the form of audiovisual presentation.

Experiential-Learning 28.2 : Correlates of Yogasana and Stretch exercises.

Correlates of Yogasana and Stretch exercises

Scholar should compare the stretching of muscles and joints in particular Asanas and stretching exercises of the same joints. scholar should record the findings and present structural basis of differences before the class in the form of audiovisual presentation/publish the findings

Experiential-Learning 28.3 : Clinical correlates of wrong body postures.

Clinical correlates of wrong body postures -

Scholar should identify people presenting the features of regional pains,like; Back pain, Neck pain, Headaches, Muscle stiffness and fatigue, Difficulty with movement and balance, Shoulder pain, Leg pain, Numbness or tingling in the limbs etc. Scholar should do clinical examination to assess lack of strength in postural muscles.

Scholar should recommend Yogasanas for postural muscle strength with proper justification. Scholar should record the findings before and after practice of Yogasanas.

Scholar should compare the result and place for peer discussion and publish it.

Modular Assessment

Assessment method

Instructions—Conduct a structured modular assessment. The assessment will be for 50 marks. Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per Table 6C.

1.Long Answer Question (25Mark)

The assessment will be conducted as a long answer question where students are given the long question during the test session. They will be instructed to structure their answers with help of following points

1.Anatomical basis of soft tissue manipulation (therapeutic massage), including the structure and function of skin, fascia, muscles, tendons, and joints, along with the neurovascular supply involved.

Hour

4

2.Explain how these anatomical features contribute to the physiological effects and therapeutic outcomes of massage in clinical practice

2. Project completion.(25Mark)

Each student will give the small project to create a visual demonstration / making models / digital presentation showing anatomical movements of muscle, joints,bones and other part involved during an particular asana.

or

Any practical in converted form can be taken for assessment.(25Mark)

and

Any of the experiential as portfolio/reflection/presentation/ can be taken for assessment. (25Mark)

Table 4 : Practical Training Activity

(*Refer table 3 of similar activity number)		
Practical No*	Practical name	Hours
1.1	Microscopic Examination of a cell.	1
1.2	Tissue sectioning, fixing and slide-preparation techniques.	2
1.3	Microscopic examination of Twaka (layers of skin).	1
1.4	Microscopic Examination of reticular tissue and plasma.	1
1.5	Microscopic Examination of adipose tissue.	1
1.6	Microscopic examination of blood smears or peripheral blood films of different blood cells.	2
1.7	Microscopic study of muscular tissue	2
1.8	Microscopic structure of bones, cartilages.	4

1.9	Microscopic Examination of tendons, ligaments and aponeurosis.	2
1.10	Microscopic examination of nervous Tissues.	2
1.11	Microscopic examination of testes and semen.	2
2.1	Formation and development of epithelial tissues (epitheliogenesis), connective tissues, muscular tissues (myogenesis), nervous tissues (neurogenesis) of the body.	5
2.2	Fate of endodermal pouches, ectodermal clefts,mesodermal components of branchial arches	3
2.3	Formation and development of face, nasal cavity, palate.	6
2.4	Chronological development of body systems .	6
3.1	Histology of respiratory tract and structural adaptations in respiratory organs.	3
3.2	Demonstrate the stages of maturation of lungs and developmental anomalies of respiratory system.	3
3.3	Formation of bronchi and stages of maturation of Lungs	2
3.4	Developmental anomalies related to bronchi and larynx.	4
3.5	Histological structure of Heart and blood vessels.	7
3.6	Fetal heart and congenital anamolies related to cardiovascular system.	2
3.7	Histological features of lymph nodes, lymphatic vessels and lymphoid glands.	6
3.8	Development of lymphoid glands.	2
3.9	Mutual relation among organs constituting a system of the body.	1
4.1	Histology of oral cavity and foregut.	4
4.2	Formation and development of oral cavity and foregut.	2
4.3	Histology of midgut/midgut derivatives.	2
4.4	Formation and development of midgut.	3

4.5	Histology of hindgut and its derivatives.	2
4.6	Histological structure of body cavities.	4
4.7	Formation and development of body cavities.	3
5.1	Histology of structures of urinary system.	4
5.2	Formation and development of urinary system.	4
5.3	Histology of male reproductive system.	5
5.4	Formation and development of male reproductive system.	4
5.5	Histology of female reproductive system.	5
5.6	Formation and development of female reproductive system.	5
5.7	Development of mesonephric duct and paramesonephric duct, penis and vagina, scrotal sacs and labia majora.	3
6.1	Histology of neurons and neuroglial cells.	3
6.2	Formation and development of Neural tube and Neural crest cells.	3
6.3	Histology of forebrain and midbrain.	3
6.4	Formation and development of forebrain and midbrain.	3
6.5	Histology of hindbrain and spinal cord.	2
6.6	Formation and development of hindbrain and spinal cord.	2
6.7	Histology of sense organs (eye, ear, nose, tongue) and endocrine glands (pituitary, thyroid, parathyroid, thymus and adrenal)	1
6.8	Demonstration of Formation, Development and developmental anomalies of Sense organs and Endocrine gland	2
6.9	Formation and development of sense organs and endocrine glands	1
7.1	Demonstration of features of the diseases related to Beeja and chromosomes.	4

7.2	Checklist of Garbhaj Vikara mentioned in Ayurveda and genetic counselling.	4
7.3	Matrijadi Bhavas and epigenetic principles.	4
7.4	Objects/ Bhava present in the ecosystem.	4
7.5	Atiyoga as potential environmental factor to effect epigenetic changes.	4
8.1	Types and techniques of plastination.	6
8.2	Setting a plastination lab.	4
8.3	Surface anatomy of Bahu (upper limb) Vaksha (thorax).	6
8.4	Surface anatomy of Sakthi (lower limb) ,Udar (abdomen).	8
8.5	Surface anatomy of Shirah (head), Griva (neck).	6
9.1	Dissection of nasal cavity and nasopharynx.	4
9.2	Cadaveric dissection of laryngeal apparatus, Trachea and bronchial tree.	8
9.3	Dissection of pleura and lungs.	8
10.1	Dissection of heart.	6
10.2	Dissection of major arteies of heart.	7
10.3	Dissection of thoracic and abdominal aorta, common iliac arteries.	7
11.1	Dissection of the veins of the head, neck and face and lymph nodes of head and neck.	8
11.2	Dissection of veins of abdomen; veins of lower limb, lymph nodes of abdomen and lymph nodes of lower limb.	6
11.3	Dissection of veins of upper limb; and dissection of veins of thorax. Dissection of superficial and deep lymphatics of upper limb; and dissection of superficial and deep lymphatics of thorax.	6
12.1	Dissection of structures of oral Cavity and pharynx.	6
12.2	Dissection of oesophagus, stomach and duodenum.	8

