# NEET MDS Dental Anatomy and Oral Histology

## Sample Paper – 8

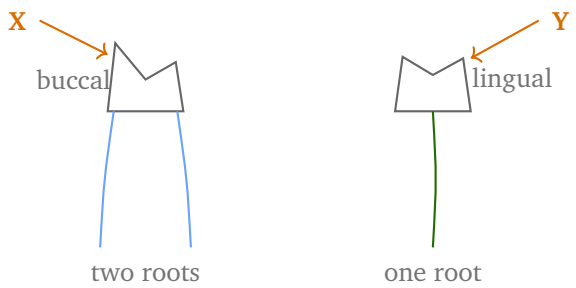
**Duration: 11 Minutes** **Maximum Marks: 56**

### 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 proximal outlines below compare the permanent maxillary first premolar (**X**) with the permanent maxillary second premolar (**Y**). Which statement correctly compares the two teeth?




(A) The second premolar is the larger tooth, it is the one that is commonly two-rooted, and its buccal cusp is much longer than its lingual

cusp

(B) Both teeth are the same size, but only the second premolar shows a marked difference in cusp height

(C) The first premolar is the larger tooth, but it is the second premolar that is commonly bifurcated into a buccal and a lingual root

(D) The first premolar is the larger tooth, it is the one commonly bifurcated into a buccal and a lingual root, and its buccal cusp is distinctly longer than its lingual cusp, whereas the cusps of the second premolar are nearly equal in height

**Q2.** Which statement about the lingual fossa and the incisal edge of a permanent maxillary central incisor is correct?

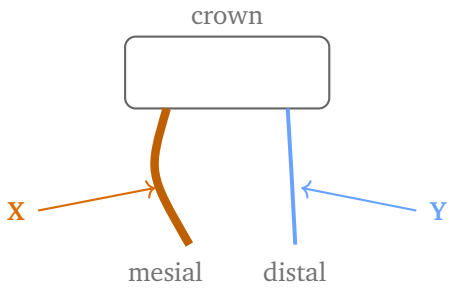
(A) The lingual fossa is the shallow concavity bounded incisally by the incisal ridge, cervically by the cingulum and on either side by the marginal ridges; the incisal ridge becomes a true incisal edge only after attrition has worn it flat

(B) The lingual fossa is bounded cervically by the incisal ridge and incisally by the cingulum, and it is the deepest fossa in the mouth

(C) The lingual fossa normally extends past the cervical line onto the root surface, which is why root caries begins there

(D) A newly erupted maxillary central incisor already presents a flat incisal edge, and the mamelons develop later as attrition proceeds

**Q3.** The buccal view below shows the two roots of a permanent mandibular first molar. Comparing the mesial root (**X**) with the distal root (**Y**):




(A) The distal root is the broader of the two buccolingually and is the more curved

(B) The two roots are equal in buccolingual width, and only the distal root is curved

(C) The mesial root is the broader of the two buccolingually and is the more curved, its apical portion bending distally

(D) The mesial root is the narrower of the two but is markedly straighter than the distal root

**Q4.** On the buccal surface of a permanent mandibular first molar, the buccal groove runs cervically from the occlusal surface and often ends in a small buccal pit. The clinical importance of this pit is that:

(A) It is a developmental landmark that never retains plaque, because the buccal surface is continuously wiped clean by the cheek

(B) It represents an area of dentine that is already exposed at the moment of eruption

(C) It is the surface marking of the furcation, so caries starting there always involves the furcation directly

(D) It is a deep, narrow, plaque-retentive fault that the bristles of a toothbrush cannot clean, making it a common site of pit and fissure caries and a routine target for a sealant or a preventive resin restoration

## Deciduous Dentition and Eruption

**Q5.** Which statement about the leeway space of Nance is correct?

(A) It is the excess width of the permanent canine and premolars over the deciduous canine and molars, and it forces the permanent molars to drift distally

(B) It is the excess width of the deciduous canine and molars over the permanent canine and premolars that replace them, measuring about 1.8 mm per side in the mandible and about 0.9 mm per side in the maxilla, and it is used up by the late mesial shift of the permanent first molar into a Class I relationship

(C) It is the space present between the maxillary deciduous lateral incisor and canine, and between the mandibular deciduous canine and first molar, from the moment the deciduous arch is complete

(D) It is the space created when the roots of the deciduous incisors resorb, and it measures about 1.8 mm per side in the maxilla and about 0.9 mm per side in the mandible

**Q6.** Which statement correctly contrasts the deciduous canine with its permanent successor?

(A) The deciduous canine is simply a smaller copy of the permanent canine, with every proportion and every cusp slope reproduced faithfully

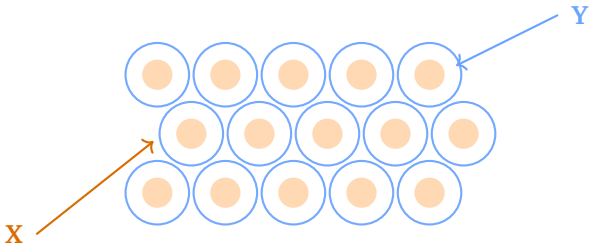
(B) The deciduous canine has a long, slender crown with no cervical ridge, and its root is shorter than its crown

