NEET MDS Dental Anatomy and Oral Histology

Sample Paper – 9

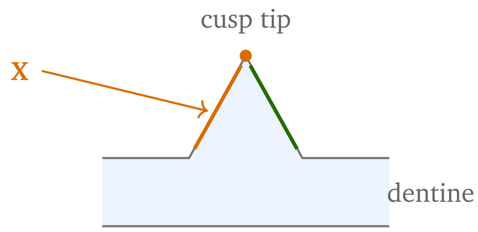
Duration: 11 Minutes **Maximum Marks: 56**

Instructions

- This paper contains **14** Multiple Choice Questions (Single Best Response), modelled on the Dental Anatomy, Embryology and Oral Histology content of **NEET MDS** conducted by NBEMS.
- The **14-question** length matches the number of Dental Anatomy and Oral Histology items you actually meet in the real 240-question paper.
- Each correct answer carries **+4 marks**. There is **negative marking of 1 mark** for every incorrect answer; unattempted questions carry no penalty.
- Every question has **exactly one best answer**. Choose the single most appropriate option.
- Attempt this practice paper in one timed sitting of about **11 minutes**, the pace the real computer-based test demands.

Permanent Tooth Morphology

Q1. The buccolingual section below cuts through a single posterior cusp. The sloping surface marked **X**, lying between the cusp ridge and the developmental groove, is the surface that actually contacts and guides the opposing cusp during closure. Surface **X** is:



(A) A marginal ridge

(B) A supplemental groove

(C) An inclined plane of the cusp ridge

(D) A developmental depression

Q2. The two occlusal outlines below are of the permanent mandibular second premolar. Form **X** carries a single lingual cusp and Form **Y** carries two lingual cusps. The groove patterns produced by these two forms are, respectively:

(A) X gives an H pattern and Y gives a U pattern

(B) X gives a U pattern and Y gives a Y pattern

(C) X gives a plus pattern and Y gives a Y pattern

(D) X gives a Y pattern and Y gives an H or U pattern

Q3. On a permanent maxillary canine viewed from the labial aspect, the cusp tip lies slightly *mesial* to the centre of the tooth. It follows that:

(A) The mesial cusp slope is shorter than the distal cusp slope

(B) The mesial cusp slope is longer than the distal cusp slope

(C) The two cusp slopes are of equal length

(D) The distal cusp slope is absent

Q4. The curvature of the cervical line on the proximal surfaces of a tooth is greatest on the maxillary central incisor and becomes progressively smaller as one moves posteriorly, until it is almost flat on the molars. The best explanation for this gradient is that:

(A) The cervical line curves more posteriorly because molar roots are longer

(B) The curvature follows the incisal or occlusal outline, which is a narrow incisal edge anteriorly and a broad flat occlusal table posteriorly

(C) The curvature depends on the thickness of cementum at the cervical margin

(D) The curvature is greatest wherever the contact area is most cervically placed

Deciduous Dentition and Eruption

Q5. A 9-year-old is brought by a worried parent because the newly erupted maxillary permanent central incisors are flared distally with a midline diastema. You recognise the "ugly duckling" stage. The correct advice is that:

(A) It is a normal transient stage that self-corrects when the permanent canines erupt and their crowns push the incisor roots mesially

(B) It is pathological and needs immediate fixed appliance therapy

(C) It is caused by a supernumerary tooth and requires surgical exposure

(D) It persists unchanged into adult life and always requires closure of the diastema

Q6. Caries in a deciduous molar reaches the pulp far more rapidly than a comparable lesion in a permanent molar. The single anatomical reason most responsible is that:

(A) Deciduous enamel is more heavily mineralised and therefore more brittle

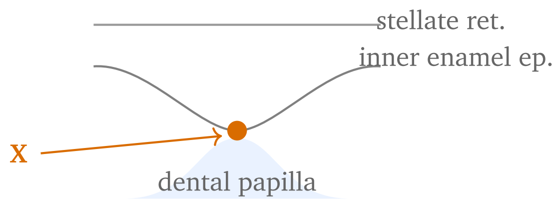
(B) Deciduous dentine contains no dentinal tubules

(C) The enamel and dentine of a deciduous tooth are thinner, so the distance from the surface to the pulp is shorter

