NEET PG Anatomy Sample Paper-6

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. During a radical retroperitoneal lymphadenectomy for a malignant testicular germ cell tumor, a surgical oncologist works closely along the anterior surface of the psoas major muscle. While isolating the tissue anterior to the muscle belly, the surgeon inadvertently shears an small, isolated nerve trunk that pierces the belly of the psoas major and descends obliquely across its anterior surface. Which of the following clinical deficits will be identified postoperatively during an objective neurological examination?

(A) Loss of the cremasteric reflex on the ipsilateral side only

(B) Complete loss of cutaneous sensation over the anterior aspect of the upper third of the thigh

(C) Sparing of the cremasteric reflex with selective cutaneous anesthesia over the femoral triangle

(D) Loss of the cremasteric reflex along with cutaneous anesthesia over both the anterior scrotum/labium majus and the proximal medial thigh

Q2. A 58-year-old female presents to the emergency department with severe, unremitting mid-back pain radiating to the epigastric region. Contrast-enhanced computed tomography (CECT) of the abdomen reveals a localized saccular aneurysm arising from the posterior aspect of the abdominal aorta, precisely between the origin of the celiac trunk and the superior mesenteric artery

(SMA). To successfully clamp the aorta superior to this structural defect, which of the following anatomical structures must be carefully mobilized or divided to gain clear access to this specific retrocrural window?

(A) The left renal vein and the uncinate process of the pancreas

(B) The median arcuate ligament of the diaphragm and the dense celiac plexus network

(C) The neck of the pancreas and the splenic vein

(D) The third part of the duodenum and the overlying root of the mesentery

Q3. A 44-year-old polytrauma patient sustains an open, unstable posterior dislocation of the right knee joint following a high-velocity motor vehicle collision. On physical examination, the distal pulses are faint but present, but there is an absolute inability to actively dorsiflex the foot or evert the ankle, paired with an objective sensory loss over the dorsum of the foot. Which of the following specific fascial or osseous constraints forced the injured neural element into intimate contact with the displacing bony fragments, leading to this presentation?

(A) Reflection around the posterior aspect of the medial malleolus beneath the flexor retinaculum

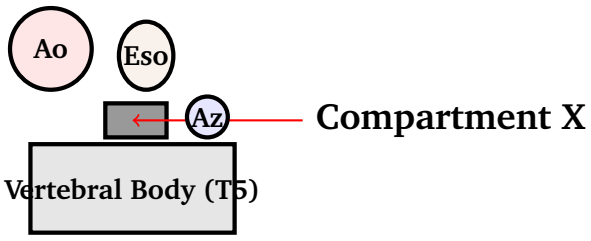
(B) Compression within the deep tendinous arch of the soleus muscle origin

(C) Direct anchoring around the fibular neck within the fibro-osseous tunnel of the peroneus longus muscle

(D) Trapping beneath the superior margin of the transverse intermuscular septum of the leg

Q4. A 62-year-old male with long-standing, poorly controlled hypertension presents with a sudden onset of tearing chest pain radiating to the back. A CT angiogram confirms an acute Stanford Type B aortic dissection. A schematic axial cross-section of the posterior mediastinum at the level of the T5 vertebra is illustrated below. Identify the structural vulnerability or spatial orientation signified by the dark-shaded target compartment labeled **X**, which sits

immediately anterior to the vertebral body and contains a critical lymphatic conduit vulnerable during surgical repair:



(A) It lies entirely to the left of the midline, anterior to the left sympathetic chain

(B) It contains the thoracic duct, bordered laterally by the descending thoracic aorta on the left and the azygos vein on the right

(C) It represents the superior recess of the lesser sac, located anterior to the azygos vein

(D) It accommodates the right vagus nerve passing directly between the esophagus and the vertebral body

Q5. A 69-year-old male presents with sudden-onset neurological deficits characterized by an ipsilateral complete third cranial nerve palsy (oculomotor) paired with a contralateral hemiballismus and choreoathetotic involuntary movements of the upper and lower extremities. A high-resolution brain MRI demonstrates an acute ischemic infarct localized to the ventral and paramedian aspects of the midbrain. Which of the following distinct intrinsic structural regions must be simultaneously involved to explain this highly specific combination of cranial nerve and hyperkinetic motor deficits?