(C) The deciduous canine crown is shorter and more bulbous, with a pronounced cervical ridge and a sharp, relatively long cusp; in the maxillary deciduous canine the mesial cusp slope is longer than the distal slope, which is the reverse of the permanent maxillary canine

(D) In the maxillary deciduous canine the distal cusp slope is longer than the mesial slope, exactly as in the permanent maxillary canine

## Enamel

**Q7.** The etched enamel surface below was produced by 37 percent phosphoric acid applied for 15 to 30 seconds and shows the classic honeycomb appearance, with the rod cores at **X** dissolved away and the rod peripheries at **Y** left standing. Regarding the patterns of acid etching:



(A) In the Type I pattern the rod peripheries are dissolved and the cores are left standing, while in the Type II pattern the cores are dissolved and the peripheries are left standing

(B) In the Type I pattern the rod cores are preferentially dissolved and the peripheries are left standing, giving the honeycomb seen here; in the Type II pattern the peripheries are dissolved and the cores are left standing; the Type III pattern is a mixed, indistinct pattern in which the rod outlines cannot be traced

(C) Acid etching works by precipitating new calcium phosphate crystals on the enamel surface, and the honeycomb is the outline of those crystals

(D) Acid etching removes about 500 microns of enamel and produces its retention entirely by dissolving the interprismatic substance of dentine

**Q8.** Regarding aprismatic (prismless) surface enamel and its bearing on the acid etching of deciduous teeth:

(A) It is a surface layer roughly 30 microns thick in which the crystals lie parallel to one another and perpendicular to the surface, with no rod boundaries; it covers almost the whole crown of a deciduous tooth, and because it lacks rod cores and peripheries it etches poorly, so deciduous enamel is either etched for longer or the layer is first removed by abrasion or by roughening with a bur

(B) It is a surface layer that is less mineralised than the rest of the enamel and therefore etches faster, so deciduous teeth need a shorter etching time than permanent teeth

(C) It is found only on the occlusal surface of erupted permanent third molars, so it has no bearing on paediatric bonding at all

(D) It is an acquired post-eruptive deposit of salivary protein that a rubber cup prophylaxis removes completely, so it never affects the etch pattern

## Dentine and Pulp

**Q9.** Which statement correctly gives the composition of dentine by weight and places it correctly among the other calcified tissues?

(A) Dentine is about 96 percent inorganic, 1 percent organic and 3 percent water, that is, the same as enamel

(B) Dentine is about 20 percent inorganic, 70 percent organic and 10 percent water, which is why it is the softest calcified tissue of the body

(C) Dentine is about 70 percent inorganic, 20 percent organic and 10 percent water, which makes it harder than enamel but softer than bone

(D) Dentine is about 70 percent inorganic, 20 percent organic and 10 percent water, which makes it less mineralised and softer than enamel but more mineralised and harder than bone and cementum

**Q10.** Regarding the resorption of dentine and the reversal lines seen in a resorbed and repaired root:

(A) Odontoclasts scoop out shallow, scalloped Howship's lacunae in the dentine; if the resorption stops and repair tissue is laid down over the defect, the scalloped outline of the old lacunae is preserved as a scalloped reversal line, which is thereby distinguished from the smooth resting line that marks a mere pause in deposition

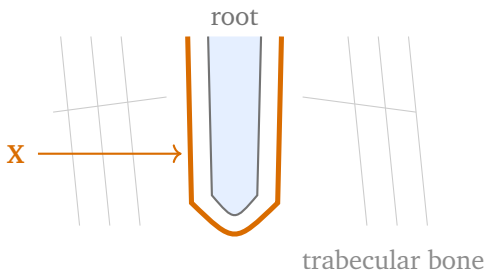
(B) Reversal lines are smooth lines that mark where deposition simply paused, while resting lines are scalloped and mark the floor of an old resorption defect

(C) Dentine, unlike bone and cementum, cannot be resorbed at all, so reversal lines are never found in it

(D) Dentine resorption is carried out by odontoblasts that reverse their polarity and dissolve the matrix they had previously secreted, and the reversal line records the moment of that reversal of polarity

## Cementum and Periodontal Ligament

**Q11.** The periapical radiograph schematic below shows the thin radiopaque line marked **X**, which outlines the tooth socket immediately outside the radiolucent periodontal ligament space. Which statement about this structure is correct?