12.3	Dissection of small intestine, Large Intestine.	6
13.1	Dissection of salivary glands.	4
13.2	Dissection of pancreas, spleen, liver and extrahepatic biliary apparatus	10
13.3	Dissection of peritoneum.	6
14.1	Dissection of kidney, ureter and urinary bladder	8
14.2	Dissection of testis, epididymis and vas deferens.	7
14.3	Dissection of ovary, uterine tubes and uterus.	6
14.4	Dissection of male urethra and female urethra; vagina and penis; and prostate gland and seminal vesicles.	8
14.5	Model study of Pratyanga related to Mutravaha, Shukravaha and Artavavaha Srotas	1
15.1	Dissection of head.	8
15.2	Practical study of cervical vertebrae on original specimen or 3D virtual dissector.	4
15.3	Practical study of thoracic, lumbar, sacral and coccyx vertebrae.	3
15.4	Dissection of muscles of back region.	5
16.1	Dissection of shoulder, scapular and arm region.	6
16.2	Dissection of bones and muscles of forearm (Radius, and Ulna) and hand (carpal, metacarpal, phalanges).	6
16.3	Dissection of gluteal and thigh region.	6
16.4	Dissection of leg and foot region.	6
16.5	Comparative study of upper and lower appendicular musculoskeleton.	6
17.1	Dissection of joints of axial skeleton.	6
17.2	Dissection of joints of upper limb.	6

17.3	Dissection of hip joint. knee joint and joints of foot and ankle.	8
18.1	Dissection of thoracic cage, abdominal muscles.	10
18.2	Practical study of fractures of skull, spines vertebral column and rib cage.	5
18.3	Practical study of normal x-ray images of upper limb and lower limb..	5
19.1	Classification of Marma on the basis of structure and on the basis of Prognosis.	6
19.2	Surface Demarcation and dissection of each Marma of Bahu (upper limb) and Sakthi (lower limb).	6
19.3	Surface Demarcation and dissection of each Marma of Udar (Abdomen, pelvis and perineum) , Prishtha (back) and Urah (chest).	6
19.4	Surface Demarcation and dissection of each Marma of head and neck region.	3
19.5	Performance of Yogasana, Pranayam and Marma Chikitsa procedure.	3
19.6	Practice of Agnikarma, Kshara Karma and Jalaukavacharana in disorders of Marma.	6
20.1	Practical demonstration of Avedhya Siras of the body.	7
20.2	Practical demonstration of Vedhya Siras of lower limb, upper limb, chest, back, head and neck.	7
20.3	Practical study of an X-ray (of bone), an echocardiograph, MRI of brain, an obstetrics ultrasound	6
21.1	Anthropometric landmarks. Anthropometric instruments.	8
21.2	Anthropometric measurements of upper and lower limbs, trunk, head and face.	8
21.3	Anguli and anjali Pramana.	2
21.4	Anthroposcopy, the morphological measurements.	2
22.1	Dissection of brain stem. Dissection of cerebellum.	6
22.2	Dissection and practical study of diencephalon. Dissection and practical study of basal ganglia. Dissection and practical study of cerebrum.	10
22.3	Dissection of ventricular system of brain.	2

22.4	Demonstrate features of duramater; and its relation with arachnoid mater and pia mater.	2
23.1	Dissection of spinal cord.	3
23.2	Practical study of reflex arc.	1
23.3	Practical study of spinal cord and tracts.	6
23.4	Dissection of brachial plexus. Dissection of lumbosacral plexus.	10
24.1	Practical study of cranial nerves.	5
24.2	Exposure of olfactory nerve, optic nerve, oculomotor, trochlear and abducent by cadaveric dissection.	6
24.3	Dissection of Ophthalmic nerve, maxillary nerve and mandibular nerve, facial nerve, vestibulocochlear nerve	7
24.4	Dissection and practical study of glossopharyngeal nerve, vagus nerve, spinal accessory nerve and hypoglossal nerve.	7
24.5	Dissection of parasympathetic ganglia and sensory ganglia associated with cranial nerves.	5
25.1	Dissection of constituents of sympathetic and parasympathetic nervous system.	3
25.2	Dissection of autonomic plexuses.	5
25.3	Dissection of hypothalamus, pituitary glands, pineal gland and suprarenal gland.	6
25.4	Dissection of thymus, thyroid and parathyroid glands.	6
26.1	Dissection of eye	9
26.2	Dissection of ear.	9
26.3	Dissection of nose and tongue.	9
26.4	Practical study of skin.	3
27.1	Practical study of features of normal young cells of epithelial tissue, connective tissue, muscular tissue and nervous tissue.	7
27.2	Practical study of features of normal young cells of Respiratory system, Cardiovascular systems, digestive system and Urogenital system.	7

27.3	Practical study of features of normal young cells of nervous .system and sense organs	6
28.1	Stretching of muscles of appendicular skeleton and back.	5
28.2	Practical study of close-packed position and loose-packed positions of the body.	4
28.3	Practical study of Yogasanas.	6
28.4	Practical study of postural muscles.	5

Table 5 : Experiential learning Activity

(*Refer table 3 of similar activity number)		
Experiential learning No*	Experiential name	Hours
1.1	Tissue preparation and staining.	3
1.2	Role of cell division in specific diseases like cancer.	3
1.3	Interconnections between Dhatus and other body systems and Dhatu imbalance.	3
1.4	Histopathological examination of epithelial tissue.	1
1.5	Histopathological examination of reticular tissue/plasma.	1
1.6	Histopathological examination of adipose tissue.	1
1.7	Histopathology of blood and lymph.	2
1.8	Histopathology of muscular tissue	2
1.9	Histopathology of tendons, ligaments and aponeurosis.	2
1.10	Histopathology of bone and cartilage.	4
1.11	Histopathology of nervous tissue.	2
1.12	Histopathology of reproductive tissue.	2
2.1	Anomalies of epitheliogenesis, connective tissue, myogenesis, neurogenesis.	8
2.2	Congenital anomalies of endodermal pouches, ectodermal clefts, mesodermal components of branchial arches.	6
2.3	Developmental anomalies of the face, nasal cavity, palate.	6
2.4	Congenital developmental anomalies and their exact chronological time of appearance.	6
3.1	Micromorphology and micromorphological changes in respiratory tract and Histological changes in covid lung.	6