(A) Base of the crus cerebri and the red nucleus

(B) Fascicles of the oculomotor nerve and the substantia nigra pars compacta

(C) Emergence of the oculomotor nerve fibers and the subthalamic nucleus / dentatorubral fibers

(D) Medial lemniscus and the superior colliculus nucleus

Q6. A 35-year-old female presents with progressive headaches, papilledema, and a restriction of upward conjugate gaze with pupillary light-near dissociation

(Parinaud syndrome). An MRI reveals a space-occupying mass within the pineal gland region causing significant mass effect. During an occipital transtentorial approach to excise this tumor, the neurosurgeon must identify and preserve the venous channels forming the Great Cerebral Vein (of Galen). The primary direct tributaries whose confluence establishes this specific vein are the:

(A) Superior sagittal sinus and the inferior sagittal sinus

(B) Right and left internal cerebral veins paired with the basal veins (of Rosenthal)

(C) Superficial middle cerebral vein and the superior ophthalmic vein

(D) Straight sinus and the occipital sinus

Q7. An advanced neuro-otological mapping procedure is performed on a patient undergoing resection of a vestibular schwannoma within the internal acoustic meatus. The surgeon utilizes micro-stimulation probes to segregate the individual nervous structures passing through the shallow bony quadrants of the meatal fundus. If the surgeon applies a local stimulus to the **anterosuperior quadrant** of the fundus, which functional manifestation or structural activation is being tested?

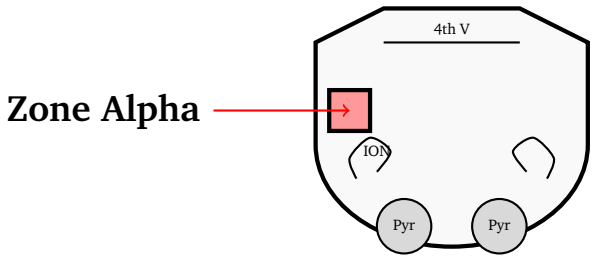
(A) Efferent motor activation of the facial muscles via the facial nerve

(B) Auditory evoked potentials via the cochlear nerve

(C) Linear acceleration signals via the superior vestibular nerve

(D) Rotational kinetic signals via the inferior vestibular nerve

Q8. A 51-year-old patient presents with intractable hiccups, loss of pain and temperature sensation over the left side of the face and the right side of the limbs, dysarthria, dysphagia, and Horner syndrome on the left side. An MRI confirms an ischemic stroke. The schematic below highlights a cross-section of the rostral medulla oblongata. Identify the specific neuroanatomical territory labeled **Zone Alpha** that has been infarcted to produce this cluster of clinical signs:



(A) Ventromedial territory supplied by the anterior spinal artery

(B) Lateral medullary territory supplied by the posterior inferior cerebellar artery (PICA)

(C) Dorsomedial territory supplied by direct bulbar branches of the vertebral artery

(D) Paramedian territory containing the medial lemniscus and hypoglossal nucleus

Q9. A 72-year-old male with an advanced ulcerated squamous cell carcinoma of the lateral border of the tongue undergoes a radical neck dissection. The surgical team intends to ligate the lingual artery near its origin to achieve definitive vascular control. To identify the lingual artery within the classic anatomical landmark known as Lesser's Triangle, which specific musculotendinous and neural borders must the surgeon meticulously isolate?

(A) Mylohyoid muscle anteriorly, posterior belly of digastric posteriorly, and the lingual nerve superiorly

(B) Anterior belly of digastric anteriorly, posterior belly of digastric posteriorly, and the stylohyoid muscle superiorly

(C) Hypoglossal nerve superiorly, anterior belly of digastric anteriorly, and the hyoid bone inferiorly

(D) Intermediate tendon of the digastric muscle inferiorly (two bellies forming the base) and the hypoglossal nerve superiorly

Q10. A patient presents with persistent numbness over the skin of the anatomical angle of the mandible, extending slightly onto the lower part of the parotid gland sheath following a traumatic deep laceration along the posterior border of the sternocleidomastoid muscle. Neurological workup reveals isolated

injury to a branch of the superficial cervical plexus. Which of the following nerves was severed, and from which spinal segments does it derive its components?

(A) Lesser occipital nerve; C2

(B) Great auricular nerve; C2 and C3

(C) Transverse cervical nerve; C2 and C3

(D) Supraclavicular nerve; C3 and C4

Q11. A neurosurgeon is operating within the infratemporal fossa to resect a deep-seated vascular anomaly. While operating near the roof of the fossa, immediately lateral to the foramen ovale, the surgeon encounters a small, isolated branch of the mandibular nerve (V_3) that loops circumferentially around the middle meningeal artery before coalescing into a single trunk that courses posteriorly. A lesion to this nerve loop during the dissection will culminate in which clinical deficit?

