NEET PG Anatomy Sample Paper-7

Duration: 15 Minutes **Maximum Marks: 68**

Instructions

- This paper contains **17** Multiple Choice Questions.
- Each correct answer carries **+4** mark. Incorrect answer: **−1** marks. Only **one** correct option.
- Unattempted questions carry **0** marks.
- Use of mobile phones, smartwatches, or any electronic gadgets is strictly prohibited.

Q1. A 39-year-old male undergoes a surgical resection for a tumor located at the head of the pancreas. During dissection, the surgeon must be particularly careful of the relationship between the pancreas and the major retroperitoneal vessels. Which of the following statements correctly describes the anatomical relationship of the pancreas to surrounding structures?

(A) The splenic vein runs along the anterior surface of the neck and body of the pancreas.

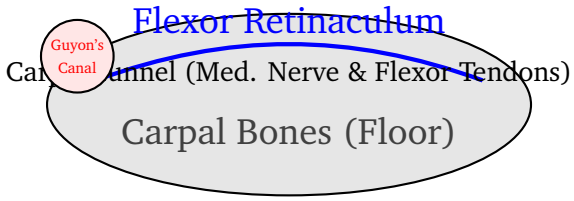
(B) The common bile duct descends anterior to the first part of the duodenum and passes anterior to the head of the pancreas.

(C) The superior mesenteric artery emerges from inferior to the neck of the pancreas and runs anterior to the uncinate process.

(D) The portal vein is formed posterior to the body of the pancreas by the junction of the splenic and inferior mesenteric veins.

Q2. A 29-year-old professional baseball pitcher presents with numbness and tingling in his ring and little fingers, along with weakness in hand grip. Physical examination reveals wasting of the hypothenar eminence. To pinpoint the site of entrapment, the clinician creates a schematic cross-section of the wrist. Refer to the TikZ diagram below showing the anatomy of the wrist

compartments:



Based on the clinical presentation and the structural layout, compression within the highlighted separate fibro-osseous tunnel (Guyon's canal) would directly affect which nerve-artery pair?

(A) Median nerve and Anterior interosseous artery

(B) Ulnar nerve and Ulnar artery

(C) Deep branch of the radial nerve and Radial artery

(D) Musculocutaneous nerve and Brachial artery

Q3. During a routine coronary angiogram, a cardiologist notes a severe occlusion in the posterior interventricular artery (posterior descending artery). If this patient possesses a right-dominant coronary circulation pattern, this occluded vessel is a direct branch of which artery?

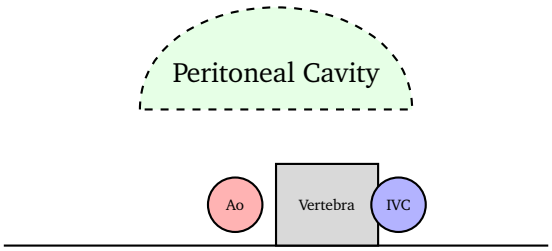
(A) Left anterior descending artery

(B) Circumflex branch of the left coronary artery

(C) Right coronary artery

(D) Left marginal artery

Q4. A 62-year-old chronic smoker presents with severe back pain. An abdominal CT angiogram reveals a large aneurysm of the infrarenal abdominal aorta. During open surgical repair, the surgeon isolates the aorta below the renal arteries. To map the collateral flow pathways before clamping, the surgical team references the following schematic cross-section of the mid-abdomen:



Which of the following retroperitoneal organs lies completely posterior to the peritoneal cavity cavity within this zone, receiving its main arterial supply directly from the lateral aspect of the aorta just superior to this cross-section?

(A) Spleen

(B) Kidney

(C) Jejunum

(D) Transverse colon

Q5. A 22-year-old football player sustains a violent blow to the lateral aspect of his right knee while his foot is firmly planted on the ground. He experiences immediate severe pain and is unable to bear weight. Physical examination reveals an abnormal anterior translation of the tibia relative to the femur and excessive opening of the joint line upon valgus stress. Which triad of structures is most likely injured in this patient?