3.2	Procedure related to thoracocentesis and intubation.	8
3.3	Identification of histopathological slides of cardiovascular system clinical case integration with histopathological study.	6
3.4	Implication of the cardiovascular anomalies.	6
3.5	Radiological and functional correlates of histology of lymphatic system.	2
3.6	Mapping of lymphatic system in the body.	2
3.7	Formation, development and clinical application of lymphatic system.	4
3.8	Inter-relation between lymphatic and cardiovascular system through embryological studies.	5
4.1	Histological changes in diseases of oral cavity, foregut with their clinical consequences.	6
4.2	Histological changes in diseases and developmental Anomalies of midgut of gastrointestinal tract.	5
4.3	Histological changes in diseases of hindgut of gastrointestinal Tract.	3
4.4	Developmental Anomalies of hindgut of gastrointestinal tract.	5
4.5	Histopathological structure of membranes related to body cavities/Vishesha Kala.	4
4.6	Developmental anomalies of body cavities.	3
5.1	Histopathology structures and developmental anomalies related to urinary system.	10
5.2	Histopathology of the male reproductive system.	7
5.3	Developmental anomalies related to male reproductive system.	7
5.4	Histopathology and Developmental anomalies related to female reproductive system.	10
5.5	Developmental anomalies of mesonephric and paramesonephric duct, penis and vagina, scrotal sacs and labia majora.	5
6.1	Histopathology of neurons and neuroglial cells.	4

6.2	Developmental anomalies of neural tube and neural crest cells.	4
6.3	Histopathology of forebrain and midbrain.	3
6.4	Developmental anomalies of forebrain and midbrain.	3
6.5	Histopathology and developmental anomalies of hindbrain and spinal cord.	6
6.6	Histopathology of sense organs (eye, ear, nose, tongue) and endocrine glands (pituitary, thyroid, parathyroid, thymus and adrenal)	3
6.7	Evaluation of developmental anomalies of Sense organs and developmental anomalies of Endocrine glands	3
7.1	Beeja Dosha and chromosomal abnormalities.	4
7.2	Ayurvedic Anuvanshiki Pramarsa and genetic counselling.	6
7.3	Vikriti as deviation from original Prakriti.	6
7.4	Interaction between Bhava of ecosystem and human body.	5
7.5	Potential of Atiyoga in causation of diseases.	5
8.1	Plastination material and type of organ for plastination. Plastination materials and techniques of plastination.	6
8.2	Application in post plastination Techniques.	6
8.3	Clinical and surgical correlates of surface anatomy of Bahu (upper limb) and Vaksha (thorax)	10
8.4	Clinical and surgical correlates of surface anatomy of Sakthi (lower limb), Udara (abdomen).	10
8.5	Clinical and surgical correlation of surface anatomy of Shirah (head), Griva (neck).	7
9.1	Clinical correlates of nasal cavity and nasopharynx.	8
9.2	Clinical correlates of laryngeal apparatus, trachea and bronchial tree.	9
9.3	Clinical correlation of pleura and lungs.	9
10.1	Clinical correlation of pericardium and heart.	10

10.2	Clinical correlates of thoracic aorta, pulmonary trunk, subclavian artery and carotid arteries.	8
10.3	Clinical correlates of abdominal aorta and common iliac arteries.	8
11.1	Clinical correlates of veins of head, neck and face , lymphatics of head and neck.	10
11.2	Clinical correlates of veins and lymph nodes of abdomen and lower limb.	8
11.3	Clinical correlates of veins of upper limb and thorax, lymph nodes of thorax.	8
12.1	Clinical/surgical correlates of structures of oral cavity and pharynx.	8
12.2	Clinical/surgical correlates of oesophagus, stomach and duodenum	10
12.3	Clinical/surgical correlates of small intestine, caecum, appendix, colon, rectum and anal canal.	8
13.1	Clinical/surgical correlates of parotid, submandibular and sublingual salivary glands.	8
13.2	Clinical/surgical correlates of pancreas, spleen, liver and extrahepatic biliary apparatus.	10
13.3	Clinical/surgical correlates of peritoneum.	8
14.1	Clinical/surgical correlates of kidney, ureter and urinary bladder.	8
14.2	Clinical/surgical correlates of testis, epididymis and vas deferens.	8
14.3	Clinical/surgical correlates of ovary, uterine tubes and uterus..	8
14.4	Clinical correlates of male urethra, female urethra, vagina, penis, prostate gland and seminal vesicles.	10
14.5	Clinical/surgical correlates of Mutravaha, Shukravaha and Artavavaha Srotas mentioned in Samhita.	5
15.1	Clinical correlation of skull and facial muscles.	6
15.2	Clinical correlates of cervical vertebrae and muscles of neck.	10
15.3	Clinical correlates of thoracic, lumbar, sacral and coccyx vertebrae and muscles of back region.	10

16.1	Clinical correlates of bones and muscles of shoulder, scapular and arm region.	9
16.2	Clinical correlates of bones of forearm (Radius, and Ulna) and hand (carpal, metacarpal, phalanges).	10
16.3	Clinical correlates of gluteal and thigh regions.	9
16.4	Clinical correlates of leg and foot regions.	10
16.5	Correlates of upper and lower appendicular musculoskeleton.	1
17.1	Clinical correlates of joints of axial skeleton.	8
17.2	Clinical correlataes of shoulder, elbow and wrist joints,joints of hand, sternal joints.	9
17.3	Clinical correlataes of hip joint, knee joint, joints of foot and ankle.	9
18.1	Clinical/surgical correlates of rib cage and abdominal muscles.	6
18.2	Clinial/surgical co-relates of fractures	10
18.3	Clinical/surgical correlates of fractures of shoulder and arm, elbow and forearm, pelvis and hip, thigh and knee, leg and ankle.	10
19.1	Clinical correlates of structural disorders and prognosis in disorders of Marma.	8
19.2	Clinical correlates of injuries to Marma of Bahu (upper limb), Sakthi (lower limb).	8
19.3	Clinical correlates of injuries to Marma of Udar (Abdomen, pelvis and perineum), Prishtha (back)and Urah (chest).	7
19.4	Clinical correlates of injuries to Urdhvajatrugata Marma (Marma of head and neck region).	4
19.5	Clinical effect of Yogasana, Pranayam and Marma Chikitsa procedure on Marma.	4
19.6	Clinical/surgical correlates of Agnikarma in Marma disorders. Clinical/surgical correlates of Kshara Karma in Marma disorders Clinical/surgical correlates of Jalaukavacharana in Marma disorders.	8
20.1	Clinical/surgical correlates of Avedhya Sira.	10
20.2	Clinical surgical co-rrelates of Vedhya Siras	8