(A) It is the cancellous supporting bone lying between adjacent sockets, that is, the interdental septum seen end-on

(B) It is a sheet of dense cortical bone with no perforations, so the vessels and nerves of the periodontal ligament can enter only through the apical foramen

(C) It is the radiographic image of the alveolar bone proper, a thin layer of compact bone that is perforated by numerous channels carrying vessels, lymphatics and nerves between the marrow spaces and the periodontal ligament and into which Sharpey's fibres are embedded, so that histologically it is called the cribriform plate; loss of its continuity is an early radiographic sign of periapical or periodontal disease

(D) It is the buccal cortical plate seen end-on, and its presence or absence bears no relation to the health of the periodontal ligament

**Q12.** A principal fibre group of the periodontal ligament that exists only in multirooted teeth, running from the cementum of the furcation region into the crest of the interradicular septum and resisting tipping, torquing and luxation of the tooth, is the:

(A) Transseptal group

(B) Interradicular group

(C) Apical group

(D) Horizontal group

## Oral Mucosa, Salivary Glands and TMJ Histology

**Q13.** Regarding the attached gingiva and the stippling seen on its surface:

(A) The attached gingiva is firmly bound down to the cementum and to the alveolar bone, and its orange-peel stippling is produced where the epithelial ridges intersect over the underlying connective tissue papillae; stippling is a feature of health, and it is typically lost when the gingiva becomes oedematous and inflamed

(B) Stippling is a sign of chronic inflammation, and healthy attached gingiva is uniformly smooth and glossy

(C) Stippling is seen on the free gingival margin and on the alveolar mucosa, but never on the attached gingiva

(D) Stippling is produced by plugs of keratin extruded from the sulcular epithelium, and its presence or absence bears no relation to gingival health

**Q14.** Regarding the synovial membrane of the temporomandibular joint and the functions of synovial fluid:

(A) The synovial membrane lines every internal surface of the joint including the articular surfaces and both faces of the disc, and the only function of synovial fluid is lubrication

(B) The synovial membrane lines the inner aspect of the capsule and the non-articular surfaces of the joint but does not cover the articular surfaces or the pressure-bearing part of the disc; it secretes synovial fluid, which lubricates the joint, nourishes the avascular articular tissue and the disc by diffusion, and helps remove metabolic debris from the joint spaces

(C) The synovial membrane is a keratinised stratified squamous epithelium, and synovial fluid is a plain ultrafiltrate of plasma containing neither protein nor hyaluronan

(D) Synovial fluid has no nutritive role, because the articular fibrocartilage and the disc are nourished by their own capillary network, and the synovial membrane has no secretory function whatever

## Detailed Solutions

**Q1.**

### Solution

**Concept – the maxillary premolars are told apart by size, root number and cusp height:** The first premolar is the more distinctive of the pair, and every point of difference favours it being the bigger, more complicated tooth.

**Step 1 – compare overall size:** The maxillary **first** premolar is the larger of the two. Its crown is wider buccolingually and its whole form is bulkier.

**Step 2 – compare root number:** The maxillary first premolar is the premolar that is characteristically bifurcated into a **buccal root and a lingual root**, and it carries two canals even in the cases where the roots are fused. The maxillary second premolar is usually **single rooted** with a single canal.

**Step 3 – compare cusp height:** On the maxillary first premolar the **buccal cusp is distinctly longer than the lingual cusp**, by roughly 1 mm, so the tooth looks clearly asymmetrical from the proximal aspect. On the maxillary second premolar the two cusps are **nearly equal in height**, which makes its proximal outline look much more symmetrical.

**Step 4 – read the diagram against these three points:** Tooth **X** has two roots and an obviously taller buccal cusp, so it is the first premolar. Tooth **Y** has one root and cusps at almost the same level, so it is the second premolar.

**Step 5 – assemble the correct statement:** The first premolar is larger, is the commonly bifurcated one, and has the taller buccal cusp; the second premolar has cusps of nearly equal height. All three points appear together only in option D.

**Why the other options are wrong:**

- A: reverses every one of the three points. The second premolar is the smaller tooth, it is not the one that bifurcates, and it is the tooth whose cusps are nearly level.
- B: is wrong twice. The two teeth are not the same size, and the marked difference in cusp height belongs to the **first** premolar, not the second.
- C: gets the size right but pairs it with the wrong root form. Bifurcation into a buccal and a lingual root is a feature of the **first** premolar.

**Final Answer:** First premolar larger, two-rooted, taller buccal cusp; second premolar cusps nearly level $\Rightarrow$ D

**Answer: (D)** Go Back to Q1

## Q2.

### Solution

**Concept – the lingual surface of a maxillary central incisor is a shallow scoop with four borders:** Name the four borders in order and the answer follows.

**Step 1 – set the boundaries of the lingual fossa:** It is bounded **cervically by the cingulum**, **incisally by the incisal ridge**, and **mesially and distally by the mesial and distal marginal ridges**.

**Step 2 – note how shallow it is:** The fossa is a gentle concavity only. It is confined to the crown and it stops at the cervical line; it never runs onto the root.

**Step 3 – take the incisal ridge at eruption:** A newly erupted central incisor presents three rounded **mamelons** on its incisal ridge, the remnants of the three developmental lobes of the labial surface.

**Step 4 – follow what wear does to it:** Attrition wears the mamelons away within the first year or two of function. Only then does the rounded incisal *ridge* become a flat incisal *edge*, that is, a definite linea angle between the labial surface and the worn lingual slope.