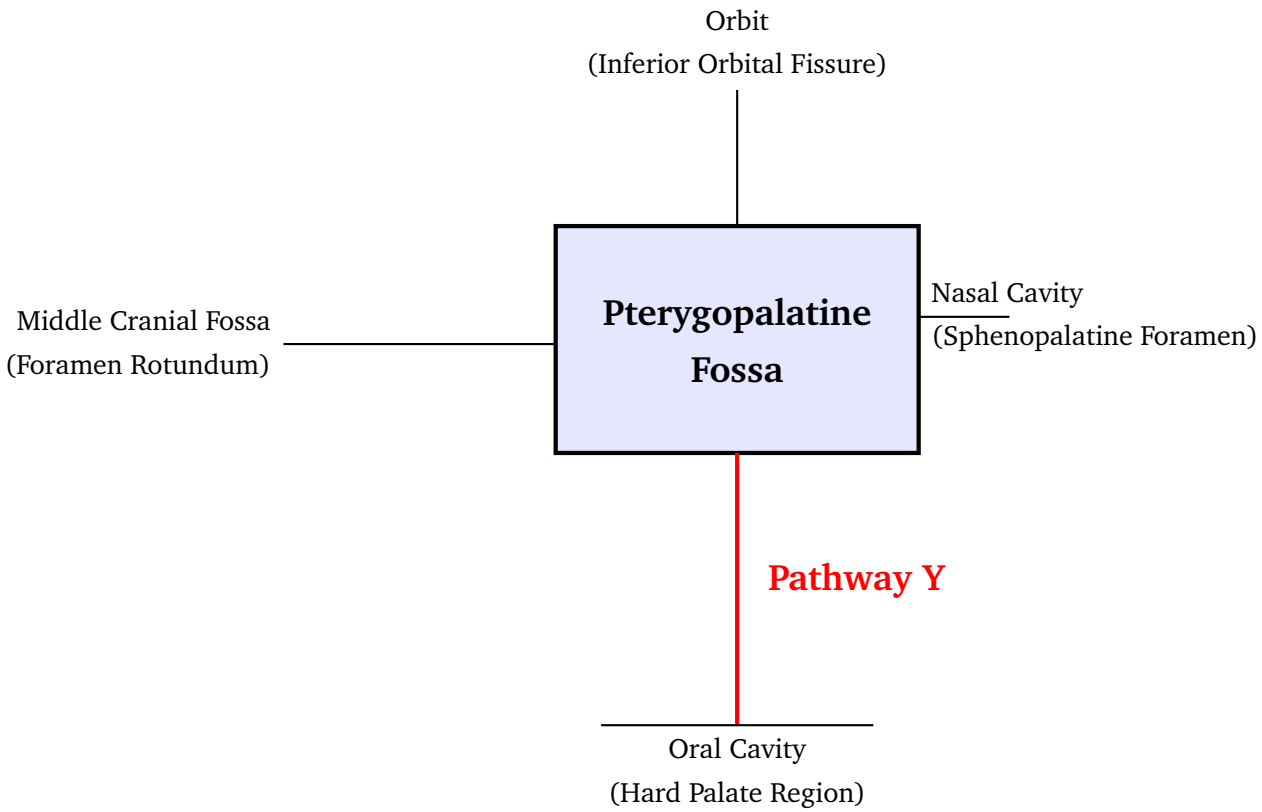
(A) Complete loss of secretomotor parasympathetic drive to the submandibular salivary gland

(B) Sensory anesthesia of the anterior two-thirds of the tongue

(C) Loss of secretomotor parasympathetic function to the parotid gland and sensory loss over the tragus

(D) Paralysis of the tensor tympani muscle with severe hyperacusis

Q12. A patient is diagnosed with an invasive juvenile nasopharyngeal angiofibroma that has filled the pterygopalatine fossa and is eroding through its osseous boundaries. The diagram below shows a schematic map of the major communications radiating from the pterygopalatine fossa. Identify the specific channel labeled **Pathway Y** that transmits the greater palatine neurovascular structures directly into the roof of the oral cavity.



(A) Pterygoid (Vidian) canal

(B) Palatovaginal (pharyngeal) canal

(C) Greater palatine canal

(D) Foramen lacerum opening

Q13. A newborn presents with high-output cardiac failure shortly after delivery. Imaging reveals a rare malformation characterized by a total failure of spiral septum development within the bulbus cordis and truncus arteriosus, leaving a single massive arterial trunk straddling both ventricles and overriding a large ventricular septal defect. Which embryological cell population failed to migrate adequately into the outflow tract walls to coordinate this septation process?

