SECTION – I
(Course Content)

THORAX

Schedule-1.
THORACIC WALL AND LUNGS

Lecture: 02 hrs
Dissection/ Prosection: 10 hrs
Tutorials: 01 hr

LECTURES:

- Intercostal space: artery, vein and nerve
- Pleura, lungs and bronchopulmonary segments

DISSECTION/ PROSECTION:

Identification of relevant skeletal features:-
thoracic cage - sternum; costal cartilages; ribs; thoracic vertebrae; inlet; outlet
sternum - manubrium, body; xiphoid process; jugular notch; sternal angle (Angle of Louis).
- head; neck; tubercle; shaft; angle; costal groove; typical rib intercostal space.

Subcutaneous structures:- anterior and lateral cutaneous branches of intercostal nerves.
Muscles:- intercostales (external, internal, innermost).
Nerves:- intercostal
Arteries and veins:- internal thoracic; anterior and posterior intercostal.
Pleurae and lungs:- pleural reflection; surfaces and borders of lungs; root of lung; fissures; lobes; bronchopulmonary segments.
Surface anatomy:- pleura, lungs and fissues of the lungs.
Applied anatomy:- auscultation of breath sounds; plain X-ray picture of the chest; bronchogram; bronchoscopy; paracentesis thoracis; bronchopulmonary segments.

TUTORIAL TOPICS FOR THE WEEK

- Relevant osteology.
- Relevant radiological anatomy.
- Relevant living anatomy.
- Relevant cross-sectional anatomy.

Schedule-2.
SUPERIOR AND MIDDLE MEDIASTINUM.

Lecture: 03 hrs
Dissection/ Prosection: 10 hrs
Tutorials: 01 hr

LECTURES:

- Pericardium, heart and great vessels.
- Right atrium
- Blood supply to the heart

DISSECTION/ PROSECTION:

Superior mediastinum and contents:- thymus; brachiocephalic veins; phrenic and vagus nerves; arch of aorta and branches; trachea; oesophagus.
Middle mediastinum and contents:-
pericardium - fibrous; serous (parietal, visceral); transverse sinus; oblique sinus.
heart - surfaces and borders; coronary arteries; coronary sinus; cardiac veins; chambers; innervation.

great vessels - ascending aorta; pulmonary trunk; superior and inferior vena cavae.
principal bronchi

Surface anatomy:- surface marking of heart and valvular opening.
Applied anatomy:- apex beat; percussion of borders of the heart; auscultation of heart sounds; X-ray of chest (pulmonary conus, aortic knuckle); ECG.

TUTORIAL TOPICS FOR THE WEEK

- Relevant osteology.
- Relevant radiological anatomy.
- Relevant living anatomy.
- Relevant cross-sectional anatomy.

Schedule-3.
SUPERIOR AND POSTERIOR MEDIASTINUM AND JOINTS OF THORAX.

Lecture: 03 hrs
Dissection/ Prosection: 10 hrs
Tutorials: 01 hr

LECTURES:

- Posterior mediastinum, azygos system of veins and thoracic duct.
- Oesophagus
- Mechanism of respiration.

DISSECTION/ PROSECTION:

Superior and posterior mediastinum:-
aorta - ascending; arch; descending; branches.
vena cava - superior; inferior.
trachea - thoracic part; primary bronchi.
oesophagus - thoracic part; constrictions.
nerves - vagus; recurrent laryngeal nerve; phrenic; sympathetic trunks; splanchnic nerves.
nerve plexuses - cardiac; pulmonary and oesophageal.
veins - posterior intercostal;hemiazygos; accessory hemiazygos; vena azygos.
thoracic duct - course.

Surface anatomy:- arch of the aorta; superior vena cava; inferior vena cava; vena azygos; openings in the diaphragm.
Applied anatomy:- barium swallow; oesophagoscopy.