20.3	Clinical correlates of diagnostic imaging.	8
21.1	Anthropological co-relates of anthropometric landmarks. Research application of anthropometric instruments.	10
21.2	Anthropological co-relates of anthropometric landmarks and Preparation of indices.	9
21.3	Application of Anjali and Anguli Pramana.	4
21.4	Clinical correlates of anthroposcopy	3
22.1	Functional and clinical correlates of brain stem (medulla, pons and midbrain). Functional and clinical correlates of cerebellum.	8
22.2	Clinical correlates of diencephalon, basal ganglia, cerebrum.	10
22.3	Clinical correlates of ventricles of brain.	4
22.4	Clinical correlates of duramater abnormalities.	4
23.1	Clinical co-relates of neuronal arrangement in spinal cord.	3
23.2	Clinical correlates of reflex arc.	3
23.3	Clinical correlates of ascending, descending and propriospinal pathways.	10
23.4	Clinical correlates of structural deformities of brachial plexus. Clinical correlates of structural deformities of lumbosacral plexus.	10
24.1	Clinical correlates of cranial nerve nuclei.	4
24.2	Clinical correlates of olfactory nerve lesions. Clinical correlates of optic nerve lesions. Clinical correlates of lesions of oculomotor, trochlear and abducent nerve.	9
24.3	Clinical correlates of ophthalmic nerve, maxillary nerve and mandibular nerve. Clinical correlates of facial nerve. Clinical correlates of vestibulocochlear nerves.	9
24.4	Clinical correlates of glossopharyngeal nerve, vagus nerve, spinal accessory nerve and hypoglossal nerve.	8
24.5	Clinical correlates of parasympathetic ganglia and of sensory ganglia cranial nerves.	9

25.1	Clinical correlates of sympathetic and parasympathetic nervous system.	6
25.2	Clinical correlates of disorders of autonomic plexuses.	4
25.3	Clinical correlates of disorders of hypothalamus, pituitary glands, pineal gland and suprarenal glands.	10
25.4	Clinical correlates of disorders of thymus, thyroid and parathyroid glands.	6
26.1	Clinical correlates of disorders of vision.	10
26.2	Clinical correlates of disorders of hearing.	10
26.3	Clinical correlates of disorders of olfaction and taste	10
26.4	Clinical correlates of disorders of sensations in skin.	9
27.1	Clinical features of aged cells of epithelial tissue, connective tissue, muscular tissue and nervous tissue.	9
27.2	Clinical features of aged cells of Respiratory system, Cardiovascular systems, digestive system and Urogenital system.	9
27.3	Clinical features of aged cells of nervous system and sense organs.	8
28.1	Clinical correlates of disorders of range of movements at various joints.	8
28.2	Correlates of Yogasana and Stretch exercises.	8
28.3	Clinical correlates of wrong body postures.	10

Table 6 : Assessment Summary: Assessment is subdivided in A to H points**6 A : Number of Papers and Marks Distribution**

Subject Code	Paper	Theory	Practical	Total
AYPG-RS	4	100 x 4 Papers = 400	400	800

6 B : Scheme of Assessment (Formative and Summative Assessment)**Credit frame work**

AYPG-RS consists of 28 modules totaling 64 credits, which correspond to 1920 Notional Learning Hours. Each credit comprises 30 Hours of learner engagement, distributed across teaching, practical, and experiential learning in the ratio of 1:2:3. Accordingly, one credit includes 5 hours of teaching, 10 hours of practical training, 13 hours of experiential learning, and 2 hours allocated for modular assessment, which carries 25 marks.

Formative Assessment :Module wise Assessment:will be done at the end of each module. Evaluation includes learners active participation to get Credits and Marks. Each Module may contain one or more credits.

Summative Assessment:Summative Assessment (University examination) will be carried out at the end of Semester VI.

6 C : Semester 2 Calculation Method for Modular Grade Points (MGP)

Module Number & Name (a)	Credits (b)	Actual No. of Notional Learning Hours (c)	Attended Number of notional Learning hours (d)	Maximu m Marks of assessmen t of modules (e)	Obtained Marks per module (f)	MGP =d* f/c*e*100
Semester No : 3						
Paper No : 1 (Garbha Sharir, Dhatu Sharir evum Anuvanshiki)						
M1 General Histology	2	60		50		
M2 Embryology (Tissues, Branchial arches and Face)	2	60		50		
Paper No : 2 (Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir)						
M8 Plastination and Angarekhankan Sharir (Surface Anatomy))	3	90		75		
Paper No : 3 (Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa)						
M15 Urdhvajatrugata evum Prishthagata Asthi- Peshi Sharir (Osteology and Myology of Head, Neck and Back)	2	60		50		
M16 Shakhagata Asthi evum Peshi Sharir (osteology and Myology of Upper and Lower limbs)	3	90		75		