(A) Splanchnic lateral plate mesoderm

(B) Cranial neural crest cells

(C) Paraxial mesodermal somatomeres

(D) Endodermal cushions of the primitive sinus venosus

Q14. During a routine pediatric well-child exam of an 18-month-old infant, the clinician notices a tiny, congenital draining pit located along the anterior border of the sternocleidomastoid muscle at the junction of its upper two-thirds and lower one-third. The mother notes that it occasionally extrudes a clear fluid when the child cries. This clinical presentation represents a remnant or anomaly linked directly to the incomplete obliteration of which embryological structure?

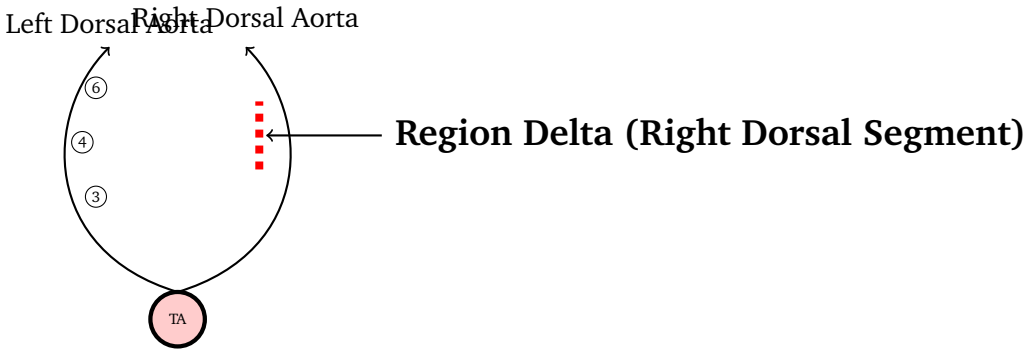
(A) First pharyngeal pouch

(B) Second pharyngeal cleft (cervical sinus of His)

(C) Thyroglossal duct tract

(D) Thymic diverticulum migration pathway

Q15. An infant is diagnosed with an atypical vascular ring anomaly causing severe tracheoesophageal compression. The condition is determined to stem from the aberrant persistence of a dorsal vascular segment that normally undergoes programmed regression. The diagram below shows the classic embryonic aortic arch system layout. Identify the fate or consequence of the segment labeled **Region Delta** if it fails to regress on the right side of the developing embryo:



(A) Formation of an anomalous double aortic ring wrapping the trachea

(B) Normal development of the definitive left-sided aortic arch

(C) Isolation of the left subclavian artery from the aortic arch

(D) Obliteration of the main pulmonary artery lumen

Q16. An experimental pathologist utilizes high-resolution transmission electron microscopy (TEM) to analyze biopsy samples taken from the human filtration barrier within the renal corpuscle. The investigator focuses specifically on the physical properties of the glomerular basement membrane (GBM). Which structural component, synthesized natively by both the podocytes and the fenestrated endothelial cells, provides the highly dense, negatively charged electrostatic barrier that limits the filtration of plasma proteins such as albumin?

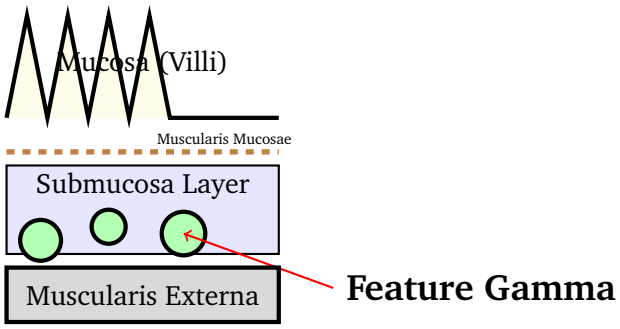
(A) Type I collagen fibrils cross-linked with chondroitin sulfate

(B) Type IV collagen meshwork paired with heparan sulfate proteoglycans (perlecan)

(C) Elastic fibers interwoven with fibrillin-1 microfibrils

(D) Desmin intermediate filaments linked to integrin receptors

Q17. A pathology resident is studying the microanatomy of the human gastrointestinal tract. Under high power magnification, a specific structural layer within the wall of the duodenum is mapped out as shown in the schematic illustration below. Identify the specialized histological structures labeled **Feature Gamma** that sit uniquely deep to the muscularis mucosae layer within this specific organ segment:



(A) Crypts of Lieberkühn confined exclusively to the mucosal lamina propria

(B) Peyer's patches located inside the ileal sub-basement compartment

(C) Brunner's glands (branched tubuloalveolar mucous glands) located within the submucosa

(D) Meissner's submucosal neural plexus aggregates devoid of glandular epithelial elements

Detailed Solutions

Q1.