Joints of Thorax

Manubriosternal - secondary cartilagenous type.
Sternocostal - synovial type, except the first sternocostal joint, which is a primary cartilagenous joint.
Costovertebral - synovial type; superior costotransverse ligament; costotransverse ligament; lateral costotransverse ligament; *no costotransverse ligament for the eleventh and twelfth ribs.*

Applied anatomy:- movements of the thoracic cage during respiration.
Cross sectional study at the levels of T3, T4 and T5.

TUTORIAL TOPICS FOR THE WEEK

- Relevant osteology.
- Relevant radiological anatomy.
- Relevant living anatomy.

- Relevant cross-sectional anatomy.

SECTION – II
(Course Content under Level – I, II, III)
LECTURES
OUTLINE OF LECTURES

S.No	TOPIC	MUST KNOW	SHOULD KNOW	COULD KNOW
1.	INTERCOSTAL SPACES	1. Def. & Features 2. Contents and their relations a. Muscles b. Attachments & actions c. IC Nerve d. IC vessels e. Lymphatics 3. Applied Anatomy a. IC Nerve Block b. Pleural Tap	a. Course c) Atypical Intercostal nerves Intercostal arteries a. Course Intercostal veins : Termination c. Herpes Zoster	b. Parts of innermost intercostal b. Branches b. Branches 4. Notching of in margin of ribs
2.	PLEURA	1. Layers i) Outer Parietal ii) Inner visceral A) Parietal pleura : Parts i) Costal ii) Mediastinal iii) Diaphragmatic iv) Cervical B) Visceral Pleura : C) Lines of pleural reflection 2. Pleural recesses i) Costodiaphragmatic ii) Costomediastinal 3. Blood supply 4. Nerve supply 6. Applied anatomy a. Pleural effusion b. Pleural tap c. Pleurisy, Pneumothorax, d. Haemothorax, Chylothorax, e. Empyema	Pulmonary ligament 5. Lymphatic drainage	
3.	LUNGS TRACHEA and BRONCHI	1. Anatomical position 2. Parts 3. Fissures & lobes 4. Relations of mediastinal surface 5. Trachea: Interior, Carina 6. Right principal bronchus 7. Root of the lung Arrangement of structures within the Right hilum & Left hilum 8. Bronchopulmonary segments a. Definition. b. Characteristics c. Importance	Azygos lobe Palpation of the trachea d. Bronchopulmonary segments in Right & Left lungs e. Foreign body in the trachea/ bronchoscopy Bronchoscopy f. Sites of auscultations g. Surgical significance of lung abscess h. Postural drainage	9. Applied aspect i) Mendelson's syndrome ii) Pan coast tumor iii) Segment pulmonary resection

4.	MEDIASTINUM	1. Def 2. Boundaries 3. Divisions 4. Boundaries and contents of each division.		5. Applied Anatomy i) Mediastinal syndrome ii) Mediastinitis
5.	PERICARDIUM and HEART	1. Definition of pericardium 2. Position of the heart; Dextrocardia 3. Chambers of the heart: Orientation : Echocardiography 4. Layers i) Fibrous pericardium - Attachments - Relations ii) Serous pericardium 5. Pericardial sinuses i) Transverse sinus ii) Oblique sinus 6. Blood supply 7. Nerve supply; Referred pain	8. Applied Anatomy: a. Pericarditis b. Paracentesis c. Pericardial tamponade	9. Pericardial recesses
6.	RIGHT ATRIUM	1. External features 2. Internal features a. In smooth part b. In rough part c. On Rt. Aspect of interatrial septum 3. Applied anatomy: ASD		4. Other features i) Triangle features ii) Torus aorticus
7.	BLOOD SUPPLY OF HEART	A) ARTERIAL SUPPLY 1. Rt. Coronary artery i) Origin ii) Course iii) Termination iv) Branches 2. Lt. Coronary artery i) Origin ii) Course iii) Termination iv) Branches 3. Dominance B) VENOUS DRAINAGE 1. Coronary sinus 2. Great cardiac vein 3. Middle cardiac vein 4. Small cardiac vein 5. Posterior vein of Lt ventricle c) APPLIED ANATOMY i) Coronary atherosclerosis ii) Ischaemic Heart Disease(IHD) iii) Coronary Bypass iv) Angina pectoris v) Referred pain vi) Heart block	v) Distribution v) Distribution 4. Anastomosis & collateral circulation 5. Peculiarities of coronaries 6. Venae cordis minimae 7. Anterior cardiac veins 8. Oblique vein of Marshall 9. Applied Anatomy: a. Coronary angiography b. Percutaneous transluminal coronary ballon angioplasty (PTCA)	
8.	ARCH OF AORTA	1. Extent 2. Course 3. Relations 4. Branches	5. Radiological appearances	