(A) Anterior cruciate ligament, Lateral collateral ligament, and Lateral meniscus

(B) Posterior cruciate ligament, Medial collateral ligament, and Lateral meniscus

(C) Anterior cruciate ligament, Medial collateral ligament, and Medial meniscus

(D) Posterior cruciate ligament, Lateral collateral ligament, and Medial meniscus

Q6. A surgeon performing a cholecystectomy must carefully isolate the cystic artery within the cystohepatic triangle (Calot's triangle). Which of the following sets of structures forms the precise anatomical boundaries of this triangle?

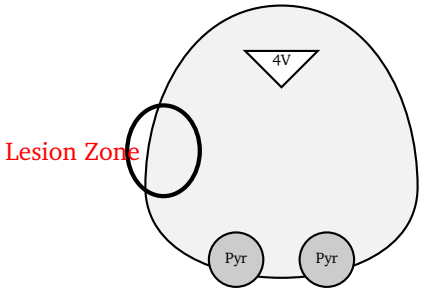
(A) Cystic duct, Common hepatic duct, and Inferior border of the liver

(B) Cystic duct, Common bile duct, and Portal vein

(C) Common hepatic duct, Common bile duct, and Cystic artery

(D) Left hepatic duct, Right hepatic duct, and Gallbladder neck

Q7. A 58-year-old woman presents to the emergency department with a sudden onset of vertigo, hoarseness, and difficulty swallowing. Neurological examination reveals a loss of pain and temperature sensation on the left side of her face and the right side of her trunk and limbs. She also exhibits left-sided Horner syndrome and left-sided cerebellar ataxia. To localized the lesion, the neurologist considers a schematic axial cross-section of the brainstem:



Occlusion of which of the following blood vessels is the most direct cause of this presentation (Wallenberg syndrome) corresponding to the shaded lateral medullary defect?

(A) Anterior spinal artery

(B) Posterior inferior cerebellar artery (PICA)

(C) Basilar artery paramedian branches

(D) Labyrinthine artery

Q8. A lumbar puncture is performed on a patient suspected of having bacterial meningitis. The needle is inserted into the subarachnoid space between vertebrae L3 and L4. To avoid damaging the spinal cord proper, the clinician must know the exact vertebral level where the conus medullaris typically terminates in a normal adult. What is this standard neuroanatomical termination level?

(A) Lower border of T12

(B) Lower border of L1 or upper border of L2

(C) Lower border of L3

(D) Sacral promontory (S1)

Q9. A 69-year-old male with chronic hypertension is brought to the hospital with a sudden complete hemiplegia affecting his left arm and left leg, alongside a loss of sensation over the same side. A brain CT scan reveals a localized hemorrhagic stroke within the internal capsule. Which structural limb of the internal capsule contains the corticospinal fibers going to the extremities, and which artery primarily supplies it?

(A) Anterior limb, supplied by the anterior cerebral artery

(B) Posterior limb, supplied by the lenticulostriate branches of the middle cerebral artery

(C) Genu, supplied by the ophthalmic artery

(D) Retrolentiform part, supplied by the posterior communicating artery

Q10. A 34-year-old female presents with progressive vision loss. Temporal visual field testing demonstrates a complete bitemporal heteronymous hemianopia. This neuro-ophthalmic deficit maps to localized structural compression at the midline base of the brain. Which of the following structures is being compressed, and what closely related endocrine organ is likely expanding to cause it?

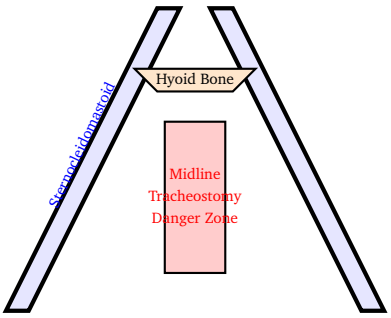
(A) Optic tract / Pineal gland

(B) Optic nerve / Adrenal rest tumor

(C) Optic chiasm / Pituitary gland

Q11. A 52-year-old patient undergoes an emergency tracheostomy due to acute upper airway obstruction. During dissection down to the tracheal rings inferior to the thyroid isthmus, the surgeon must stay strictly in the midline to avoid injuring major vascular structures. Refer to the geometric layout of

the anterior cervical anatomy below:



Which midline vascular structure lies directly anterior to the cervical trachea within this infrahyoid intervention zone and risks massive hemorrhage if damaged?