Solution

Concept: The nerve that pierces the belly of the psoas major muscle and descends obliquely across its anterior surface is the **genitofemoral nerve** ($C1, C2$). It divides near the inguinal ligament into two distinct branches: the **genital branch** and the **femoral branch**.

Solution:

Let's analyze the deficits resulting from a lesion to the main trunk of the genitofemoral nerve:

(a) **Genital Branch Deficit:** The genital branch passes through the deep inguinal ring to enter the inguinal canal. In males, it supplies motor innervation to the cremaster muscle and sensory innervation to the anterior scrotum and adjacent skin. Injury results in a complete **loss of the ipsilateral cremasteric reflex** and cutaneous anesthesia of the anterior scrotum.

(b) **Femoral Branch Deficit:** The femoral branch passes beneath the inguinal ligament within the lateral compartment of the femoral sheath to supply cutaneous sensation over the skin of the **femoral triangle** (the anterior upper third of the thigh).

(c) Therefore, an inadvertent injury to the main nerve trunk on the anterior surface of the psoas major muscle abolishes both paths simultaneously, leading to a loss of the cremasteric reflex along with cutaneous anesthesia covering the anterior scrotum and proximal medial thigh.

Final Answer: Loss of the cremasteric reflex along with cutaneous anesthesia over both the anterior scrotum/labium majus and the proximal medial thigh

Answer: (D)

Go Back to Question 1

Q2.

Solution

Concept: The abdominal aorta exits the posterior mediastinum and enters the retroperitoneal space of the abdomen by passing behind the **median arcuate ligament** of the diaphragm at the level of the T12 vertebra. The space situated immediately posterior to the diaphragm crust lines is known as the **retrocrural window**, which contains the initialization of the abdominal aorta before it branches into the celiac trunk.

Solution:

Let's determine the surgical exposures required to access this specific segment:

(a) The saccular aneurysm is located on the posterior aspect of the aorta between the celiac trunk ($T12$) and the superior mesenteric artery ($L1$).

(b) To obtain proximal vascular control and safely place a vascular clamp superior to the celiac trunk, the surgeon must gain access to the supra-celiac/retrocrural region of the aorta.

(c) This requires the mobilization or division of the **median arcuate ligament** of the diaphragm, which arches directly over the aorta at this exact location, along with the dissection of the dense network of the **celiac plexus** fibers surrounding the root of the celiac trunk.

Final Answer: The median arcuate ligament of the diaphragm and the dense celiac plexus network

Answer: (B)

Go Back to Question 2

Q3.

Solution

Concept: A posterior dislocation of the knee joint can cause major traction or mechanical deformation of the sciatic nerve or its terminal branches. The clinical findings—inability to actively dorsiflex the foot (foot drop) or evert the ankle, alongside sensory loss across the dorsum of the foot—indicate a selective injury to the **common fibular (peroneal) nerve**.

Solution:

Let's analyze why the common fibular nerve is uniquely vulnerable to this displacement:

(a) As the common fibular nerve leaves the popliteal fossa, it winds laterally around the posterior aspect of the **fibular neck**.

(b) At this site, the nerve passes deep to the origin of the **peroneus longus muscle**, entering a rigid, unyielding **fibro-osseous tunnel** bound by the bone and the deep fascial insertions of the muscle.

(c) Because the nerve is firmly anchored and tethered within this osseous constraint, it has no structural compliance to accommodate the mechanical strain or displacement caused by an unstable knee dislocation, resulting in severe traction or compression injury.

Final Answer: Direct anchoring around the fibular neck within the fibro-osseous tunnel of the peroneus longus muscle

Answer: (C)

Go Back to Question 3

Q4.

Solution

Concept: The schematic represents an axial section of the posterior mediastinum at the level of the mid-thorax ($T5$). Within this fascial interval, known as the inter-azygos-aortic recess, lies the **thoracic duct** as it transitions from the right side toward the left side of the vertebral column.

Solution:

Let's trace the spatial boundaries of the highlighted compartment:

(a) **Anterior boundary:** The compartment is bounded anteriorly by the posterior muscular wall of the **esophagus (Eso)**.

(b) **Posterior boundary:** It is bounded posteriorly by the anterior surface of the **T5 vertebral body**.

(c) **Lateral boundaries:** It is bounded on the left lateral side by the **descending thoracic aorta (Ao)** and on the right lateral side by the **azygos vein (Az)**.