(D) The deciduous pulp has no capacity to lay down any reparative dentine

Enamel

Q7. During the cap stage of tooth development, a cluster of non-dividing cells marked **X** appears in the inner enamel epithelium. It secretes signalling molecules, does not itself proliferate, and then undergoes apoptosis. Its presence determines where a cusp will form. Structure **X** is:



(A) The enamel knot

(B) The enamel niche

(C) The enamel cord remnant of the dental lamina

(D) Hertwig's epithelial root sheath

Q8. In a transverse ground section of enamel, the rod core, the rod sheath and the interrod substance can be distinguished. The correct statement about crystal orientation is:

(A) The rod sheath is more mineralised than the rod core and its crystals run at right angles to it

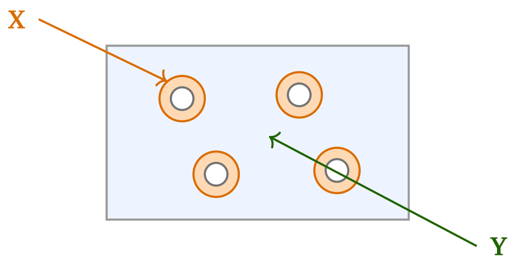
(B) Crystals in the rod core, the rod sheath and the interrod substance all run in exactly the same direction

(C) The interrod substance contains no crystals at all, being purely organic

(D) Crystals of the rod core run parallel to the rod's long axis, those of the interrod substance are inclined to them, and the rod sheath is the organic-rich boundary where the two orientations meet

Dentine and Pulp

Q9. The transverse section of dentine below shows a dentinal tubule. The collar marked **X** forms the immediate wall of the tubule, while the bulk tissue marked **Y** lies between the tubules. Regarding **X**:



(A) X is intertubular dentine and is less mineralised than Y

(B) X is intratubular (peritubular) dentine and is more mineralised than Y

(C) X is intratubular dentine and is less mineralised than Y

(D) X and Y are equally mineralised and differ only in collagen content

Q10. The odontoblast secretes the principal organic matrix of dentine, into which mineral is later deposited. That matrix protein is:

(A) Amelogenin

(B) Elastin

(C) Collagen type IV

(D) Collagen type I

Cementum and Periodontal Ligament

Q11. The elastic-like fibres that are peculiar to the periodontal ligament, run mostly parallel to the long axis of the root rather than across the ligament, and are demonstrated only after oxidation of the section, are the:

(A) Elaunin fibres

(B) Oxytalan fibres

(C) Reticulin fibres

(D) Mature elastic fibres

Q12. Cementum and alveolar bone are both mineralised connective tissues, yet only bone is resorbed and rebuilt during orthodontic tooth movement. The property of cementum that best explains this is that cementum:

(A) Is avascular, is not innervated and does not undergo continuous physiologic remodelling, being added to in appositional layers instead

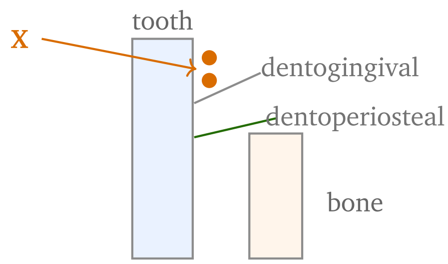
(B) Is richly vascular and innervated but is protected by the periodontal ligament

(C) Contains no mineral and so cannot be resorbed by osteoclasts

(D) Is remodelled even faster than bone, which is why light forces are used

Oral Mucosa, Salivary Glands and TMJ Histology

Q13. The diagram shows the gingival fibre groups at the neck of a tooth. The group marked **X** runs its whole course within the free gingiva without attaching to cementum or bone, encircling the tooth in a ring. Its function is to:



(A) Attach the gingiva firmly to the cementum below the junctional epithelium

(B) Bind the gingiva to the periosteum of the alveolar crest

(C) Hold the free gingiva closely against the tooth and support the other gingival fibre groups

(D) Join one tooth to the next across the interdental septum

Q14. The contractile cells that lie between the acinar cells and the basement membrane of a salivary gland, sending out branching processes that embrace the acinus, are the:

(A) Serous demilune cells

(B) Myoepithelial (basket) cells

(C) Intercalated duct cells

(D) Plasma cells of the acinar stroma

Detailed Solutions

Q1.

Solution

Concept – a cusp is built from ridges, and the ridges have working faces: The cusp tip is a point, so it cannot by itself guide anything. The guidance is done by the sloping faces on either side of each ridge.