Paper No : 4 (Tantrika Indriya Granthi Jara Sharir evum Yogasana)						
M22 Brain	2	60		50		
M23 Spinal cord and spinal nerves	2	60		50		
	16	480		400		
Semester No : 4						
Paper No : 1 (Garbha Sharir, Dhatu Sharir evum Anuvanshiki)						
M3 Histology and Embryology of respiratory, cardiovascular and lymphatic system	3	90		75		
Paper No : 2 (Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir)						
M9 Pranavaha Srotas (Respiratory system)	2	60		50		
M10 Raktavaha Srotas (Heart and Arteries)	2	60		50		
M11 Raktavaha Srotas (Veins and Lymphatics))	2	60		50		
Paper No : 3 (Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa)						
M17 Asthi-sandhi sharir (Arthrology)	2	60		50		
M18 Udar evum Vaksha Peshi Sharir (Myology of Abdomen and thorax) and AsthiBhagna (Fractures))	2	60		50		
Paper No : 4 (Tantrika Indriya Granthi Jara Sharir evum Yogasana)						
M24 Cranial Nerves	3	90		75		
	16	480		400		
Semester No : 5						
Paper No : 1 (Garbha Sharir, Dhatu Sharir evum Anuvanshiki)						
M4 Histology and embryology of digestive system	2	60		50		
Paper No : 2 (Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir)						
M12 Annavaha Srotas (Digestive tract)	2	60		50		
M13 Annavaha Srotas(Digestive glands and peritoneum))	2	60		50		
Paper No : 3 (Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa)						
M19 Marma Sharir	3	90		75		
M20 Radiology and anatomical application in viddha chikitsa	2	60		50		

Paper No : 4 (Tantrika Indriya Granthi Jara Sharir evum Yogasana)						
M25 Autonomic nervous system and Endocrinology	2	60		50		
M26 Gyanendriya Sharir(Sense Organs)	3	90		75		
	16	480		400		
Semester No : 6						
Paper No : 1 (Garbha Sharir, Dhatu Sharir evum Anuvanshiki)						
M5 Histology and Embryology of Urogenital System	3	90		75		
M6 Histology and Embryology of Nervous System, Sense organs and Endocrine glandss	2	60		50		
M7 Anuvanshiki and Paranuvanshiki-Genetics and epigenetics	2	60		50		
Paper No : 2 (Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir)						
M14 Mutravaha, Shukravaha evum Aartvavaha Srotas (Urogenital system)	3	90		75		
Paper No : 3 (Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa)						
M21 Pramana Sharir (Anthropometry)	2	60		50		
Paper No : 4 (Tantrika Indriya Granthi Jara Sharir evum Yogasana)						
M27 Jara Sharir (Geriatric anatomy) and Application of anatomy in panchakarma	2	60		50		
M28 Anatomical Basis of Physiotherapy and Yogasana	2	60		50		
	16	480		400		
MGP = ((Number of Notional learning hours attended in a module) X (Marks obtained in the modular assessment) / (Total number of Notional learning hours in the module) X (Maximum marks of the module)) X 100						

6 D : Semester Evaluation Methods for Semester Grade point Average (SGPA)

SGPA will be calculated at the end of the semester as an average of all Module MGPs. Average of MGPs of the Semester For becoming eligible for Summative assessment of the semester, student should get minimum of 60% of SGPA

SGPA = Average of MGP of all modules of all papers = add all MGPs in the semester/ no. of modules in the semester
Evaluation Methods for Modular Assessment

Semester No : 3		
Paper No : 1 Garbha Sharir, Dhatu Sharir evum Anuvanshiki		
A S.N o	B Module number and Name	C MGP
1	M1.General Histology	C1
2	M2.Embryology (Tissues, Branchial arches and Face)	C2
Paper No : 2 Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir		
A S.N o	B Module number and Name	C MGP
3	M8.Plastination and Angarekhankan Sharir (Surface Anatomy))	C3
Paper No : 3 Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa		
A S.N o	B Module number and Name	C MGP
4	M15.Urdhvajatrugata evum Prishthagata Asthi- Peshi Sharir (Osteology and Myology of Head, Neck and Back)	C4
5	M16.Shakhagata Asthi evum Peshi Sharir (osteology and Myology of Upper and Lower limbs)	C5
Paper No : 4 Tantrika Indriya Granthi Jara Sharir evum Yogasana		
A S.N o	B Module number and Name	C MGP
6	M22.Brain	C6
7	M23.Spinal cord and spinal nerves	C7
	Semester Grade point Average (SGPA)	(C1+C2+C3+C4+C5+C6+C7) / Number of modules(7)
Semester No : 4		
Paper No : 1 Garbha Sharir, Dhatu Sharir evum Anuvanshiki		
A S.N	B Module number and Name	C MGP

o		
1	M3.Histology and Embryology of respiratory, cardiovascular and lymphatic system	C1
Paper No : 2 Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir		
A S.N o	B Module number and Name	C MGP
2	M9.Pranavaha Srotas (Respiratory system)	C2
3	M10.Raktavaha Srotas (Heart and Arteries)	C3
4	M11.Raktavaha Srotas (Veins and Lymphatics))	C4
Paper No : 3 Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa		
A S.N o	B Module number and Name	C MGP
5	M17.Asthi-sandhi sharir (Arthrology)	C5
6	M18.Udar evum Vaksha Peshi Sharir (Myology of Abdomen and thorax) and AsthiBhagna (Fractures))	C6
Paper No : 4 Tantrika Indriya Granthi Jara Sharir evum Yogasana		
A S.N o	B Module number and Name	C MGP
7	M24.Cranial Nerves	C7
	Semester Grade point Average (SGPA)	$(C1+C2+C3+C4+C5+C6+C7) / \text{Number of modules}(7)$
Semester No : 5		
Paper No : 1 Garbha Sharir, Dhatu Sharir evum Anuvanshiki		
A S.N o	B Module number and Name	C MGP
1	M4.Histology and embryology of digestive system	C1
Paper No : 2 Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir		
A S.N o	B Module number and Name	C MGP
2	M12.Annavaha Srotas (Digestive tract)	C2
3	M13.Annavaha Srotas(Digestive glands and peritoneum))	C3

Paper No : 3 Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa		
A S.N o	B Module number and Name	C MGP
4	M19.Marma Sharir	C4
5	M20.Radiology and anatomical application in viddha chikitsa	C5
Paper No : 4 Tantrika Indriya Granthi Jara Sharir evum Yogasana		
A S.N o	B Module number and Name	C MGP
6	M25.Autonomic nervous system and Endocrinology	C6
7	M26.Gyanendriya Sharir(Sense Organs)	C7
	Semester Grade point Average (SGPA)	(C1+C2+C3+C4+C5+C6+C7) / Number of modules(7)
Semester No : 6		
Paper No : 1 Garbha Sharir, Dhatu Sharir evum Anuvanshiki		
A S.N o	B Module number and Name	C MGP
1	M5.Histology and Embryology of Urogenital System	C1
2	M6.Histology and Embryology of Nervous System, Sense organs and Endocrine glandss	C2
3	M7.Anuvanshiki and Paranuvanshiki- Genetics and epigenetics	C3
Paper No : 2 Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir		
A S.N o	B Module number and Name	C MGP
4	M14.Mutravaha, Shukravaha evum Aartvavaha Srotas (Urogenital system)	C4
Paper No : 3 Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa		
A S.N o	B Module number and Name	C MGP
5	M21.Pramana Sharir (Anthropometry)	C5
Paper No : 4 Tantrika Indriya Granthi Jara Sharir evum Yogasana		
A S.N o	B Module number and Name	C MGP