(A) Superior thyroid artery

(B) Inferior thyroid veins / Thyroid ima artery (when present)

(C) Lingual artery

(D) External carotid artery

Q12. A 42-year-old female presents with a painful swelling on the floor of her mouth. Sialolithiasis is suspected in the submandibular duct (Wharton's duct). As the duct courses anteriorly from the deep lobe of the submandibular gland along the surface of the mylohyoid muscle, it is intimately crossed by a major cranial nerve branch. Which nerve loops inferior to the submandibular duct from lateral to medial before ascending into the tongue?

(A) Lingual nerve (branch of CN V3)

(B) Hypoglossal nerve (CN XII)

(C) Glossopharyngeal nerve (CN IX)

(D) Chorda tympani (branch of CN VII)

Q13. A tumor located within the infratemporal fossa expands anteriorly and invades the pterygopalatine fossa via the pterygomaxillary fissure. Which of the following vital neural structures resides inside the pterygopalatine fossa and would be directly compromised by this expansion?

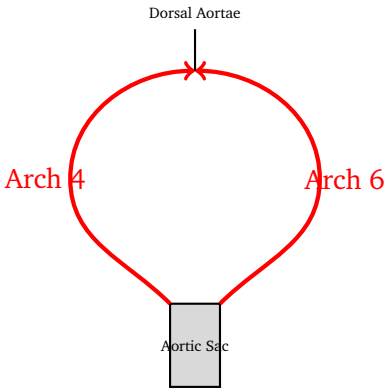
(A) Mandibular nerve (CN V3) and Otic ganglion

(B) Maxillary nerve (CN V2) and Pterygopalatine ganglion

(C) Facial nerve (CN VII) main trunk

(D) Oculomotor nerve (CN III) inferior division

Q14. A newborn is evaluated for cyanosis and a loud holosystolic murmur. Echocardiography establishes a congenital cardiovascular defect involving abnormal restructuring of the embryonic branchial aortic arch system. Consider the developmental map of the paired pharyngeal arch arteries shown below:



During normal morphogenesis, which adult vascular structures are correctly derived from the embryonic Left 4th arch and Left 6th arch respectively?

(A) Arch of the aorta / Left pulmonary artery and Ductus arteriosus

(B) Right subclavian artery / Right pulmonary artery

(C) Common carotid artery / Brachiocephalic trunk

(D) Pulmonary trunk / Ascending aorta

Q15. A pediatric surgeon operates on an infant with an unhealed umbilicus leaking small amounts of fecal matter. This presentation indicates a patent congenital connection tracking back to embryonic gut folding. From which structure is this abnormality derived due to a complete failure of involution?

(A) Urachus (Allantois remnant)

(B) Vitellointestinal duct (Omphalomesenteric duct)

(C) Cardinal vein system

(D) Paramesonephric (Müllerian) duct

Q16. A pathology resident examines a biopsy specimen from the gastrointestinal tract under a light microscope. She observes well-developed mucosal folds, deep crypts lined by simple columnar epithelium, an absence of villi, and an abundance of mucus-secreting goblet cells within the mucosal layer. The submucosa lacks Brunner's glands or Peyer's patches. From which section of the tract was this tissue harvested?

(A) Duodenum

(B) Ileum

(C) Colon

(D) Stomach (Fundus)

Q17. A 17-year-old male undergoes an excision biopsy of a small subcutaneous mass. Microscopic review reveals a specialized connective tissue matrix characterized by nests of chondrocytes residing inside distinct lacunae. The matrix exhibits a glassy, amorphous, basophilic background appearance without dense visible bundles of elastic fibers or thick irregular bundles of type I collagen. Which specific structural tissue type does this biopsy represent?