Step 1 – define the cusp ridge: A **cusp ridge** is an elevation of enamel that runs from the cusp tip in a definite direction, either mesially, distally, or towards the centre of the occlusal table.

Step 2 – look at the sides of that ridge: Every cusp ridge has two sloping surfaces falling away from its crest. Each of those sloping surfaces is an **inclined plane**.

Step 3 – match the description in the stem: The stem describes a sloping surface lying between the cusp ridge and the developmental groove, and it is the surface that contacts the opposing tooth. That is exactly an inclined plane of the cusp ridge.

Step 4 – state how the guidance works: In closure, an inclined plane of a mandibular cusp meets an inclined plane of a maxillary cusp. Because both faces are sloped, the contact is not a dead stop: the mandibular cusp **slides along** the maxillary inclined plane until the teeth seat in centric.

Step 5 – give the clinical consequence: Any restoration that leaves an inclined plane too steep or badly angled deflects the mandible on closing and produces a premature contact. Occlusal adjustment is largely the reshaping of inclined planes.

Why the other options are wrong:

- A, a marginal ridge: is a rounded ridge of enamel forming the **mesial and distal margins** of the occlusal table. It is a boundary structure, not a sloping guiding face on a cusp.
- B, a supplemental groove: is a shallow, irregular groove that does not mark the junction of developmental lobes. A groove is a depression, and the stem describes a raised sloping surface.
- D, a developmental depression: is a concavity such as the one on the mesial surface of the maxillary first premolar. It is a depression, not a slope on a cusp ridge.

Final Answer: An inclined plane of the cusp ridge $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q1

Q2.

Solution

Concept – the mandibular second premolar has two accepted crown forms: It is the only tooth that is routinely described as having either two cusps or three cusps as a normal variant, and each form has its own groove pattern.

Step 1 – take the two-cusp form (X in the figure): It has one buccal cusp and **one** lingual cusp.

Step 2 – work out its groove pattern: With a single lingual cusp there is a central pit from which three grooves radiate: a mesial groove, a distal groove, and a lingual groove. Three grooves meeting at one pit produce the **Y pattern**.

Step 3 – take the three-cusp form (Y in the figure): It has one buccal cusp and **two** lingual cusps, a mesiolingual and a distolingual, of which the mesiolingual is the larger.

Step 4 – work out its groove pattern: Here a central groove runs mesiodistally and a lingual groove runs from it between the two lingual cusps. That layout is described as the **H pattern** or, when the central groove is more curved, the **U pattern**.

Step 5 – assemble the answer: Two-cusp form gives Y; three-cusp form gives H or U. That is option D.

Step 6 – note the frequency: The three-cusp form is the more common of the two, and it is the reason this tooth resembles a small molar more than its mandibular first premolar neighbour does.

Why the other options are wrong:

- A: reverses the two forms completely, giving H to the two-cusp form and U to the three-cusp form.
- B: wrongly assigns U to the two-cusp form. U belongs with the three-cusp form.
- C: the **plus** pattern is the groove pattern of a four-cusp mandibular **second molar**, not of any premolar form.

Final Answer: X gives a Y pattern and Y gives an H or U pattern $\Rightarrow \boxed{D}$

Answer: (D) Go Back to Q2

Q3.

Solution

Concept – an off-centre cusp tip must give unequal cusp slopes: This is pure geometry. The tip divides the incisal outline into two slopes, so wherever the tip sits, the shorter slope is on the side the tip has moved towards.

Step 1 – fix the position of the tip: On the permanent maxillary canine the cusp tip lies **slightly mesial** to the centre of the tooth, when viewed from the labial.

Step 2 – apply the geometry: Because the tip has shifted towards the mesial, there is less horizontal distance left between the tip and the mesial angle, and more distance between the tip and the distal angle.

Step 3 – convert distance into slope length: The **mesial cusp slope is therefore shorter** and the distal cusp slope is longer. On the maxillary canine the distal slope is roughly one and a half times the mesial.

Step 4 – note the angle at which they meet: The two slopes meet at the tip at an angle of about 100 to 110 degrees, and the distal slope is also the more concave of the two.

Step 5 – give the practical use: This asymmetry is the standard way of siding an extracted canine, and it must be reproduced when the cusp tip is restored or when a worn canine is rebuilt for canine guidance.