6	M27.Jara Sharir (Geriatric anatomy) and Application of anatomy in panchakarma	C6
7	M28.Anatomical Basis of Physiotherapy and Yogasana	C7
	Semester Grade point Average (SGPA)	(C1+C2+C3+C4+C5+C6+C7) / Number of modules(7)

S. No	Evaluation Methods
1.	Method explained in the Assessment of the module or similar to the objectives of the module.

6 E : Question Paper Pattern

MD/MS Ayurveda Examination AYPG-RS Sem VI

Time: 3 Hours ,**Maximum Marks:** 100
INSTRUCTIONS: All questions compulsory

		Number of Questions	Marks per Question	Total Marks
Q 1	Application-based Questions (ABQ)	1	20	20
Q 2	Short answer questions (SAQ)	8	5	40
Q 3	Analytical based structured Long answer question (LAQ)	4	10	40
				100

6 F : Distribution for summative assessment (University examination)

S.No	List of Module/Unit	ABQ	SAQ	LAQ
Paper No : 1 (Garbha Sharir, Dhatu Sharir evum Anuvanshiki)				
(M-1)General Histology (Marks: Range 5-10)				
1	(U-1) General classification of Dhatu, cell and tissue	No	Yes	No
2	(U-2) Kala, Ras Dhatu and Meda Dhatu	No	Yes	No
3	(U-3) Rakta Dhatu and Maans Dhatu	No	Yes	No
4	(U-4) Asthi, Majja and Shukra Dhatu; and Snayu	No	Yes	No
(M-2)Embryology (Tissues, Branchial arches and Face) (Marks: Range 5-15)				
1	(U-1) Dhatu Nirman - Formation of tissues of the body	No	Yes	No
2	(U-2) Branchial arches	No	Yes	No
3	(U-3) Development of face and nose	No	Yes	No
4	(U-4) Garbhavridhhi and foetal development	No	Yes	Yes
(M-3)Histology and Embryology of respiratory, cardiovascular and lymphatic system (Marks: Range 5-20)				
1	(U-1) Histology and embryology of respiratory system	No	Yes	No
2	(U-2) Histology and embryology of cardiovascular system	No	Yes	No
3	(U-3) Histology and embryology of lymphatic system	No	Yes	Yes
4	(U-4) Dhatu, Pratyanga and Srotas	No	Yes	Yes
(M-4)Histology and embryology of digestive system (Marks: Range 5-20)				
1	(U-1) Histology and embryology of foregut	No	Yes	No
2	(U-2) Histology and embryology of midgut	No	Yes	No
3	(U-3) Histology and embryology of hindgut	No	Yes	Yes
4	(U-4) Development of body cavities	Yes	Yes	Yes
(M-5)Histology and Embryology of Urogenital System (Marks: Range 5-15)				
1	(U-1) Mutravaha Srotas and formation and development of Urinary system	No	Yes	Yes
2	(U-2) Shukravaha Srotas and formation and development of male reproductive system	No	Yes	No
3	(U-3) Aartvavaha Srotas and formation and development of female reproductive system	No	Yes	No
4	(U-4) Koshthanga and Pratyanga of Srotas	No	Yes	Yes
(M-6)Histology and Embryology of Nervous System, Sense organs and Endocrine glandss (Marks: Range 5-20)				

1	(U-1) Majjavaha Srotas; development of neural tube and neural crest	No	Yes	No
2	(U-2) Histology and embryology of forebrain and midbrain	No	Yes	Yes
3	(U-3) Histology and embryology of hind brain and spinal cord	Yes	Yes	Yes
4	(U-4) Histology and embryology of sense organs and endocrine glands; Gyanendriya Nirman	Yes	Yes	Yes
(M-7)Anuvanshiki and Paranuvanshiki- Genetics and epigenetics (Marks: Range 5-20)				
1	(U-1) Beej, Beejbhag and Beejbhagavyava	No	Yes	No
2	(U-2) Garbha Vikara and Anuvanshiki Paramarsh	Yes	Yes	No
3	(U-3) Epigenetics; Prakriti and Garbhakar Bhava	No	Yes	Yes
4	(U-4) Mechanism of epigenetics and Pranuvanshiki Paramarsh	No	Yes	No

S.No	List of Module/Unit	ABQ	SAQ	LAQ
Paper No : 2 (Plastination, Angarekhankan evum Sira Dhamani Srotas Koshtha Sharir)				
(M-8)Plastination and Angarekhankan Sharir (Surface Anatomy)) (Marks: Range 5-15)				
1	(U-1) Plastination - history, types and techniques	No	Yes	No
2	(U-2) Post-plastination procedures and plastination lab	No	Yes	No
3	(U-3) Angarehankan - Bahu and Vaksha	No	Yes	No
4	(U-4) Angarekhankan - Sakthi and Udar	No	Yes	No
5	(U-5) Angarekhankan - Urdhvajatru	No	Yes	Yes
(M-9)Pranavaha Srotas (Respiratory system) (Marks: Range 5-15)				
1	(U-1) Nose and nasal cavities	No	Yes	No
2	(U-2) Upper respiratory tract - pharynx and laryngeal apparatus; lower respiratory tract - trachea and bronchial tree	No	Yes	No
3	(U-3) Lungs and pleura; Pratyanga of Pranavaha Srotas	No	Yes	No
(M-10)Raktavaha Srotas (Heart and Arteries) (Marks: Range 5-20)				
1	(U-1) Heart and concept of Hridaya	No	Yes	Yes
2	(U-2) Major arteries of heart	Yes	Yes	Yes
3	(U-3) Arteries of limbs and concept of Dhamani	No	Yes	Yes
(M-11)Raktavaha Srotas (Veins and Lymphatics)) (Marks: Range 5-15)				
1	(U-1) Veins and lymphatics of head and neck	No	Yes	No
2	(U-2) Veins and lymphatics of abdomen, pelvis and lower limb	No	Yes	No
3	(U-3) Veins and lymphatics of thorax and upper limb; and Rasavaha Srotas	No	Yes	No
(M-12)Annavaha Srotas (Digestive tract) (Marks: Range 5-20)				
1	(U-1) Digestive tract - mouth	No	Yes	No
2	(U-2) Digestive tract - foregut	No	Yes	No
3	(U-3) Digestive tract - midgut and hindgut	No	Yes	No
(M-13)Annavaha Srotas(Digestive glands and peritoneum)) (Marks: Range 5-20)				
1	(U-1) Digestive glands of oral cavity	No	Yes	Yes
2	(U-2) Digestive glands - liver and pancreas; and spleen	No	Yes	Yes
3	(U-3) Peritoneum and Pratyanga of Annavaaha Srotas	No	Yes	No
(M-14)Mutravaha, Shukravaha evum Aartvavaha Srotas (Urogenital system) (Marks: Range 5-15)				