(A) Fibrocartilage

(B) Elastic cartilage

(C) Hyaline cartilage

(D) Compact bone

Detailed Solutions

Q1.

Solution

Concept: The surgical management of pancreatic head tumors requires an intimate knowledge of retroperitoneal vascular landmarks. The pancreas acts as a central crossroads in the upper abdomen, where major arterial branches and portal venous confluences lie in close proximity to the pancreatic parenchymal segments. Misidentification of these posterior relationships during dissection can lead to catastrophic, life-threatening intraoperative hemorrhage.

Solution:

(a) The superior mesenteric artery (SMA) arises directly from the abdominal aorta posterior to the body of the pancreas. It emerges anteriorly by passing inferiorly under the lower margin of the pancreatic neck.

(b) As the superior mesenteric artery descends, it courses directly anterior to the uncinate process of the pancreas and posterior to the first/second parts of the duodenum, placing this specific choice as the correct anatomical configuration.

(c) Conversely, the splenic vein does not run along the anterior surface; it travels entirely along the posterior groove or surface of the pancreatic body and tail.

(d) The common bile duct descends posterior to the first part of the duodenum and passes through a groove on the posterior-superior aspect of the pancreatic head, rather than anteriorly.

(e) The portal vein is formed posterior to the neck of the pancreas, not the body, by the direct confluence of the splenic vein and the superior mesenteric vein.

Final Answer: The superior mesenteric artery emerges from inferior to the neck of the pancreas and runs anterior to the uncinate process.

Answer: (C)

Go Back to Question 1

Q2.

Solution

Concept: The wrist contains distinct osteofibrous tunnels that segregate neurovascular structures entering the hand. Sensory and motor deficits in the medial aspect of the hand typically point to compression within Guyon's canal (ulnar tunnel). This space is localized superficially to the flexor retinaculum, bounded medially by the pisiform bone and laterally by the hook of the hamate.

Solution:

(a) Compression within Guyon's canal primarily affects the ulnar nerve and its accompanying ulnar artery, which run together through this specific anatomical gap.

(b) The ulnar nerve supplies motor innervation to the hypothenar muscles, all interossei, the medial two lumbricals, and the adductor pollicis, explaining the visible wasting of the hypothenar eminence.

(c) It also provides cutaneous sensation to the palmar and dorsal aspects of the fifth digit and the medial half of the fourth digit, matching the tingling pattern described.

(d) The median nerve and the flexor tendons travel within the deeper carpal tunnel beneath the dense flexor retinaculum, causing carpal tunnel syndrome when compressed.

(e) The radial artery and the deep branch of the radial nerve course through the lateral anatomical snuffbox and posterior compartments of the forearm and hand, respectively.

Final Answer: Ulnar nerve and Ulnar artery

Answer: (B)

Go Back to Question 2

Q3.

Solution

Concept: Coronary artery dominance is defined by which coronary artery gives rise to the posterior interventricular artery (also termed the posterior descending artery or PDA). The PDA runs along the posterior interventricular sulcus and supplies the posterior third of the interventricular septum, the diaphragmatic surface of both ventricles, and typically the posteromedial papillary muscle.

Solution:

(a) In a right-dominant coronary circulation pattern, which is present in approximately 70 to 80 percent of the population, the posterior interventricular artery branches directly from the right coronary artery (RCA).

(b) In a left-dominant circulation pattern, the PDA arises instead from the circumflex branch of the left coronary artery.

(c) Codominant circulation occurs when both the right coronary artery and the left circumflex artery contribute branches to the posterior interventricular sulcus.

(d) The left anterior descending artery (LAD) travels down the anterior interventricular sulcus and transitions around the apex, but it does not form the main trunk of the PDA.

(e) The left marginal artery is a lateral branch of the circumflex artery that tracks along the left margin of the heart to supply the lateral wall of the left ventricle.

Final Answer: Right coronary artery

Answer: (C)

Go Back to Question 3

Q4.