(d) **Contents:** This space, labeled **Compartment X**, accommodates the **thoracic duct**. During a surgical repair for a Stanford Type B aortic dissection, mobilization around the medial border of the aorta can inadvertently lacerate or compromise this conduit, leading to chylothorax.

Final Answer: It contains the thoracic duct, bordered laterally by the descending thoracic aorta on the left and the azygos vein on the right

Answer: (B)

Go Back to Question 4

Q5.

Solution

Concept: The clinical presentation describes **Benedikt syndrome** (paramedian midbrain syndrome). It is characterized by an ipsilateral oculomotor nerve palsy combined with hyperkinetic movement disorders (hemiballismus, chorea, and intention tremor) on the contralateral side of the body due to localized disruption of motor coordination pathways running through the midbrain tegmentum.

Solution:

Let's pinpoint the structural boundaries involved in producing these deficits:

(a) **Oculomotor Deficits:** The complete third nerve palsy is caused by damage to the efferent **fascicles of the oculomotor nerve ($CN\ III$)** as they course anteriorly through the midbrain tegmentum.

(b) **Hyperkinetic Movements:** The dramatic contralateral involuntary choreoathetotic and hemiballistic movements are caused by the destruction of the **red nucleus** and the adjacent **dentatorubral tract fibers** (cerebellothalamic projections) that pass directly through this paramedian zone.

(c) In some variants, extension into the subthalamic nucleus projections accounts for the ballism. Thus, the simultaneous involvement of the exiting oculomotor nerve fibers and the subthalamic nucleus / dentatorubral fibers within the tegmentum explains this cluster of signs.

Final Answer: Emergence of the oculomotor nerve fibers and the subthalamic nucleus / dentatorubral fibers

Answer: (C)

Go Back to Question 5

Q6.

Solution

Concept: The deep venous drainage of the cerebral hemispheres converges toward the tentorial notch to form the **Great Cerebral Vein of Galen**. This short, thick vascular channel curves around the splenium of the corpus callosum and empties directly into the anterior apex of the straight sinus.

Solution:

Let's identify the direct venous tributaries that meet to form this trunk:

(a) The deep structural drainage is carried initially by the paired **internal cerebral veins**, which run posteriorly within the tela choroidea of the third ventricle.

(b) At the level of the pineal gland region, the two internal cerebral veins emerge and are joined by the paired **basal veins of Rosenthal** (which ascend from the base of the brain around the midbrain).

(c) The union of the **right and left internal cerebral veins** along with the **basal veins** directly establishes the Great Cerebral Vein of Galen. These vessels are highly vulnerable to surgical traction during an occipital transtentorial approach to the pineal region.

Final Answer: Right and left internal cerebral veins paired with the basal veins (of Rosenthal)

Answer: (B)

Go Back to Question 6

Q7.

Solution

Concept: The fundus of the internal acoustic meatus (IAM) is divided into four structural quadrants by a horizontal bony ridge (the transverse crest) and a vertical bony ridge (Bill's bar). Each quadrant transmits a specific nerve component toward the inner ear or face.

Solution:

Let's map out the contents of the four quadrants of the meatal fundus using the classic clinical mnemonic ("7-Up, Coke-Down"):

(a) **Anterosuperior quadrant:** Transmits the **facial nerve ($CN\ VII$)**. (7-Up: Cranial nerve 7 is in the upper anterior position).

(b) **Anteroinferior quadrant:** Transmits the **cochlear nerve**. (Coke-Down: Cochlear nerve is in the lower anterior position).

(c) **Posterosuperior quadrant:** Transmits the **superior vestibular nerve**.

(d) **Posteroinferior quadrant:** Transmits the **inferior vestibular nerve**.

(e) Therefore, applying a micro-stimulation probe to the **anterosuperior quadrant** directly targets the facial nerve trunk, testing the **efferent motor activation of the facial muscles**.

Final Answer: Efferent motor activation of the facial muscles via the facial nerve

Answer: (A)

Go Back to Question 7

Q8.

Solution

Concept: The clinical constellation of symptoms—intractable hiccups, loss of pain and temperature over the ipsilateral face and contralateral limbs, dysarthria, dysphagia, and ipsilateral Horner syndrome—defines **Wallenberg syndrome** (Lateral Medullary Syndrome).

Solution:

Let's map the clinical signs to the anatomy of **Zone Alpha**:

(a) **Zone Alpha** is located in the dorsolateral aspect of the rostral medulla oblongata, lateral to the inferior olivary nucleus (ION).