Why the other options are wrong:

- B, mesial slope longer: is the reverse of the truth for a maxillary canine, and it is the commonest error in this question. A mesially placed tip makes the mesial slope the **shorter** one.
- C, equal slopes: would require the cusp tip to lie exactly at the centre, which is not the case in either canine.
- D, distal slope absent: is anatomically meaningless. A cusp tip on a canine always has two slopes running from it.

Final Answer: The mesial cusp slope is shorter than the distal $\Rightarrow \boxed{A}$

$\boxed{\text{Answer: (A)}}$ Go Back to Q3

Q4.

Solution

Concept – the cervical line curvature mirrors the incisal or occlusal outline: The cementoenamel junction on a proximal surface is not a straight line. It curves towards the incisal or occlusal, and the size of that curve is set by the shape of the biting surface above it.

Step 1 – start at the front of the mouth: The maxillary central incisor has a **narrow incisal edge**. The crown is a wedge, tapering from a wide labial face to a thin edge.

Step 2 – see what that does to the cervical line: To keep a constant band of enamel between the cervical line and that narrow edge, the cervical line must sweep sharply incisally on the proximal surface. The maxillary central incisor therefore has the **greatest** curvature of any tooth, about 3.5 mm on the mesial.

Step 3 – move backwards along the arch: The canine has a slightly smaller curvature, the premolars smaller again, and the molars smaller still, until on a maxillary second molar the proximal cervical line is very nearly **flat**, about 0 to 1 mm.

Step 4 – explain the gradient: The reason is that the biting surface has changed shape. A molar does not end in a thin edge; it ends in a **broad, flat occlusal table**. There is no wedge for the cervical line to follow, so it stays almost level.

Step 5 – state the rule that follows: Curvature of the cervical line **diminishes steadily from the incisors back to the molars**, because it tracks the incisal or occlusal outline. Option B states exactly this.

Step 6 – note the clinical use: This is why the gingival margin of a proximal restoration or a crown preparation must be scalloped steeply on an anterior tooth but is nearly straight on a molar.

Why the other options are wrong:

- A, longer molar roots: is false as a fact and irrelevant as a reason. Molar roots are not longer than a maxillary canine root, and the cervical line is a crown-root junction feature that does not depend on root length.
- C, cementum thickness: is wrong. Cementum is thinnest cervically on every tooth, anterior and posterior alike, so it cannot produce a front-to-back gradient.
- D, contact area position: is a confusion of two separate rules. Contact areas do move cervically from anterior to posterior teeth, but the cervical line curvature is governed by the incisal or occlusal outline, not by where the contact sits.

Final Answer: It follows the incisal or occlusal outline ⇒ $\boxed{\text{B}}$

Answer: (B) Go Back to Q4

Q5.

Solution

Concept – the ugly duckling stage is a stage, not a disease: Broadbent described this appearance in the early mixed dentition, and its whole importance is that recognising it prevents needless treatment.

Step 1 – describe what is seen: Around 8 to 9 years the erupted maxillary permanent central and lateral incisors are **flared distally** and a **midline diastema** of a few millimetres is present. The child looks awkward, hence the name.

Step 2 – find the cause: The permanent canines are still unerupted, sitting high in the bone. Their crowns press on the **roots** of the lateral incisors.

Step 3 – follow the lever: Pressure on the incisor roots pushes those roots distally. Because the tooth pivots, the **crowns** swing the opposite way and tip distally, opening the midline space.

Step 4 – follow what happens next: As the canines continue to erupt, their crowns slide down the incisor roots and come to lie against the **crown** contact instead. The pressure on the roots is released.

Step 5 – see the correction: Once that pressure goes, the incisor roots move distally back into line and the crowns swing mesially, so the flare and the diastema **close on their own**. This is complete once the canines are fully erupted, at about 11 to 12 years.

Step 6 – state the clinical rule: The correct management is reassurance and observation. Closing the diastema before the canines erupt traps the canines and can cause root resorption.

Why the other options are wrong:

- B, immediate fixed appliance therapy: is over-treatment of a normal stage, and by removing the space it can obstruct the erupting canine.
- C, a supernumerary tooth: is a genuine cause of a midline diastema, that is the mesiodens, but it produces a persistent diastema with a radiographic tooth, not the transient bilateral distal flare described here.
- D, persists into adult life: is exactly what does not happen. Being self-limiting is the defining feature of this stage.

Final Answer: A normal transient stage that self-corrects on canine eruption ⇒

$\boxed{A}$

$\boxed{\text{Answer: (A)}}$ Go Back to Q5

Q6.