Solution

Concept: Anatomical retroperitoneal organs are positioned behind the parietal peritoneum and are covered by it only on their anterior surfaces. Understanding the cross-sectional alignment of these organs relative to the infrarenal aorta is critical for planning surgical exposures and maintaining proper vascular isolation boundaries during aortic aneurysm repairs.

Solution:

(a) The kidneys are primarily retroperitoneal organs situated in the paravertebral gutters, resting entirely posterior to the peritoneal cavity within the upper lumbar zone.

(b) The renal arteries emerge directly from the lateral aspects of the abdominal aorta, typically at the level of the L1-L2 intervertebral disc, which sits just superior to an infrarenal clamp zone.

(c) The spleen is an intraperitoneal organ located high in the left upper quadrant, enclosed within the visceral peritoneum and connected via ligaments.

(d) The jejunum is a highly mobile intraperitoneal structure suspended completely within the abdominal cavity by the expansive fan-shaped mesentery proper.

(e) The transverse colon is also an intraperitoneal organ suspended across the mid-abdomen by its own dedicated mesentery, known as the transverse mesocolon.

Final Answer: Kidney

Answer: (B)

Go Back to Question 4

Q5.

Solution

Concept: The knee joint relies heavily on its ligamentous and meniscal complexes for mechanical stability. A force applied to the lateral side of the knee joint induces a severe valgus stress. This stress excessive stretches the medial structures, often leading to a classic combined structural failure pattern known clinically as the unhappy triad (or O'Donoghue's triad).

Solution:

(a) A planted foot coupled with a violent lateral impact forces the knee inward, tearing the medial collateral ligament (MCL) as the joint line opens under valgus pressure.

(b) Because the deep fibers of the medial collateral ligament are firmly attached to the medial meniscus, this valgus force routinely tears the medial meniscus simultaneously.

(c) The concomitant anterior translation of the tibia observed during the clinical assessment demonstrates a complete rupture of the anterior cruciate ligament (ACL).

(d) The lateral collateral ligament (LCL) and lateral meniscus are positioned on the opposite side of the joint and are compressed rather than tensioned during valgus stress.

(e) Consequently, the specific combination of torn structures comprising this clinical triad contains the ACL, the MCL, and the medial meniscus.

Final Answer: Anterior cruciate ligament, Medial collateral ligament, and Medial meniscus

Answer: (C)

Go Back to Question 5

Q6.

Solution

Concept: The cystohepatic triangle (traditionally referred to as Calot's triangle) is a critical anatomical workspace mapped out during cholecystectomy. Accurate boundary identification within this clearing prevents inadvertent ligation of the common hepatic duct or the main bile duct, which would result in severe postoperative biliary obstruction or leak.

Solution:

(a) The precise anatomical boundaries of Calot's triangle are formed inferiorly by the cystic duct, medially by the common hepatic duct, and superiorly by the inferior border of the liver.

(b) The cystic artery typically travels across the interior interior of this triangle, making it the primary target for isolation and ligation during the surgical procedure.

(c) The common bile duct is formed lower down by the junction of the cystic and common hepatic ducts, making it a distal relation rather than a direct border.

(d) The portal vein runs entirely posterior to the biliary ducts within the hepatoduodenal ligament, forming part of the deeper portal triad arrangement.

(e) The left and right hepatic ducts merge outside the superior boundary of this space to form the single common hepatic duct trunk.

Final Answer: Cystic duct, Common hepatic duct, and Inferior border of the liver

Answer: (A)

Go Back to Question 6

Q7.

Solution

Concept: The lateral medullary syndrome (Wallenberg syndrome) represents a classic brainstem stroke pattern. It demonstrates a predictable constellation of neurological deficits based on damage to the closely packed sensory, autonomic, and motor pathways localized within the posterolateral aspect of the medulla oblongata.

Solution:

(a) The lateral medullary zone contains the spinothalamic tract, spinal trigeminal nucleus, nucleus ambiguus, inferior cerebellar peduncle, and descending sympathetic fibers.

(b) Occlusion of the posterior inferior cerebellar artery (PICA), or the parent vertebral artery, cuts off the blood supply to this specific wedge-shaped territory.