(b) Infarction of this specific territory injures the **nucleus ambiguus** (causing dysphagia and dysarthria), the **spinal trigeminal nucleus** (causing ipsilateral facial analgesia), the **spinothalamic tract** (causing contralateral body analgesia), and the descending **sympathetic fibers** (causing Horner syndrome).

(c) This lateral medullary zone is vascularized by the **posterior inferior cerebellar artery (PICA)**, which is a major branch of the vertebral artery. Occlusion of PICA produces this exact ischemic pattern.

Final Answer: Lateral medullary territory supplied by the posterior inferior cerebellar artery (PICA)

Answer: (B)

Go Back to Question 8

Q9.

Solution

Concept: Lesser's triangle (also called the digastric triangle's sub-space) is a structural landmark used in neck surgery to isolate and ligate the **lingual artery** before it enters the deep musculature of the tongue.

Solution:

Let's delineate the boundaries that form this precise space:

(a) **Inferior boundary (Base):** Formed by the convergence of the **anterior and posterior bellies of the digastric muscle** (specifically their intermediate tendon).

(b) **Superior boundary (Roof):** Formed by the horizontal trunk of the **hypoglossal nerve ($CN\ XII$)**.

(c) **Floor:** The floor of this triangle is formed by the **hyoglossus muscle**.

(d) By isolating the intermediate tendon inferiorly and the hypoglossal nerve superiorly, the surgeon can safely incise the fibers of the hyoglossus muscle to locate the lingual artery running deep to it.

Final Answer: Intermediate tendon of the digastric muscle inferiorly (two bellies forming the base) and the hypoglossal nerve superiorly

Answer: (D)

Go Back to Question 9

Q10.

Solution

Concept: The cutaneous innervation of the neck and the lower face is partially supplied by the cutaneous branches of the **superficial cervical plexus**. These branches emerge from behind the posterior border of the sternocleidomastoid muscle at Erb's point.

Solution:

Let's identify the specific nerve injured based on the sensory territory lost:

(a) The skin covering the **angle of the mandible** and the lower portion of the **parotid gland sheath** is uniquely supplied by the **great auricular nerve**.

(b) This nerve ascends vertically across the superficial surface of the sternocleidomastoid muscle toward the base of the ear.

(c) The great auricular nerve derives its spinal components from the ventral rami of the **C2 and C3** spinal segments. A laceration cutting this nerve trunk results in isolated anesthesia localized to the mandibular angle.

Final Answer: Great auricular nerve; C2 and C3

Answer: (B)

Go Back to Question 10

Q11.

Solution

Concept: The nerve structure that loops circumferentially around the middle meningeal artery within the upper infratemporal fossa is the **auriculotemporal nerve**, a major branch of the mandibular division of the trigeminal nerve (V_3).

Solution:

Let's analyze the functional contributions carried by the auriculotemporal nerve:

(a) The auriculotemporal nerve carries **somatosensory fibers** to the skin of the auricle, the external acoustic meatus, the tympanic membrane, and the **tragus**.

(b) Crucially, it also serves as the vehicle for **postganglionic parasympathetic secretomotor fibers** originating from the **otic ganglion** (originally derived from the glossopharyngeal nerve, $CN\ IX$). These fibers travel with the auriculotemporal nerve to stimulate secretion by the **parotid salivary gland**.

(c) Therefore, a lesion to this nerve loop eliminates both parasympathetic secretomotor drive to the parotid gland and somatic sensation over the tragus.

Final Answer: Loss of secretomotor parasympathetic function to the parotid gland and sensory loss over the tragus

Answer: (C)

Go Back to Question 11

Q12.

Solution

Concept: The pterygopalatine fossa communicates with surrounding cranial, nasal, and oral cavities via multiple channels. The vertical pathway directed straight down from the floor of the fossa into the roof of the oral cavity is the **greater palatine canal** (pterygopalatine canal).

Solution:

Let's trace the contents and course of this pathway:

(a) **Pathway Y** leaves the inferior aspect of the pterygopalatine fossa trunk.

(b) This channel represents the **greater palatine canal**, which descends through the palatine bone.

(c) It transmits the **greater palatine nerve** and the **descending palatine artery** down to the hard palate of the oral cavity.

(d) Invasive tumors like juvenile nasopharyngeal angiofibromas routinely use this canal to spread vertically between the nasal/pterygoid infrastructure and the roof of the mouth.

Final Answer: Greater palatine canal

Answer: (C)

Go Back to Question 12

Q13.

Solution

Concept: The formation of the aorticopulmonary septum, which divides the truncus arteriosus and bulbus cordis into the ascending aorta and pulmonary trunk, depends entirely on the migration and differentiation of a specific population of embryonic cells.