1	(U-1) Urinary tract and organs	No	Yes	Yes
2	(U-2) Male genital tract and organs	No	Yes	No
3	(U-3) 3	No	Yes	Yes
4	(U-4) Male-female urethra and external genitalia	No	Yes	No
5	(U-5) Pratyanga of Mutra, Shukra and Artva vaha Srotas	No	Yes	Yes

S.No	List of Module/Unit	ABQ	SAQ	LAQ
Paper No : 3 (Asthi Sandhi Peshi, Pramana, Ksha-vikiran, Marma Sharir evum Viddha Chikitsa)				
(M-15)Urdhvajatrugata evum Prishthagata Asthi- Peshi Sharir (Osteology and Myology of Head, Neck and Back) (Marks: Range 5-20)				
1	(U-1) osteology and myology of skull	No	Yes	No
2	(U-2) Osteology and myology of cervical region	No	Yes	No
3	(U-3) Osteology and myology of lumbar and sacral region	No	Yes	No
(M-16)Shakhagata Asthi evum Peshi Sharir (osteology and Myology of Upper and Lower limbs) (Marks: Range 5-20)				
1	(U-1) Osteology and myology of shoulder and arm	No	Yes	No
2	(U-2) Osteology and myology of forearm and hand	No	Yes	No
3	(U-3) Osteology and myology of hip and thigh	No	Yes	No
4	(U-4) Osteology and myology of leg and foot	No	Yes	Yes
5	(U-5) Comparative osteology and myology of limbs; Asthi and bones	No	Yes	Yes
(M-17)Asthi-sandhi sharir (Arthrology) (Marks: Range 5-15)				
1	(U-1) Joints of vertebral column	No	Yes	Yes
2	(U-2) Joints of upper limb	No	Yes	Yes
3	(U-3) Joints of lower limb	No	Yes	Yes
(M-18)Udar evum Vaksha Peshi Sharir (Myology of Abdomen and thorax) and AsthiBhagna (Fractures)) (Marks: Range 5-15)				
1	(U-1) Osteology and myology of thorax and abdomen	No	Yes	No
2	(U-2) Fractures of head, neck, vertebral column and chest	No	Yes	Yes
3	(U-3) Fractures of limbs	No	Yes	Yes
(M-19)Marma Sharir (Marks: Range 5-20)				
1	(U-1) Classification of Marma	No	Yes	Yes
2	(U-2) Marma of Bahu and Sakthi	No	Yes	Yes
3	(U-3) Marma of Prishtha, Udara and Urah	Yes	Yes	No
4	(U-4) 4	No	Yes	No
5	(U-5) Marma Chikitsa and other Parasurgical procedures related to Marma	No	Yes	No
(M-20)Radiology and anatomical application in viddha chikitsa (Marks: Range 5-15)				

1	(U-1) Avedhya Siras	No	Yes	No
2	(U-2) Vedhya Siras	No	Yes	Yes
3	(U-3) Radiological anatomy	No	Yes	Yes
(M-21)Pramana Sharir (Anthropometry) (Marks: Range 5-15)				
1	(U-1) Anthropometry - general description	No	Yes	Yes
2	(U-2) Anthropometry of Head, neck and limbs	No	Yes	Yes
3	(U-3) Metric and non-metric measurements; Anguli and Anjali Pramana	No	Yes	Yes

S.No	List of Module/Unit	ABQ	SAQ	LAQ
Paper No : 4 (Tantrika Indriya Granthi Jara Sharir evum Yogasana)				
(M-22)Brain (Marks: Range 5-20)				
1	(U-1) Hindbrain and Midbrain	No	Yes	No
2	(U-2) Forebrain	No	Yes	No
3	(U-3) Meninges and ventricular system	Yes	Yes	Yes
(M-23)Spinal cord and spinal nerves (Marks: Range 5-20)				
1	(U-1) General structure of spinal cord	No	Yes	Yes
2	(U-2) Tracts of spinal cord	Yes	Yes	Yes
3	(U-3) Spinal nerves	Yes	Yes	Yes
(M-24)Cranial Nerves (Marks: Range 5-20)				
1	(U-1) Cranial nerve nuclei	No	No	Yes
2	(U-2) Description of cranial nerves - nose and eyes	No	Yes	No
3	(U-3) Description of cranial nerves - face and ear	No	Yes	No
4	(U-4) Description of cranial nerves - IX to XII	No	Yes	No
5	(U-5) Sympathetic and parasympathetic ganglia of cranial nerves	No	Yes	Yes
(M-25)Autonomic nervous system and Endocrinology (Marks: Range 5-15)				
1	(U-1) Autonomic nervous system - classification	No	Yes	No
2	(U-2) Autonomic plexuses	No	Yes	Yes
3	(U-3) Endocrine glands related to brain; suprarenal glands	No	Yes	No
4	(U-4) Endocrine glands of branchial arches	No	Yes	Yes
(M-26)Gyanendriya Sharir(Sense Organs) (Marks: Range 5-20)				
1	(U-1) Sense organs - eye	Yes	Yes	Yes
2	(U-2) Sense organs - ear	No	Yes	No
3	(U-3) Sense organs - nose and tongue	No	Yes	Yes
4	(U-4) Sense organs - skin	No	Yes	Yes
(M-27)Jara Sharir (Geriatric anatomy) and Application of anatomy in panchakarma (Marks: Range 5-15)				
1	(U-1) cellular aging and age related changes in tissues	No	Yes	Yes
2	(U-2) Geriatric anatomy of respiratory, cardiovascular, digestive and urogenital systems; and Rasayana	No	Yes	No

3	(U-3) Geriatric anatomy of nervous system and sense organs; and panchakarma	No	Yes	Yes
(M-28)Anatomical Basis of Physiotherapy and Yogasana (Marks: Range 5-15)				
1	(U-1) Microanatomy and biomechanics of musculoskeletal system	No	Yes	Yes
2	(U-2) Musculoskeletal strengthening - Yogasanas and stretch exercises	No	Yes	Yes
3	(U-3) Application of Yogasanas	No	Yes	No

6 G : Instruction for the paper setting & Blue Print for Summative assessment (University Examination)

Instructions for the paper setting.