		6. Applied i) Coarction of Aorta ii) PDA iii) Aneurysm	i) Aortic knuckle iv) Anomalies of Aortic arch v) Variation of branches vi) Aortic isthmus vii) Aortic spindle	ii) Aortic window
9	INTERIOR OF THE VENTRICLES AND CONDUCTING SYSTEM	1. Interior features 2.Orifices and valves 3.Arterial supply 4. Conducting system: Components 5. VSD 6. Fallot's tetrology		
10	AZYGOS SYSTEM OF VEINS	A) Azygos Vein 1. Formation 2. Course 3. Relations 4. Tributaries	B) Hemi- Azygos Vein C) Accessory Azygos vein	5. Applied Anatomy SVC/IVC obstruction
11	MECHANISM OF RESPIRATION	1. Joints of the thorax: A. Costovertebral joints B. Costotransverse joints 2. Ligaments of the joints 3. Movements and axes of the joints a. Pump handle movement b. Bucket handle movement 4. Muscles causing normal respiration 5. Muscles causing forced respiration 6. Accessory muscles of respiration		
12	THORACIC DUCT	Formation Course Termination Areas of drainage	Chylothorax	
13	OESOPHAGUS	Commencement Course & relations Termination Normal curvatures and constrictions Blood supply		Achalasia cardia Sphincters

SECTION – II
(Course Content under Level – I, II, III)
DISSECTION

Learning Objectives of Dissection

S.No	TOPIC	DISSECTION STEPS	WHAT IS EXPECTED FROM THE STUDENTS			SUMMARY	

			LEVEL 1	LEVEL 2	LEVEL 3	IDENTIFY	UNDERSTAND
1	1.INTERCOSTAL SPACE	• Remove remains of serr.ant & pectoral muscles • Choose one space & cut thru ext. intercostal muscle & membrane along lower border of the space. Turn muscle upward & identify • Expose & identify lat.cut.br.of ICN to erve trunk deep to int.intercostal muscle • Cut int.intercostal& expose & follow ICN forward & backward with accompanied ICVs • Identify innermost intercostal deep to ICN & Vs • Remove ICMs & membranes from ant. part of 1st & 2nd . intercostal space & expose • Trace int. thoracic artery in 6th space & note its terminal branches	• Ext. intercostal muscle and membrane • Int. intercostal muscle & membrane • ICN & Vs & note their arrangement. • Int. thoracic artery (one cm) lat.lat. sternal border).	• Lat .cut.br.of ICN • Innermost intercostal (defined only in middle 2/4 of ICS) • Sup. Epigastric art. • Musculophrenic art.		• Intercostal muscles • Instercostal Ns & Vs • Int. thoracic art.	• Arrangement of intercostal muscles • Arrangement of neurovascular bundle in the space
						APPLIED ASPECTS	
						• Pleural tap vis-à-vis ICV & N	