Solution:

Let's evaluate the embryological cell type responsible for this septation:

(a) During early craniofacial and cardiac development, **cranial neural crest cells** detach from the dorsal neural tube and migrate through pharyngeal arches 4 and 6 to reach the cardiac outflow tract.

(b) Once inside the truncus arteriosus, these neural crest cells proliferate and drive the formation of the **endocardial cushions** that fuse to establish the spiral aorticopulmonary septum.

(c) A total failure in the migration or signaling of these **cranial neural crest cells** prevents septation entirely, resulting in **Persistent Truncus Arteriosus**, where a single large vessel straddles both ventricles.

Final Answer: Cranial neural crest cells

Answer: (B)

Go Back to Question 13

Q14.

Solution

Concept: A congenital draining pit or fistula located along the anterior border of the sternocleidomastoid muscle is a classic sign of a **branchial cleft sinus** or **branchial fistula**.

Solution:

Let's isolate the specific embryonic structure that failed to regress:

(a) During the development of the neck, the rapid expansion of the second pharyngeal arch grows downward to cover the third and fourth arches, creating a temporary ectodermal cavity called the **cervical sinus of His**.

(b) Under normal conditions, this cervical sinus—derived from the **second pharyngeal cleft**—undergoes complete obliteration.

(c) If the second pharyngeal cleft/cervical sinus fails to close completely, it leaves a persistent tract lined with epithelium. This opens onto the skin along the anterior border of the sternocleidomastoid muscle, forming a branchial sinus that intermittently drains fluid.

Final Answer: Second pharyngeal cleft (cervical sinus of His)

Answer: (B)

Go Back to Question 14

Q15.

Solution

Concept: The embryonic aortic arch system undergoes a highly coordinated remodeling process where specific segments regress via programmed cell death, while others persist to form the definitive great vessels.

Solution:

Let's analyze the fate of the segment labeled **Region Delta**:

(a) **Region Delta** represents the caudal segment of the **right dorsal aorta**.

(b) In normal embryogenesis, this specific right dorsal segment undergoes complete involution and regression, which allows the definitive aortic arch to develop as a left-sided structure.

(c) If this right dorsal segment **fails to regress** and abnormally persists alongside the left dorsal aorta, both the right and left components remain patent.

(d) This leads to the formation of a vascular ring anomaly known as a **double aortic arch**, which forms a tight vascular collar around the trachea and esophagus, causing severe respiratory stridor and dysphagia in infancy.

Final Answer: Formation of an anomalous double aortic ring wrapping the trachea

Answer: (A)

Go Back to Question 15

Q16.

Solution

Concept: The glomerular basement membrane (*GBM*) serves as both a physical size barrier and an electrical charge barrier within the renal corpuscle to restrict the filtration of macromolecules.

Solution:

Let's analyze the biochemical components that establish this charge barrier:

(a) The structural framework of the GBM is composed of a self-assembling meshwork of **Type IV collagen alpha-chains**, which provides mechanical stability and size selectivity.

(b) Attached to this collagen framework are abundant, highly customized glycosaminoglycan chains, principally **heparan sulfate proteoglycans** (such as perlecan and agrin).

(c) These heparan sulfate complexes carry dense clusters of polyanions, giving the entire basement membrane a strong **negative electrostatic charge**. This charge repels negatively charged plasma proteins, such as albumin, preventing them from crossing into Bowman's space.

Final Answer: Type IV collagen meshwork paired with heparan sulfate proteoglycans (perlecan)

Answer: (B)

Go Back to Question 16

Q17.

Solution

Concept: The histological layers of the small intestine are modified to serve digestion and protection. The defining microanatomical feature of the **duodenum** is the presence of specialized mucous glands located deep to the muscularis mucosae.

Solution:

Let's analyze the structures labeled **Feature Gamma** in the schematic:

(a) Look at the position: The structures sit in the **Submucosa Layer**, immediately deep to the dashed line representing the muscularis mucosae.

(b) Identify the structure: Submucosal glands in the small intestine are unique to the duodenum and are known as **Brunner's glands** (branched tubuloalveolar mucous glands).

(c) These glands secrete an alkaline, bicarbonate-rich fluid that neutralizes acidic gastric chyme delivered from the pylorus, protecting the intestinal mucosa and optimizing the local pH for pancreatic enzymatic activity.

Final Answer: Brunner's glands (branched tubuloalveolar mucous glands) located within the submucosa

Answer: (C)

Go Back to Question 17

Answer Key

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