**Step 5 – match to the options:** Correct boundaries plus the ridge-becomes-edge sequence appear together only in option A.

**Step 6 – note the clinical value:** The lingual fossa is the site of the palatogingival groove and of dens invaginatus, and it is a favoured site for caries in a maxillary lateral incisor. The functional part of the incisal edge is also where centric stops are checked.

**Why the other options are wrong:**

- B: reverses the two borders. The **cingulum** is cervical and the **incisal ridge** is incisal, not the other way round. The lingual fossa is also a shallow fossa, not the deepest in the mouth.
- C: is false. The lingual fossa ends at the cervical line and is entirely a coronal feature. Root caries is a cemental problem and has nothing to do with this fossa.
- D: reverses the time course. Mamelons are present **at eruption** and are progressively lost to attrition; they do not appear later.

**Final Answer:** Fossa bounded by cingulum, incisal ridge and marginal ridges; incisal edge appears after attrition $\Rightarrow$ A

**Answer: (A)** Go Back to Q2

## Q3.

**Solution**

**Concept – the two roots of a mandibular molar are not equal partners:** The mesial root carries more of the load, and its form reflects that.

**Step 1 – compare buccolingual width:** The **mesial root is the broader** of the two in the buccolingual direction. It is also flattened mesiodistally, so it appears wide from the proximal view and narrow from the buccal view.

**Step 2 – compare curvature:** The **mesial root is the more curved**. It leaves the crown running mesially, then its apical third bends back **distally**, giving the classic mesial-root curve. The distal root is broader mesiodistally but rounder, and it runs a much straighter, often almost vertical course.

**Step 3 – read the figure:** Root **X**, the mesial, is drawn thick and curved. Root **Y**, the distal, is drawn thinner in outline and nearly straight. That matches option C.

**Step 4 – link form to clinical work:** Because the mesial root is broad, flattened and curved, its canals are ribbon-like and difficult to instrument, and a rotary file is prone to strip perforation on the concave distal wall of the mesial root, the so-called danger zone. The straighter, rounder distal root is the easier of the two to negotiate.

**Step 5 – link form to extraction:** The curved mesial root also resists elevation and is the root more likely to fracture during extraction, which is why elevation is directed to lift the tooth distally along the curve.

**Why the other options are wrong:**

- A: reverses both properties. The **distal** root is the narrower buccolingually and the straighter of the two.
- B: is wrong on both counts. The roots are not equal in buccolingual width, and the marked curvature belongs to the mesial root, not the distal.
- D: keeps the curvature the wrong way round and adds a second error. The mesial root is the broader buccolingually, and it is the **more** curved, not the straighter.

**Final Answer:** The mesial root is broader buccolingually and more curved, with a distal apical bend $\Rightarrow$ $\boxed{C}$

**Answer: (C)** Go Back to Q3

## Q4.

### Solution

**Concept – a developmental fault is a caries trap:** Wherever two developmental lobes fail to coalesce completely, a narrow fault is left in the enamel, and every such fault is a caries risk.

**Step 1 – state what the buccal groove is:** It is the developmental groove that separates the mesiobuccal and distobuccal cusps and runs cervically down the buccal surface from the occlusal table.

**Step 2 – state what the buccal pit is:** Where the buccal groove ends, the enamel of the adjoining lobes often fails to fuse completely, and a small, deep, sharply defined **buccal pit** is left.

**Step 3 – consider its dimensions against a toothbrush:** The pit is far narrower than a toothbrush bristle. Bristles cannot enter it, so plaque and food debris sit in it undisturbed however carefully the patient brushes.

**Step 4 – draw the caries conclusion:** Stagnant plaque plus enamel that is thin and imperfectly coalesced at the base of the pit makes this a classic site of **pit and fissure caries**, exactly like the occlusal fissures.

**Step 5 – draw the treatment conclusion:** Because the risk is anatomical rather than behavioural, the answer is to seal it. A sound buccal pit is sealed, and a pit that is already carious but minimally cavitated is restored conservatively as a **preventive resin restoration**, extending the seal over the rest of the groove.

**Why the other options are wrong:**

- A: is exactly backwards. The pit is too narrow for either the cheek or a bristle to clean, which is precisely why it is dangerous. The self-cleansing argument applies to smooth convex surfaces, not to a pit.
- B: is false. The pit is an enamel defect in the coalescence of lobes, not an area of exposed dentine. Dentine is exposed only later, once caries or wear has breached the enamel.
- C: is false. The buccal pit lies well coronal to the furcation, and the furcation of a mandibular first molar is marked instead by the buccal developmental depression on the root trunk. Caries in the buccal pit spreads occlusally and pulpally, not straight into the furcation.

**Final Answer:** A plaque-retentive fault that is a common caries site and a target for sealing $\Rightarrow$ D

**Answer: (D)** Go Back to Q4

## Q5.

### Solution

**Concept – the deciduous posterior teeth are wider than the permanent teeth that replace them:** That surplus width is a reserve of space, and the arch spends it during the mixed dentition.