S.No	TOPIC	DISSECTION STEPS	WHAT IS EXPECTED FROM THE STUDENTS			SUMMARY	
			LEVEL 1	LEVEL 2	LEVEL 3	IDENTIFY	UNDERSTAND
2	2.REMOVAL OF THE LUNGS	• Cut through rib cage in ant. axillary line on both sides • Reflect the flap towards & identify Pull the lungs	• Heart with pericardium in situ. • Lungs with pleura in situ. • Mediastinum • Internal thoracic artery & its terminal branches	• Superior Epigastric artery • Musculophrenic art	• Transversus thoracis muscle	• Lungs morphological differences fissures • Root of lung & arrangement of structures at hilum • Pulmonary ligament • Impressions on the lungs	• Disposition of pleura • Fissures of lungs • Pulmonary ligaments role in expansion of lung/distension of vessels

		laterally & identify structures seen medially. Cut through the root close to the lungs & remove the lungs	• Study the lungs in situ including its various gross features • Root of lungs • Study & identify external features of lungs • Structures related at medial surface • Structures at root of lung & their relationship	• Pulmonary ligament		(mediastinal) surface and correlate with structures	
						APPLIED ASPECTS	
						• Pleural effusion & its drainage	

S.No	TOPIC	DISSECTION STEPS	WHAT IS EXPECTED FROM THE STUDENTS			SUMMARY	
			LEVEL 1	LEVEL 2	LEVEL 3	IDENTIFY	UNDERSTAND
3	LUNGS (Continued) : BRONCHOPULMONARY SEGMENTS	• Remove the substance of lung piecemeal starting from principal bronchus	• Lobes of lungs • Approximate position of bronchopul. Segments			• Principal bronchus • Lobar bronchi • Segmental bronchi	• Bronchopulmonary segments and disposition of pulmonary .vein and artery within lung
						APPLIED ASPECTS	
						• Applied anatomy of bronchopul. segments. • Interpretation of plain X-ray chest -Hilar shadow -Vessels -Bronchi	

S.No	TOPIC	DISSECTION STEPS	WHAT IS EXPECTED FROM THE STUDENTS			SUMMARY	
			LEVEL 1	LEVEL 2	LEVEL 3	IDENTIFY	UNDERSTAND
4	3.MEDIASTINUM & HEART IN SITU	• Define the boundaries and subdivisons of mediastinum • Clean the pericardium & study pericardium • Cut the finrous pericardium on both sides in front of phrenic nerves vertically • Join lower ends of incisions by a	• Mediastinum & subdivisions • Middle mediastinum heart in situ with pericaridum phrenic nerves			• Mediastinum & its divisions • Heart in situ & its gross features • Pericardium • Coronary arteries • Major cardiac veins • Phrenic nerves	• Pericardium & its disposition • Sinuses of pericardium -Transverse -Oblique (embryology) • Base of heart anatomical & clinical

		transverse cut 1 cm above diaphragm • Note the attachments of pericardium to SVC, aorta & pul.trunk • Cut through these structures keeping a small flap on these vessels • Remove the fibrous pericardium & study • Sinuses of pericardium to be demonstrated by teachers • Strip pericardium from sternocostal surface and identify • Heart in situ, note its gross features	• Heart in situ , note its gross features • Sinuses of pericardium • Transverse • Oblique • In situ coronary arteries. Great cardiac vein Middle cardiac vein	• Coronary sinus	• Ant. cardiac vein		**APPLIED ASPECTS** • Apex beat • Pericardial effesion • Paracentesis • Transverse sinus (surgical)

S.No	TOPIC	DISSECTION STEPS	WHAT IS EXPECTED FROM THE STUDENTS			SUMMARY	
			LEVEL 1	LEVEL 2	LEVEL 3	IDENTIFY	UNDERSTAND
5	4.RIGHT ATRIUM	• Remove heart by cutting pul.trunk & ascending aorta(on alternate tables) • Dissect out arch of aorta i.e.cut beyond branches of aortic arch & cut left pulmonary trunk beyond ligamentum arteriosum • Open right atrium by giving a longitudinal incision from lower end of SVC along sulcus terminalis till IVC opening in right atrium • Reflect the	• Study external features by keeping heart in anatomical position • External features -Right auricle -Sulcus terminalis • Internal features -Smooth part -Rt. AV opening -Opening of coronary sinus -Opening of SVC & IVC -Rough part -Crista terminalis -Musculi pectinati -Interatrial septum -Fossa ovalis -Limbus fossa ovalis	• Valve of IVC	• Valve of coronary sinus • Triangle of koch • Tendon of todaro	• Features of heart (ext) -Apex -Base -Borders -Surfaces • Anatomical position • Right atrium • Ext. features • Int. features **APPLIED ASPECTS** • Congenital heart disease ASD (cyanotic & acyanotic) • X-ray view(PA) -Rt.Border -Lt. Border	• Openings in right atrium • Inflowing and out flowing parts • Development of IA septum (model)