(c) Damage to the spinothalamic tract causes contralateral loss of pain and temperature sensation, while injury to the spinal trigeminal nucleus causes ipsilateral facial sensory loss.

(d) Nucleus ambiguus destruction leads to hoarseness, dysphagia, and loss of the gag reflex due to paralysis of the ipsilateral palatal and laryngeal muscles.

(e) Occlusion of the anterior spinal artery results in medial medullary syndrome, which presents with contralateral hemiparesis and ipsilateral tongue deviation instead.

Final Answer: Posterior inferior cerebellar artery (PICA)

Answer: (B)

Go Back to Question 7

Q8.

Solution

Concept: Performing a safe lumbar puncture requires clear knowledge of the differential growth rates between the bony vertebral column and the central nervous system. During development, the vertebral column elongates more rapidly than the spinal cord, causing the distal tip of the cord to occupy a progressively higher relative position within the spinal canal.
Solution:

(a) In a normal adult population, the tapering terminal end of the spinal cord, known as the conus medullaris, typically ends at the lower border of the L1 vertebra or the upper border of the L2 vertebra.

(b) In newborns and infants, the spinal cord terminates lower down, typically at the level of the L3 vertebra, before reaching adult proportions.

(c) Because the spinal cord ends near L1-L2 in adults, a lumbar puncture needle inserted at the L3-L4 or L4-L5 interspaces passes safely into the lumbar cistern.

(d) Within this subarachnoid space below the conus, the needle encounters only the flexible nerve roots of the cauda equina, which displace easily without sustaining structural damage.

(e) The sacral promontory marks the lower pelvic boundary, far below the termination of both the spinal cord and the dural sac.

Final Answer: Lower border of L1 or upper border of L2

Answer: (B)

Go Back to Question 8

Q9.

Solution

Concept: The internal capsule is a compact subcortical white matter pathway carrying projection fibers between the cerebral cortex, brainstem, and deep nuclei. Its specific structural segments show strict somatotopic organization, meaning that localized vascular strokes within individual limbs produce highly predictable clinical focal deficits.

Solution:

(a) The posterior limb of the internal capsule contains the descending corticospinal fibers that mediate voluntary motor control over the contralateral extremities.

(b) It also carries the ascending third-order sensory fibers running from the thalamus to the primary somatosensory cortex, explaining the combined motor and sensory presentation.

(c) The primary blood supply to this dense pathway is delivered by the lenticulostriate arteries, which are small, thin-walled perforating branches arising from the M1 segment of the middle cerebral artery.

(d) Due to their right-angled origin and high exposure to systemic pressure, these vessels are highly susceptible to rupture in hypertensive patients.

(e) The anterior limb carries frontopontine and thalamocortical fibers, while the genu contains corticobulbar paths, neither of which match the complete limb hemiplegia profile.

Final Answer: Posterior limb, supplied by the lenticulostriate branches of the middle cerebral artery

Answer: (B)

Go Back to Question 9

Q10.

Solution

Concept: The optic chiasm is situated immediately superior to the pituitary fossa (sella turcica) at the base of the diencephalon. This close relationship means that any mass effect or structural expansion originating from the pituitary gland will exert direct upward mechanical pressure against the fibers passing through the chiasm.

Solution:

(a) The optic chiasm houses the crossing decussating nerve fibers derived from the nasal halves of both retinas.

(b) These nasal retinal fibers are responsible for capturing visual information from the temporal halves of the left and right visual fields.

(c) When an expanding pituitary adenoma pushes upward, it selectively compresses these crossing central nasal fibers while sparing the uncrossed lateral temporal retinal paths.

(d) This localized compression produces a classic bitemporal heteronymous hemianopia, characterized by a complete loss of peripheral vision in both eyes.

(e) Damage to an individual optic tract occurs posterior to the chiasm and results in a contralateral homonymous hemianopia, which does not match this patient's visual field profile.

Final Answer: Optic chiasm / Pituitary gland

Answer: (C)

Go Back to Question 10

Q11.