Solution

Concept – caries has to travel a distance, and in a deciduous tooth that distance is short: Rate of pulpal involvement is governed by how much hard tissue lies between the lesion and the pulp.

Step 1 – measure deciduous enamel: Deciduous enamel is roughly **0.5 to 1 mm** thick, and it is of fairly even thickness over the crown. Permanent enamel reaches 2 to 2.5 mm at a cusp.

Step 2 – measure deciduous dentine: The dentine layer is likewise **thinner**, and it is at its thinnest over the pulp horns.

Step 3 – add the pulp chamber: The deciduous pulp chamber is proportionally **larger** and its horns are high, so the pulp itself comes closer to the surface.

Step 4 – combine the three: Thin enamel plus thin dentine plus a high pulp horn means the total surface-to-pulp distance is far shorter than in a permanent molar. The same rate of demineralisation therefore reaches the pulp much sooner.

Step 5 – state the clinical consequence: A deciduous molar lesion that looks small can already be close to exposure, and pulpal involvement in a child is measured in months rather than years. This is why cavity preparation depth must be conservative and why radiographs are needed early.

Why the other options are wrong:

- A, more heavily mineralised enamel: is false. Deciduous enamel is **less** mineralised than permanent enamel, which speeds caries further but by a different mechanism, and the option's stated reason, brittleness, is not the mechanism of caries progression.
- B, no dentinal tubules: is plainly false. Deciduous dentine has dentinal tubules, and they are relatively wide and numerous.
- D, no reparative dentine at all: is an overstatement. The deciduous pulp does form reparative dentine, only less efficiently and with less time available. Saying it has no capacity is wrong.

Final Answer: Thinner enamel and dentine shorten the distance to the pulp $\Rightarrow$ $\boxed{C}$

$\boxed{\text{Answer: (C)}}$ Go Back to Q6

Q7.

Solution

Concept – cusps do not appear at random, a signalling centre puts them where they are: The tooth germ needs a local instruction telling the epithelium where to stop growing and let a cusp rise. That instruction comes from the enamel knot.

Step 1 – place it in time: The **primary enamel knot** appears at the **cap stage**, as a localised thickening of the inner enamel epithelium at the centre of the germ.

Step 2 – note what it does not do: Its cells **do not divide**. They express the cell cycle inhibitor p21 and remain non-proliferative while all the epithelium around them proliferates.

Step 3 – note what it does do: It secretes signalling molecules of the FGF, BMP, SHH and WNT families, which drive proliferation in the **surrounding** epithelium.

Step 4 – turn that into shape: Because the knot itself stays still while its neighbours grow down around it, the epithelium folds. The knot ends up sitting at the tip of the fold. That is how a **cusp** is positioned.

Step 5 – follow its fate: The primary enamel knot then disappears by **apoptosis**. In multicusped teeth, **secondary enamel knots** then form at the bell stage, one at the site of each additional cusp, which is why a molar gets several cusps and an incisor gets none.

Step 6 – state the significance: The enamel knot is the reason cusp number and cusp position are genetically determined features, and disturbance of this signalling underlies several cusp-number anomalies.

Why the other options are wrong:

- B, the enamel niche: is not a signalling centre at all. It is an apparent structure, a funnel-shaped depression seen in sections because the dental lamina is a sheet rather than a strand. It has no role in cusp position.
- C, the enamel cord: is a strand of cells running from the knot to the outer enamel epithelium. It is related to the knot but it is a separate structure, and the stem describes a **cluster within the inner enamel epithelium** that decides cusp position, which is the knot itself.
- D, Hertwig's epithelial root sheath: acts much later, after crown formation is complete, and it maps out the shape of the **root**, not the cusps. Its remnants are the epithelial rests of Malassez.

Final Answer: The enamel knot $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q7

Q8.

Solution

Concept – what really separates one enamel rod from the next is a change of crystal direction: Enamel is a single mass of hydroxyapatite crystals. The rod, the sheath and the interrod substance are not different materials so much as regions where the crystals point different ways.

Step 1 – take the rod core: Within the core of a rod, the hydroxyapatite crystals lie **parallel to the long axis of the rod**, running outwards from the dentinoenamel junction towards the surface.

Step 2 – take the interrod substance: The interrod substance fills the space between the rods. Its crystals are chemically identical, but they are **inclined** to the rod axis, deviating from it by roughly 40 to 60 degrees.