1. University examination shall have 4 papers of 100 marks.
Each 100 marks question paper shall contain:-
 - Application Based Question: 1 No (carries 20 marks)
 - Short Answer Questions: 8 Nos (each question carries 05 marks)
 - Long Answer Questions: 4 Nos (each question carries 10 marks)
2. Questions should be drawn based on the table 6F.
3. Marks assigned for the module in 6F should be considered as the maximum marks. No question shall be asked beyond the maximum marks.
4. Refer table 6F before setting the questions. Questions should not be framed on the particular unit if indicated “NO”.
5. There will be a single application-based question (ABQ) worth 20 marks. No other questions should be asked from the same module where the ABQ is framed.
6. Except the module on which ABQ is framed, at least one Short Answer Question should be framed from each module.
7. Long Answer Question should be analytical based structured questions assessing the higher cognitive ability.
8. Create Blueprint based on instructions 1 to 7

6 H : Distribution of Practical Exam (University Examination)

S.No	Heads	Marks
1	Cadaver dissection - 1. Dissection skills 2. Surface anatomy and Marma 3. Myology and arthrology	100
2	Skills in conduction of procedures 1. Plastination 2. Anthropometry 3. X-ray reading and fractures/dislocations	50
3	Spotting - 1. Osteology 2. Histology slides 3. Embryology models 4. Organ specimen	50
4	Assessing teaching ability (Topic to be assigned on 1st day of practical exam) - 1. Preparation of contents 2. Lecture delivery skills 3. Understanding of topic	20
5	Assessing presentation skills (Topic to be assigned on 1st day of practical exam) - 1. Contents 2. Presentation skill 3. Understanding of the topic	20
6	Viva voce in applied anatomy (4 examiners: 25 marks/each examiner) 1. Anuvanshiki 2. Jara Sharir 3. Yogasana 4. Viddha Chikitsa	80
7	Dissertation Viva - 1. Introduction to the topic 2. Literary review 3. Observations and results 4. Discussion	40

8	Logbook (Experiential activity record) 1. Conduction of activities 2. Presentation of activities 3. Timely submission of activity record.	20
9	Practical activity Record - 1. Conduction of practical activities 2. Timely submission of records	20
Total Marks		400

Reference Books/ Resources

S.No	References
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20	Gunn, C. (2017). Bones and joints: a guide for students. Edinburgh; New York: Elsevier
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25	Shenoy, R.K. (2019). Manipal manual of clinical methods in surgery: differential diagnosis and clinical discussion. S.L.: Cbs Publ & Dist Pvt Ltd I pg. 1047-1060
26	Anatomy for Diagnostic Imaging, 4th Edition (published September 2024)
27	Gould DJ, Patino G. Clinical neuroanatomy: a case-based approach. New York: Thieme; 2019
28	Spittgerber. Snell's Clinical Neuroanatomy 9. Lippincott Williams & Wilkins; 2024
29	Kapoor K. Inderbir Singh's Textbook of Clinical Neuroanatomy. Jaypee Brothers Medical Publishers; 2022
30	Vanderah TW, Gould DJ. Nolte's The Human Brain: an introduction to its functional anatomy. Philadelphia, Pennsylvania: Elsevier; 2021
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Abbreviations

Domain		T L Method		Level	
CK	Cognitive/Knowledge	L	Lecture	K	Know
CC	Cognitive/Comprehension	L&PPT	Lecture with PowerPoint presentation	KH	Knows how
CAP	Cognitive/Application	L&GD	Lecture & Group Discussion	SH	Shows how
CAN	Cognitive/Analysis	L_VC	Lecture with Video clips	D	Does
CS	Cognitive/Synthesis	REC	Recitation		
CE	Cognitive/Evaluation	SY	Symposium		
PSY-SET	Psychomotor/Set	TUT	Tutorial		
PSY-GUD	Psychomotor/Guided response	DIS	Discussions		
PSY-MEC	Psychomotor/Mechanism	BS	Brainstorming		
PSY-ADT	Psychomotor Adaptation	IBL	Inquiry-Based Learning		
PSY-ORG	Psychomotor/Origination	PBL	Problem-Based Learning		
AFT-REC	Affective/ Receiving	CBL	Case-Based Learning		
AFT-RES	Affective/Responding	PrBL	Project-Based Learning		
AFT-VAL	Affective/Valuing	TBL	Team-Based Learning		
AFT-SET	Affective/Organization	TPW	Team Project Work		
AFT-CHR	Affective/ characterization	FC	Flipped Classroom		
		BL	Blended Learning		
		EDU	Edutainment		
		ML	Mobile Learning		
		ECE	Early Clinical Exposure		
		SIM	Simulation		
		RP	Role Plays		
		SDL	Self-directed learning		
		PSM	Problem-Solving Method		
		KL	Kinaesthetic Learning		
		W	Workshops		
		GBL	Game-Based Learning		
		LS	Library Session		
		PL	Peer Learning		
		RLE	Real-Life Experience		
		PER	Presentations		
		D-M	Demonstration on Model		
		PT	Practical		
		X-Ray	X-ray Identification		
		CD	Case Diagnosis		

		LRI	Lab Report Interpretation		
		DA	Drug Analysis		
		D	Demonstration		
		D-BED	Demonstration Bedside		
		DL	Demonstration Lab		
		DG	Demonstration Garden		
		FV	Field Visit		
		JC	Journal Club		
		Mnt	Mentoring		
		PAL	Peer Assisted Learning		
		C_L	Co Learning		
		DSN	Dissection		
		PSN	Prosection		

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