**Step 1 – define the space:** The leeway space of Nance is the **difference between the combined mesiodistal widths of the deciduous canine, first molar and second molar and the combined widths of the permanent canine, first premolar and second premolar** that succeed them.

**Step 2 – give the sign of the difference:** The deciduous group is the **wider** group, mainly because the deciduous second molar is so much wider than the second premolar. So the exchange leaves surplus space.

**Step 3 – give the amounts:** About **1.8 mm per side, that is 3.4 to 3.5 mm in total, in the mandible**, and about **0.9 mm per side, that is roughly 1.8 mm in total, in the maxilla**. The mandibular figure is the larger of the two, which is the point examiners test.

**Step 4 – say what happens to the space:** As the deciduous second molar is shed, the permanent first molar drifts mesially into the surplus. This is the **late mesial shift**, and it carries the molar from a flush terminal plane relationship into a **Class I** molar relationship.

**Step 5 – say how it is used clinically:** Because the shift is larger in the mandible, the mandibular leeway space is the reserve an orthodontist protects with a lower lingual holding arch when there is mild crowding, keeping it for incisor alignment instead of letting the molar consume it.

**Why the other options are wrong:**

- A: reverses the sign of the difference. The permanent canine and premolars are collectively **narrower**, not wider, and the resulting drift of the permanent molar is **mesial**, not distal.
- C: describes the **primate spaces**, which are a different thing entirely. Those are physiological gaps present in the deciduous arch from the start, mesial to the maxillary canine and distal to the mandibular canine. Leeway space is not present in the deciduous arch at all; it only appears at the moment of exchange.
- D: has the wrong origin and the wrong figures. The space has nothing to do with incisor root resorption, and the two arch values are swapped: the larger figure of 1.8 mm per side belongs to the **mandible**.

**Final Answer:** Surplus of deciduous over permanent widths, 1.8 mm mandibular

and 0.9 mm maxillary per side, used by the late mesial shift $\Rightarrow$ B

**Answer: (B)** Go Back to Q5

## Q6.

### Solution

**Concept – a deciduous tooth is not a miniature permanent tooth:** It differs in proportion and, in the canine, in the direction of its cusp slopes.

**Step 1 – compare crown proportions:** The deciduous canine crown is **shorter and more bulbous**. Its crown is constricted at the cervix, and it carries a **prominent cervical ridge** on the labial surface, a feature the permanent canine does not show in that degree.

**Step 2 – compare crown to root:** The deciduous canine root is **long and slender relative to the crown** and is markedly longer than the crown, out of proportion to the small crown it supports, because it must resist function while a permanent successor develops beneath it.

**Step 3 – compare the cusp:** The cusp of a deciduous canine is **sharp and relatively long** for the height of its crown, so the tooth looks more pointed than its permanent counterpart.

**Step 4 – compare the cusp slopes, the key discriminator:** In the **maxillary deciduous canine the mesial cusp slope is longer than the distal slope**. In the **permanent maxillary canine the distal slope is the longer of the two**. So the relationship is exactly reversed between the two dentitions, and this single fact identifies the tooth.

**Step 5 – match the option:** Short bulbous crown, prominent cervical ridge, sharp long cusp, and the reversed maxillary cusp slopes appear together only in option C.

**Why the other options are wrong:**

- A: is the standard misconception. A deciduous tooth is **not** a scaled copy. Its proportions are different and, as Step 4 shows, its maxillary cusp slopes are actually reversed.
- B: reverses two features. The deciduous canine crown is short and bulbous, **not** long and slender, it does carry a prominent cervical ridge, and its root is distinctly **longer** than its crown, not shorter.
- D: states the permanent relationship and wrongly assigns it to the deciduous tooth. In the maxillary deciduous canine the **mesial** slope is the longer one.

**Final Answer:** Short bulbous crown with cervical ridge, sharp cusp, mesial slope

longer in the maxillary deciduous canine $\Rightarrow$ C

**Answer: (C)** Go Back to Q6

## Q7.

### Solution

**Concept – acid etching works by selective dissolution, not by roughening at random:** Acid finds the parts of the enamel that differ in crystal orientation and mineral density, and dissolves them first.

**Step 1 – state what the acid does:** Phosphoric acid at 37 percent, applied for 15 to 30 seconds, dissolves roughly **10 microns** of the enamel surface and leaves a further porous layer some tens of microns deep, raising the surface energy and letting resin tags flow in and set.

**Step 2 – explain why the dissolution is selective:** Within a rod the crystals of the **core** run roughly parallel to the rod's long axis, while at the **periphery** they flare away at an angle. The acid attacks crystals end-on far faster than side-on, so core and periphery dissolve at different rates.

**Step 3 – define the Type I pattern:** The **rod cores are preferentially dissolved** and the peripheries are left standing as a network of walls. Looking down on it, the standing walls surround empty cores and the surface looks like a **honeycomb**. That is what the figure shows, with the dissolved cores at **X** and the standing peripheries at **Y**. Type I is the most common and the most favourable pattern.