Step 3 – find the boundary: Where the parallel crystals of the core meet the inclined crystals of the interrod region, the crystals cannot pack together neatly. A narrow space is left, and it is filled with **organic matrix**. That narrow, organic-rich boundary is the **rod sheath**.

Step 4 – draw the conclusion about mineralisation: The rod sheath is therefore the **least** mineralised and the most organic part of this trio, not the most mineralised. It is only about 0.5 micrometres wide.

Step 5 – explain the keyhole: This is also why a rod looks like a keyhole in transverse section. The head of the keyhole is the rod core; the tail is interrod substance; and the sheath outlines the head where the two orientations meet.

Step 6 – note the clinical link: Because the sheath is organic-rich, it is the path of least resistance for acid, which is why acid etching and early caries follow the rod sheaths.

Why the other options are wrong:

- A, sheath more mineralised than the core: is the reverse of the truth. The sheath is the **organic** boundary and is the least mineralised region of the three.
- B, all crystals in the same direction: destroys the distinction altogether. If the orientations were identical there would be no rod sheath, no keyhole outline and no visible rods at all.
- C, interrod substance purely organic: is false. Interrod substance is fully mineralised and is chemically the same hydroxyapatite as the core. It differs only in **crystal orientation**.

Final Answer: Core parallel, interrod inclined, sheath the organic boundary $\Rightarrow$ $\boxed{D}$

Answer: (D) Go Back to Q8

Q9.

Solution

Concept – dentine has two compartments, and they are not equally mineralised: Name them by where they sit relative to the tubule, then compare their mineral.

Step 1 – name X: X is the collar forming the immediate wall of the tubule. Tissue lining the inside of the tubule is **intratubular dentine**, also called **peritubular dentine**.

Step 2 – settle the naming confusion: "Peritubular" is the older term and it is misleading, because the tissue does not lie *around* the tubule so much as *within* its lumen, narrowing it. "Intratubular" is the more accurate term. Both names appear in exams and mean the same tissue.

Step 3 – name Y: Y is the bulk dentine lying between the tubules, so it is **intertubular dentine**. This immediately eliminates option A, which swaps the two.

Step 4 – compare the mineral: Intratubular dentine is about **9 to 40 percent more mineralised** than intertubular dentine. It is the most highly mineralised part of dentine.

Step 5 – explain why: Intertubular dentine is a collagen type I meshwork with mineral deposited in it. Intratubular dentine has **almost no collagen**. With very little organic scaffold occupying space, the mineral fraction is correspondingly higher.

Step 6 – give the clinical consequence: Intratubular dentine is laid down slowly throughout life, so the tubules narrow with age. When the lumen is obliterated the tissue becomes **sclerotic dentine**, which reduces permeability and is why an older patient's exposed dentine is less sensitive.

Why the other options are wrong:

- A: reverses the labels. It calls the tubule wall intertubular and the bulk tissue something else, which contradicts the diagram.
- C: gets the naming right but the mineralisation backwards. Intratubular dentine is **more**, not less, mineralised than intertubular dentine.
- D, equally mineralised: is false. The two differ markedly in mineral content, and that difference is precisely because of the collagen difference the option tries to use.

Final Answer: X is intratubular dentine and is more mineralised $\Rightarrow \boxed{B}$

Answer: (B) Go Back to Q9

Q10.

Solution

Concept – every mineralised connective tissue needs a scaffold, and dentine's scaffold is collagen: Mineral cannot be deposited into empty space. It is deposited onto a pre-formed organic framework.

Step 1 – take the organic fraction of dentine: Dentine is about 20 percent organic by weight, and roughly **90 percent of that organic fraction is collagen**.

Step 2 – specify the type: The collagen of dentine is **type I**. This is the same type found in bone, cementum and skin, which is what makes dentine a mineralised connective tissue rather than an epithelial product.

Step 3 – name the cell: The **odontoblast** synthesises this collagen and secretes it, together with non-collagenous proteins, at its distal end.

Step 4 – follow the sequence: The unmineralised collagen matrix laid down first is **predentine**. Mineral is then deposited into it, converting predentine into dentine, and the odontoblast retreats pulpally as it goes.

Step 5 – note the non-collagenous helpers: The remaining organic fraction includes dentine phosphoprotein and dentine sialoprotein. These do not form the scaffold; they **control** where mineral is deposited on the collagen.