Solution

Concept: Performing an emergency tracheostomy requires precise knowledge of the fascial compartments and vascular channels running anterior to the cervical trachea. The visceral space of the neck inferior to the thyroid gland ismet contains vulnerable venous networks and potential variant arteries that reside entirely inside the midline surgical field of entry.

Solution:

(a) During a midline infrahyoid tracheostomy, the surgical dissection proceeds inferior to the thyroid isthmus, directly exposing the anterior wall of the lower cervical tracheal rings.

(b) The inferior thyroid veins emerge from the lower margin of the thyroid gland and descend vertically over the anterior surface of the trachea to drain into the brachiocephalic veins.

(c) In a small percentage of individuals, a variant vessel known as the thyroid ima artery arises directly from the brachiocephalic trunk or aortic arch and ascends along the midline.

(d) Accidentally cutting through these vessels leads to severe venous or arterial pooling that obscures the airway visualization and creates a profound surgical hazard.

(e) The superior thyroid and lingual branches arise superiorly near the hyoid level, whereas the external carotid trunk rests laterally within the carotid sheath boundaries.

Final Answer: Inferior thyroid veins / Thyroid ima artery (when present)

Answer: (B)

Go Back to Question 11

Q12.

Solution

Concept: The submandibular triangle contains complex structural relationships between muscular planes, salivary gland lobes, secretory ducts, and traveling cranial nerves. The physical path of the submandibular duct along the superficial face of the mylohyoid muscle displays a unique architectural crossing arrangement with a key branch of the trigeminal nerve.

Solution:

(a) As the submandibular duct travels forward toward the sublingual caruncle, the lingual nerve passes from a superior and lateral position to loop beneath the lower border of the duct.

(b) After looping inferiorly, the lingual nerve loops back up medially to reach the deep muscles and mucous membranes of the anterior two-thirds of the tongue.

(c) This intimate loop makes the lingual nerve highly vulnerable to traction or direct laceration injuries during surgical exploration for submandibular duct stones.

(d) The hypoglossal nerve passes further inferiorly and deeply across the hyoglossus muscle plane, staying separate from the immediate borders of Wharton duct.

(e) The glossopharyngeal nerve is situated superiorly within the posterior third of the tongue, and the chorda tympani joins the lingual trunk high up inside the infratemporal fossa.

Final Answer: Lingual nerve (branch of CN V3)

Answer: (A)

Go Back to Question 12

Q13.

Solution

Concept: The pterygopalatine fossa is a small, inverted-tear-shaped space acting as a central distribution center for neurovascular structures between the infratemporal fossa, nasal cavity, orbit, and oral cavity. Its lateral portal of entry is formed by the vertical pterygomaxillary fissure.

Solution:

(a) Any pathologic process expanding anteriorly through the pterygomaxillary fissure moves directly from the infratemporal space into the core of the pterygopalatine fossa.

(b) The primary neural elements residing inside this rigid bony hub are the maxillary nerve (CN V2) trunk and the suspended pterygopalatine parasympathetic ganglion.

(c) Damage to this region causes sensory loss along the midface, upper teeth, and palate, along with a disruption of secretomotor pathways to the lacrimal and nasal glands.

(d) The mandibular nerve and its associated otic ganglion are located within the infratemporal fossa proper, adjacent to the foramen ovale.

(e) The facial nerve exits through the stylomastoid foramen to enter the parotid gland, while the oculomotor division enters the orbit directly via the superior orbital fissure.

Final Answer: Maxillary nerve (CN V2) and Pterygopalatine ganglion

Answer: (B)

Go Back to Question 13

Q14.

Solution

Concept: The transformation of the embryonic pharyngeal arch arteries into the adult systemic arterial layout involves asymmetric remodeling, selective regression, and stabilization of specific vascular channels under the influence of complex molecular signaling cascades.

Solution:

(a) The embryonic fourth pharyngeal aortic arch develops asymmetrically; its left side persists to form a major portion of the permanent adult arch of the aorta.

(b) The embryonic sixth pharyngeal aortic arch, also known as the pulmonary arch, contributes its proximal portion to the development of the left pulmonary artery.