**Step 4 – define the Type II pattern:** The reverse. The **peripheries are dissolved** and the cores are left standing as a field of projecting pegs, giving a cobblestone rather than a honeycomb appearance.

**Step 5 – define the Type III pattern:** A **mixed and indistinct** pattern in which parts look like Type I, parts like Type II, and parts show no rod outline at all. It is typical of surfaces where the rods do not meet the surface at right angles or where prismless enamel persists, and it gives the poorest retention.

**Step 6 – match to the options:** Cores dissolved in Type I, peripheries dissolved in Type II, mixed in Type III. Only option B states all three correctly.

**Why the other options are wrong:**

- A: swaps Type I and Type II. It is Type I that dissolves the **cores**, and this swap is the trap the question is built around.
- C: inverts the chemistry. Etching **dissolves** mineral, it does not precipitate it. Precipitation of calcium phosphate salts on the surface is an unwanted by-product that inadequate rinsing leaves behind, and it weakens the bond.

- D: is wrong twice. Etching removes about 10 microns, not 500, which would be a destructive amount. It also names the wrong tissue: the question is about **enamel** rods and their peripheries, and interprismatic substance is an enamel term, not a dentine term.

**Final Answer:** Type I dissolves the cores giving the honeycomb, Type II dissolves the peripheries, Type III is mixed $\Rightarrow$ B

**Answer: (B)** Go Back to Q7

## Q8.

### Solution

**Concept – the outermost enamel has no rods, and etching depends on rods:** If there is no core and no periphery, there is nothing for the acid to dissolve selectively.

**Step 1 – describe the layer:** Aprismatic or prismless enamel is a surface layer about **30 microns thick** in which all the crystals lie **parallel to one another and perpendicular to the surface**, with no rod sheaths and no rod boundaries anywhere in it.

**Step 2 – explain how it forms:** It is laid down at the very end of amelogenesis, once the ameloblasts have **lost their Tomes' processes**. It is the Tomes' process that gives enamel its rod pattern, so enamel made without one has no rods.

**Step 3 – state where it is found:** It covers **almost the entire crown of a deciduous tooth**, and in permanent teeth it persists mainly in the **cervical region** and in fissures, the sites where post-eruptive abrasion never wears it away.

**Step 4 – work out the etching consequence:** Etching depends on the acid attacking rod cores or peripheries at different rates. Aprismatic enamel has neither, and its crystals are all presented end-on and uniformly. It therefore etches **sluggishly and uniformly**, giving a shallow, featureless, Type-III-like surface with little of the honeycomb retention that resin tags need.

**Step 5 – state the clinical answer:** Either **etch the deciduous tooth for longer** than the permanent tooth, or **remove the layer first** by air abrasion, pumice, or light roughening with a bur, so that the acid reaches true prismatic enamel. Bond strengths on deciduous enamel improve measurably once this is done.

**Step 6 – match the option:** Thickness, crystal orientation, distribution and the longer-etch-or-remove conclusion appear together only in option A.

**Why the other options are wrong:**

- B: reverses the whole argument. Aprismatic enamel is **more highly mineralised** than rod-bearing enamel, not less, and the practical consequence is a **longer** etch, not a shorter one.
- C: is false about the site. Aprismatic enamel covers nearly the whole deciduous crown, so it is precisely the paediatric bonding problem, not a third molar curiosity.
- D: confuses it with an acquired deposit. Aprismatic enamel is a **developmental** feature of the enamel itself, formed by ameloblasts without Tomes' processes. It cannot be polished off with a rubber cup, and it does affect the etch pattern.

**Final Answer:** Rodless 30 micron layer, covers deciduous crowns, etches poorly, so etch longer or remove it $\Rightarrow$ $\boxed{\text{A}}$

**Answer: (A)** Go Back to Q8

## Q9.

### Solution

**Concept – rank the calcified tissues by mineral content:** Learn one ladder and the whole question answers itself.

**Step 1 – write the ladder by weight:** Enamel about **96 percent** inorganic. **Dentine about 70 percent** inorganic, **20 percent** organic, **10 percent** water. Bone about **65 percent** inorganic, and cementum about **65 percent** inorganic.

**Step 2 – place dentine on the ladder:** 70 is well below 96 and slightly above 65. So dentine is **less mineralised than enamel** but **more mineralised than bone and cementum**.

**Step 3 – convert mineral content into hardness:** Hardness tracks mineral content across these tissues. Dentine is therefore **softer than enamel** and **harder than bone and cementum**. The classic ordering is enamel $>$ dentine $>$ cementum, with bone in the same range as cementum.

**Step 4 – identify the organic phase:** The 20 percent organic fraction is overwhelmingly **type I collagen**, with a small proportion of non-collagenous proteins such as phosphophoryn. Enamel's tiny organic fraction is not collagen at all, which is a further contrast.

**Step 5 – explain why the collagen matters:** That collagenous matrix is exactly why dentine is elastic and resilient rather than brittle, and why it can absorb the occlusal load and support the brittle enamel above it. Enamel unsupported by dentine fractures.