Step 6 – give the clinical link: Because the scaffold is collagen type I, the defective collagen of osteogenesis imperfecta affects dentine as well as bone, producing dentinogenesis imperfecta.

Why the other options are wrong:

- A, amelogenin: is the principal matrix protein of **enamel** and is secreted by the ameloblast. It is not a collagen at all, and enamel matrix contains no collagen.
- B, elastin: gives tissues recoil, as in artery walls and the elastic cartilage of the ear. It has no place in a hard tissue that must resist deformation.
- C, collagen type IV: is the collagen of the **basement membrane**. It forms a sheet-like network, not the fibrillar scaffold a mineralised tissue needs.

Final Answer: Collagen type I $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q10

Q11.

Solution

Concept – the periodontal ligament contains an elastic-family fibre found almost nowhere else: The elastic fibre family has three members, graded by how much elastin they contain, and the ligament carries only the most immature of them.

Step 1 – list the family: Oxytalan fibres are pure bundles of microfibrils with **no elastin**. **Elaunin** fibres have microfibrils plus a little elastin. **Mature elastic** fibres have an elastin core.

Step 2 – pick the one in the ligament: The human periodontal ligament contains **oxytalan** fibres. True elastic fibres are absent from it, being confined to the walls of its blood vessels.

Step 3 – match the staining clue: Oxytalan fibres are not shown by routine elastic stains. They stain only after the section is **oxidised**, with peracetic acid or oxone, and then stained with aldehyde fuchsin or Weigert's stain. The stem gives exactly this clue.

Step 4 – match the orientation clue: Unlike the principal collagen fibre groups, which run **across** the ligament from cementum to bone, oxytalan fibres run mostly **parallel to the long axis of the root**. They are embedded in cementum at one end and course towards the alveolar crest and the apex, and many end on the walls of blood vessels.

Step 5 – state the presumed function: That vascular attachment suggests they regulate blood flow in the ligament as the tooth is loaded. They are also more numerous in teeth carrying heavy or abnormal loads, such as abutment teeth, and they increase in number during orthodontic movement.

Why the other options are wrong:

- A, elaunin fibres: are the intermediate stage of the elastic family, with some elastin. They are found in skin and are not the ligament's characteristic fibre.
- C, reticulin fibres: are collagen **type III**, not elastic fibres. They form the delicate supporting mesh of lymphoid organs and are demonstrated by silver stains, not by oxidation.
- D, mature elastic fibres: are **not present** in the substance of the human periodontal ligament. They appear only in the walls of the afferent blood vessels within it. This is the intended trap, since the stem says elastic-**like**.

Final Answer: Oxytalan fibres $\Rightarrow \boxed{B}$

Answer: (B) Go Back to Q11

Q12.

Solution

Concept – cementum looks like bone but behaves quite differently: Comparing the two tissue by tissue explains why orthodontics works at all.

Step 1 – take vascularity: Bone is **richly vascular**, with a Haversian system carrying vessels through it. Cementum is **avascular** and is nourished entirely by diffusion from the periodontal ligament.

Step 2 – take innervation: Bone is innervated. Cementum has **no nerve supply**, which is one reason cemental resorption is silent.

Step 3 – take remodelling: This is the key difference. Bone undergoes continuous **physiologic remodelling**, resorbed by osteoclasts and rebuilt by osteoblasts throughout life. Cementum does **not** remodel in this way. It grows only by **apposition**, adding new layers on its surface, so cementum thickens with age but is not turned over.

Step 4 – apply this to orthodontic movement: Apply a force to a tooth. On the pressure side the ligament is compressed and osteoclasts resorb the **alveolar bone**, so the socket moves. On the tension side osteoblasts lay down new bone. The tooth moves because the socket is rebuilt around it.

Step 5 – see why the root usually survives: The root surface is spared largely because cementum, being avascular and non-remodelling, resists the resorptive process that bone readily undergoes. It is the bone that gives way, not the root. Option A states these three properties correctly.

Step 6 – note the limit of that protection: The protection is relative, not absolute. **Heavy or continuous forces** can crush the ligament, cut off its blood supply and produce hyalinisation. Odontoclasts then attack the root and cause root resorption. That is the reason light, intermittent forces are used.