		flap to left side • Study the right atrium and note • Wash it thoroughly				

TOPIC	DISSECTION STEPS	WHAT IS EXPECTED FROM THE STUDENTS			SUMMARY	
		LEVEL 1	LEVEL 2	LEVEL 3	IDENTIFY	UNDERSTAND
5.CHAMBERS OF THE HEART	• Make a T-shaped incision in right ventricle with the help of table teacher • Open the cavity of right ventricle & study its interior & note thickness of its wall • Note shape of cavity & bulging of IVS to the right • Make an inverted T shaped incision in left ventricle to open the cavity with the help of teacher & study the interior. Note thickness of its wall. Compare with right ventricle • To open left atrium 2 horizontal incisions are given one through sup.pul.veins & open the chambers study the interior	• Right AV opening • Smooth part of cavity (infundibulum) • Rough part(trabeculae carnae) • Ridges • Bridges • Pillars / papillary muscles • Cordae tendinae • Intervent.septum • Cusps of tricuspid valve • Smooth part(aortic vestibule) • Rough part(T.carnae) • Thickness of muscle wall 3:1 • Papillary muscles • Left AV orifice • Cusps of bicuspid or mitral valve • Aortic cusps /valve • Opening of 4 pulmonary veins • Smooth part • Rough part (musculi pectinati) • Fossa lunata • Left AV orifice from atrial aspect • SA node • AV node • Bundle of His	• Septomarginal trabecula(moderator band) • Bulging of IVS to the right • Septal papillary muscle	• Parts of IV septum membranous part muscular part	• Chambers of heart • Features of these chambers • Rt. & lt. AV openings • Cusps of tricuspid valves • Papillary muscles • Moderator band	• Conducting system of heart • Blood flow through heart • Development of IV septum • Development of bulbar ridges
					APPLIED ASPECTS • Congenital heart diseases - Cyanotic - Acyanotic • Tetrology of Fallot • Rheumatic heart disease (RHD) • Auscultation points	

S.No	TOPIC	DISSECTION STEPS	WHAT IS EXPECTED FROM THE STUDENTS			SUMMARY	
			LEVEL 1	LEVEL 2	LEVEL 3	IDENTIFY	UNDERSTAND
7	6.BLOOD SUPPLY OF THE HEART	• Remove visceral pericardium from the surface & identify	• Rt. Coronary artery(between pul.trunk & Rt. Auricle)			• RCA & LCA • Ant. interventricular art.	• Blood supply of heart • Venous drainage • Anastomosis

		• Scrape the fat present in ant. interventricular sulcus & left part of coronary sulcus & identify • Clean & trace ant.interventricular art.to diaphragmatic surface • Remove fat from coronary sulcus & identify RCA • Trace RCA to ant.aortic sinus • Trace post interventricular br. RCA on diaphragmatic surface in post. interventricular br. RCA on diaphragmatic surface in post. interventricular groove with accompanied vein • Clean and trace coronary sinus in coronary sulcus posteriorly	• Lt. Coronary artery(between pul.trunk & Lt. Auricle) • Coronary sinus (post.part of coronary sulcus) • Ant. interventricular br. of LCA • Rt. Coronary art. In depth of coronary sulcus • Marginal br. of RCA. • Post. interventricular art. • Middle cardiac vein	• Small cardiac vein along RCA	• Individual branches to both ventricles and septum • Individual branches to right ventricle & atrium • Oblique vein on the post surface of Lt. Atrium • Post. vein of lt. Ventricle	• Post. interventricular art • Circumflex art. • ,arginal art • coronary sinus • great cardiac vein • middle cardiac vein • Crux of heart	intracardiac extracardiac • Dominance
						APPLIED ASPECTS	
						• Angina • Referred pain • Coronary artery disease(CAD) • Heart attack /infarction • Heart block • Coronary angiography • Coronary bypass(CABG)-anatomical considerations.	