**Step 6 – match the option:** 70 / 20 / 10 with dentine placed below enamel and above bone appears only in option D.

**Why the other options are wrong:**

- A: quotes **enamel's** figures and attaches them to dentine. Dentine is not 96 percent mineral, and if it were it would be as brittle as enamel.
- B: swaps the inorganic and organic fractions. Dentine is not 70 percent organic. The 20/70/10 pattern is closer to an uncalcified matrix such as predentine, and dentine is certainly not the softest calcified tissue.
- C: gives the right numbers but draws the ranking backwards on both sides. At 70 percent mineral, dentine must be **softer** than 96 percent enamel and **harder** than 65 percent bone, which is the exact opposite of what C claims. This is the trap in the question: correct data, wrong conclusion.

**Final Answer:** 70 / 20 / 10, less mineralised than enamel and more than bone and cementum $\Rightarrow$ D

**Answer: (D)** Go Back to Q9

## Q10.

### Solution

**Concept – hard tissue keeps a record of its own history:** The shape of an incremental line tells you whether the tissue was merely resting or was being eaten away before repair began.

**Step 1 – name the cell:** Dentine resorption is carried out by **odontoclasts**, multinucleated cells of the same lineage as osteoclasts, working in exactly the same way with a ruffled border, an acidic microenvironment and lysosomal enzymes.

**Step 2 – describe the defect they leave:** Each odontoclast scoops out a shallow, saucer-shaped bay in the dentine. These are **Howship's lacunae**, and a row of them along a surface produces a **scalloped**, wavy outline rather than a straight one.

**Step 3 – describe what happens if the resorption stops:** If the stimulus is removed, the odontoclasts disappear and reparative tissue, whether cementum-like tissue, bone-like tissue or reparative dentine, is deposited over the defect, filling in the bays.

**Step 4 – see how the record survives:** The new tissue simply follows the contour of the old resorbed surface. The scalloped floor of the old lacunae is therefore preserved as a permanent boundary in the section. That boundary is the **reversal**

**line**, so named because it marks the reversal from resorption to deposition.

**Step 5 – contrast it with a resting line:** A **resting line** forms where deposition merely paused and then restarted without any resorption in between. Nothing scooped the surface, so the line is **smooth and regular**. Scalloped means reversal; smooth means resting. That is the discriminator.

**Step 6 – state the clinical relevance:** Reversal lines are the histological proof of a healed internal or external resorption. This matters in orthodontically treated roots, in replanted teeth, and in the assessment of an internal resorption defect that has arrested after the pulp was extirpated.

**Why the other options are wrong:**

- B: swaps the two lines. The **reversal** line is the scalloped one because it follows Howship's lacunae, and the **resting** line is the smooth one because nothing was resorbed.
- C: is false. Dentine is resorbed readily. Physiological resorption of deciduous roots is the everyday example, and internal resorption and orthodontic external resorption are the pathological ones.
- D: names the wrong cell and invents a mechanism. Odontoblasts are **formative** cells and cannot resorb their own matrix. Resorption is done by odontoclasts, which arrive from the blood as monocyte-derived precursors.

**Final Answer:** Scalloped Howship's lacunae preserved as a scalloped reversal line, unlike the smooth resting line $\Rightarrow$ $\boxed{\text{A}}$

**Answer: (A)** Go Back to Q10

## Q11.

### Solution

**Concept – one structure with three names, one for each way of looking at it:** Anatomically the alveolar bone proper, histologically the cribriform plate, radiographically the lamina dura.

**Step 1 – name the anatomical structure:** The socket wall is lined by a thin layer of compact bone called the **alveolar bone proper**. The periodontal ligament fibres insert directly into it.

**Step 2 – explain the histological name:** It is pierced by numerous **Volkmann's canals** carrying blood vessels, lymphatics and nerves between the marrow spaces of the supporting bone and the periodontal ligament. Because it is riddled with these openings, like a sieve, it is called the **cribriform plate**.

**Step 3 – add the bundle bone point:** The portion into which **Sharpey's fibres** are embedded is arranged in incremental layers around the fibre bundles and is called **bundle bone**. This is what anchors the periodontal ligament to the socket.

**Step 4 – explain the radiographic name:** X-rays passing tangentially along this compact plate traverse a long path of dense bone, so it images as a thin **radiopaque line** outlining the socket, immediately outside the radiolucent periodontal ligament space. Radiographically it is called the **lamina dura**, and that is the line marked **X**.

**Step 5 – state why continuity matters:** An intact, continuous lamina dura is a sign of a healthy attachment. **Loss of its continuity**, especially at the apex or at the alveolar crest, is one of the earliest radiographic signs of periapical inflammation or of periodontal breakdown, and its loss also occurs generally in hyperparathyroidism.

**Step 6 – match the option:** Alveolar bone proper, perforated, cribriform plate, early sign when broken. All of that is in option C.