Why the other options are wrong:

- B, richly vascular and innervated: is the description of **bone**, not cementum. Cementum has neither vessels nor nerves.
- C, contains no mineral: is false. Cementum is about 45 to 50 percent mineral by weight, and it certainly can be resorbed, as happens in deciduous exfoliation and in orthodontic root resorption.
- D, remodelled faster than bone: reverses the whole comparison. Cementum remodels the **least** of the mineralised tissues, and if it did turn over faster than bone, tooth movement would resorb the root instead of the socket.

Final Answer: Avascular, not innervated, no continuous physiologic remodelling $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q12

Q13.

Solution

Concept – the gingival fibres are a separate system from the principal fibres of the ligament: They lie in the lamina propria of the free gingiva, and they are named by where each group starts and ends.

Step 1 – take the dentogingival group: It is the largest group. Its fibres arise from the **cementum** just apical to the junctional epithelium and fan outwards into the lamina propria of the free and attached gingiva. It attaches the gingiva to the tooth.

Step 2 – take the dentoperiosteal group: Its fibres also arise from cementum near the cementoenamel junction, but they run **over the alveolar crest** and insert into the **periosteum** of the outer plate of bone. It anchors the gingiva to bone.

Step 3 – take the circular group: This group is the odd one out. Its fibres **do not attach to cementum or to bone at all**. They run their entire course **within the free gingiva**, encircling the tooth as a ring or cuff. The stem describes exactly this.

Step 4 – work out the function that follows: Because it is a ring with no bony anchor, it can only tighten. Contracting the ring **holds the free gingiva firmly against the tooth surface**, maintaining the gingival cuff and the contour of the sulcus.

Step 5 – add the second function: The circular fibres also interlace with and thereby **support the other gingival fibre groups**, binding the whole system together. Option C gives both functions.

Step 6 – note the clinical relevance: These fibres are among those cut in a circumferential supracrestal fiberotomy, a procedure used after orthodontic derotation to reduce relapse, precisely because the elastic recoil of this encircling group pulls the tooth back.

Why the other options are wrong:

- A, attach the gingiva to cementum below the junctional epithelium: is the function of the **dentogingival** group. It contradicts the stem, which states that group X attaches to neither cementum nor bone.
- B, bind the gingiva to the periosteum of the alveolar crest: is the function of the **dentoperiosteal** group, which does have a bony insertion.
- D, join one tooth to the next across the interdental septum: describes a fibre

group that runs between adjacent teeth. That is a different group entirely, and it is not confined to the free gingiva of a single tooth as group X is.

Final Answer: Hold the free gingiva against the tooth and support the other groups ⇒ $\boxed{\text{C}}$

Answer: (C) Go Back to Q13

Q14.

Solution

Concept – an acinus secretes, but something has to squeeze the secretion out: The acinar cells make saliva. They cannot expel it themselves, so a contractile cell wraps around them.

Step 1 – locate the cell: The **myoepithelial cell** lies **between the basal surface of the acinar cells and the basement membrane**, so it is inside the epithelial compartment, not in the surrounding connective tissue. This is exactly the position given in the stem.

Step 2 – describe its shape: It has a flattened cell body from which several long branching processes radiate. These processes embrace the acinus like the staves of a basket, which is why it is called a **basket cell**.

Step 3 – identify its nature: It is **epithelial** in origin but **contractile** in function, containing actin and myosin filaments. That combination is what makes it unusual.

Step 4 – give its function: On stimulation it **contracts**, squeezing the acinus and expelling the secretion into the intercalated duct. It thereby speeds the output of saliva and helps overcome the resistance of the duct system.

Step 5 – add its secondary roles: By hugging the acinus, it also supports the acinar cells and prevents them from distending under secretory back-pressure. Myoepithelial cells around the ducts are more spindle-shaped and shorten the duct rather than compressing it.

Step 6 – note the clinical relevance: Myoepithelial cells participate in salivary gland tumours. Their presence gives pleomorphic adenoma its mixed appearance, and they form the whole of a myoepithelioma.

Why the other options are wrong:

- A, serous demilune cells: are **serous secretory** cells capping a mucous acinus in a mixed gland such as the submandibular. They secrete; they do not contract, and many now regard the demilune as a fixation artefact.

- C, intercalated duct cells: form the **duct** leading away from the acinus. They are cuboidal cells lining a lumen, not contractile cells wrapped around an acinus.
- D, plasma cells: are immune cells of the connective tissue stroma. They secrete IgA for transport into saliva, they lie **outside** the basement membrane, and they have no contractile function.

Final Answer: Myoepithelial (basket) cells $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q14

Answer Key

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