o	TOPIC	DISSECTION STEPS	WHAT IS EXPECTED FROM THE STUDENTS			SUMMARY	
			LEVEL 1	LEVEL 2	LEVEL 3	IDENTIFY	UNDERSTAND
	7.POSTERIOR MEDIASTINUM	• Define the boundaries of post. mediastinum • Identify & divide ligamentum arteriosum & identify • Trace Lt. RLN to arch of aorta • Trace RLN branches to deep part of cardiac plexus which is in front of bifurcation of trachea(cardiac plexus to be explained by teachers) • Clean & turn trachea upwards & then identify • Clean & identify desc. Thoracic aorta • Trace upper part of thoracic duct to its termination (junction of Lt. IJC & Lt. SCV) • Trace post. IC veins to the azygous vein, hemiazygous	• Boundaries • Left RLN • Trachea • Oesophagus • Vagi on oesophagus • Desc. Thoracic aorta & its branches • Azygous vein • Hemiazygous vein • Symp. chain	• Deep cardiac plexus • Thoracic duct • Acc. Hemiazygous vein • Splanchnic	• Brs. of vagi to oesophageal and pul.plexus • Post. IC veins	• Trachea & oesophagus • Desc. Thoracic aorta • Azygous & hemiazygous veins • Sympathetic chain • Thoracic duct • Splanchnic nerves • Structures at T4	• Boundaries of post. mediastinum • Cardiac plexus • Batson's vein
						APPLIED ASPECTS	
						• Endoscopy Brochoscopy Oesophagoscopy • Spread of carcinoma	

	vein,acc.hemiazygous vein • Clean & identify symp.chain related to heads of ribs • Identify splanchnic nerves		nerves		

SECTION – II
(Course Content under Level – I, II, III)
TUTORIALS

OUTLINE OF TUTORIALS

S.No	TOPIC	MUST KNOW	SHOULD KNOW	COULD KNOW
1.	STERNUM	1. Type of bone 2. Parts 3. Articulations 4. Features & muscle attachments 5. Importance of sternal angle	6. Sex differences 7. Ossification	8. Applied anatomy a) Anomalies of sternum i) Sternal foramen ii) Bifid sternum b) Ectopia cordis c) Depressed sternum
2.	RIBS	1. Type of bone 2. No & classification 3. Typical rib i) Parts & features ii) Anatomical position & side determination iii) Articulation 4. First rib i) Anatomical position ii) Parts & features 5. Second rib features 6. Twelfth rib features 7. Movements of rib i) Pump handle ii) Bucket handle iii) Muscles causing normal respiration iv) Muscles causing forced respiration	iv) Ossification iii) Attachments	iv) Anatomical position & side determination 8. Applied anatomy i) Site of # of ribs ii) Notching of lower iii) Border of ribs iv) Accessory ribs v) Cervical ribs
3.	THORACIC VERTEBRA	1.Typical i) Parts ii) Features 2. Atypical i) 1st Thoracic identifying features differentiation ii) 11th thoracic identifying features iii) 12th thoracic identifying features	3. Movements of thoracic part of vertebral column	

SURFACE MARKING: Lung, heart; Auscultation of lungs , heart and valves of the heart; heart sounds
RADIOGRAPHY: Chest X-Ray- AP and PA views, lateral and oblique views;
CONTRASTY RADIOGRAPHY PICTURES: Barium swallow, Angiography
CT SCANS: At the levels of T3, T4, T6 and T9