(c) The distal segment of the left sixth aortic arch retains its luminal patency throughout fetal development to form the critical shunt known as the ductus arteriosus.

(d) The right fourth arch instead forms the proximal segment of the right subclavian artery, which does not match the systemic leftward landmarks.

(e) The common carotid stems develop from the third pair of pharyngeal arches, whereas the ascending aorta is partitioned directly from the embryonic truncus arteriosus.

Final Answer: Arch of the aorta / Left pulmonary artery and Ductus arteriosus

Answer: (A)

Go Back to Question 14

Q15.

Solution

Concept: Embryonic midgut morphogenesis includes a temporary physiological herniation into the umbilical cord, where the primary intestinal loop remains continuous with extraembryonic structures through a dedicated connecting stalk. Complete or partial failure of this stalk to undergo physiological occlusion results in clear fistulous tracts.

Solution:

(a) The vitellointestinal duct, alternatively termed the omphalomesenteric duct, forms the embryological channel linking the primitive midgut lumen directly to the primary yolk sac.

(b) If this connection fails to completely obliterate and involute before birth, a patent vitellointestinal duct persists, creating a physical passage between the ileum and the umbilicus.

(c) This patency allows liquid ileal contents and fecal matter to escape onto the newborn abdominal skin surface, requiring prompt surgical correction.

(d) A patent urachus represents a failure of the allantois remnant to close, presenting as a urinary discharge from the umbilicus rather than fecal matter.

(e) The cardinal vein tracks relate to systemic venous development, while the paramesonephric structures differentiate into the internal female reproductive tracts.

Final Answer: Vitellointestinal duct (Omphalomesenteric duct)

Answer: (B)

Go Back to Question 15

Q16.

Solution

Concept: Microscopic identification of the distinct regions of the alimentary canal relies on evaluating mucosal specializations, cellular sub-populations, and the presence or absence of specific glandular structures within the underlying submucosal layer.

Solution:

(a) The large intestine or colon is histologically characterized by an absolute lack of surface villi, featuring instead a flat luminal landscape punctuated by long, straight, parallel mucosal crypts.

(b) The epithelial lining consists of simple columnar enterocytes intermixed with an abundant population of goblet cells that secrete mucus to facilitate lubricating the compacting fecal mass.

(c) The submucosa of the colon is composed of dense irregular connective tissue that completely lacks any native specialized glandular structures.

(d) The duodenum is differentiated by the presence of alkaline-secreting Brunner glands located within its submucosal layer to neutralize acidic gastric chyme.

(e) The ileum contains aggregated lymphoid follicles known as Peyer patches in its lamina propria and submucosa, alongside well-developed projecting mucosal villi.

Final Answer: Colon

Answer: (C)

Go Back to Question 16

Q17.

Solution

Concept: Cartilage is a highly specialized avascular connective tissue categorized into three structural types based on the composition of its extracellular matrix and the relative abundance of specific fibrous networks embedded within the fundamental ground substance.

Solution:

(a) Hyaline cartilage features an amorphous, glassy matrix dominated by a high density of ground substance containing proteoglycans, chondroitin sulfate, and structurally invisible type II collagen fibrils.

(b) Under standard light microscopy, this composition gives the matrix an even, smooth, basophilic appearance where individual chondrocytes are seen gathered within isolated lacunae.

(c) Fibrocartilage is defined by the presence of dense, clearly visible bundles of thick type I collagen running through the matrix, providing immense tensile strength.

(d) Elastic cartilage contains an extensive, dark-staining network of branching elastic fibers that provide specialized structural flexibility to tissues like the external ear.

(e) The absence of visible fiber bundles or lamellar osteon patterns confirms that this subcutaneous biopsy sample represents pure hyaline cartilage tissue.

Final Answer: Hyaline cartilage

Answer: (C)

Go Back to Question 17

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	C	2	B	3	C	4	B	5	C
6	A	7	B	8	B	9	B	10	C
11	B	12	A	13	B	14	A	15	B
16	C	17	C						