**Why the other options are wrong:**

- A: names the wrong bone. The **supporting** bone, which includes the cancellous bone of the interdental septum, lies outside the alveolar bone proper and images as a coarse trabecular pattern, not as a thin sharp line hugging the root.
- B: contradicts the defining feature. The plate is compact but it is **heavily perforated**, and those perforations are exactly how the periodontal ligament receives most of its blood supply and innervation. If they did not exist, cutting the apical vessels would devitalise the ligament, which is not what happens.
- D: names the wrong plate. The buccal cortical plate is a separate outer layer of the alveolar process, and the lamina dura is the socket lining that is intimately related to the periodontal ligament. Its integrity is directly, not remotely, related to periodontal health.

**Final Answer:** Alveolar bone proper, the perforated cribriform plate seen as the lamina dura $\Rightarrow$ C

**Answer: (C)** Go Back to Q11

## Q12.

### Solution

**Concept – one fibre group exists only where there is a furcation:** If the tooth has one root, the group cannot exist, and that fact identifies it immediately.

**Step 1 – use the exclusivity clue:** The question says the group is present **only in multirooted teeth**. Of the principal fibre groups, only the **interradicular group** carries that restriction, because only a multirooted tooth has an interradicular septum for the fibres to reach.

**Step 2 – trace its course:** The fibres run from the **cementum of the furcation region** down and out into the **crest of the interradicular septum**, the wedge of bone standing between the roots.

**Step 3 – state its function:** Fanning out from the furcation into the septum, it resists **tipping, torquing and luxation**, so it helps hold a molar down in its socket when a vertical or rotational force tries to lift or twist it.

**Step 4 – note the clinical link:** Because this group anchors the furcation, furcation involvement in periodontitis destroys it early, and its loss is part of why a furcation-involved molar becomes mobile out of proportion to its bone loss. It also explains why the roots of a multirooted tooth must be separated before elevation during a surgical extraction.

**Why the other options are wrong:**

- A, the transseptal group: runs **from the cementum of one tooth, over the alveolar crest, to the cementum of the adjacent tooth**. It belongs to the gingival fibre system rather than to a single socket, it exists in single-rooted teeth too, and it maintains the interproximal relationship. It is the group blamed for orthodontic relapse.
- C, the apical group: radiates from the **root apex** into the surrounding bone, resisting luxation and protecting the vessels and nerves at the apical foramen. Every tooth has one, so it fails the exclusivity clue.
- D, the horizontal group: runs at **right angles to the long axis** of the root from cementum to bone, just apical to the alveolar crest, and resists horizontal and tipping forces. It exists in all teeth, so it also fails the exclusivity clue.

**Final Answer:** Interradicular group $\Rightarrow$ B

**Answer: (B)** Go Back to Q12

## Q13.

### Solution

**Concept – stippling is a clinical sign you read at the chairside:** It comes straight from the histology of the attached gingiva.

**Step 1 – define the attached gingiva:** It extends from the free gingival groove to the mucogingival junction. It is **keratinised masticatory mucosa**, and it is **firmly bound down** to the cementum and to the underlying alveolar bone by a dense collagenous lamina propria, with essentially no submucosa. That is why it is immobile and cannot be lifted from the bone.

**Step 2 – explain the anatomy of stippling:** The interface between the epithelium and the connective tissue is not flat. Connective tissue **papillae** push up into the epithelium, and **epithelial ridges** descend between them. Where the ridges intersect, the surface is pulled down into a shallow depression; between the intersections it bulges up. The result is a fine **orange-peel** texture.

**Step 3 – state its relationship with health:** Stippling appears at around 5 years of age, increases into adulthood, varies a great deal between individuals, and is **a feature of healthy gingiva**. Its absence in an individual patient is not by itself a diagnosis of disease, because some healthy patients simply have little of it.

**Step 4 – state what inflammation does to it:** In gingival inflammation the tissue becomes **oedematous**. The fluid swells the connective tissue and flattens the papillae and the epithelial ridge network out. The stippling is smoothed away, and the gingiva becomes **smooth, shiny and glossy**. Loss of stippling in a patient known to have had it is therefore an early sign of gingivitis, and it returns when the inflammation resolves.

**Step 5 – match the option:** Bound-down attached gingiva, stippling produced by intersecting epithelial ridges, present in health and lost in oedematous inflammation, is option A.

**Why the other options are wrong:**

- B: inverts the sign completely. Stippling belongs to **health**, and the smooth glossy surface is the inflamed one, because oedema flattens the tissue out.
- C: reverses the distribution. Stippling is a feature of the **attached gingiva** and of the interdental papilla. The free gingival margin is smooth, and the alveolar mucosa is non-keratinised, mobile and never stippled.
- D: invents a mechanism. Stippling has nothing to do with keratin plugs, and the **sulcular** epithelium is non-keratinised in any case. The cause is the intersecting ridge and papilla pattern beneath the surface.

**Final Answer:** Bound-down keratinised gingiva whose stippling reflects the ep-

ithelial ridges and is lost in oedematous inflammation $\Rightarrow$ A

**Answer: (A)** Go Back to Q13

## Q14.

### Solution

**Concept – the synovial membrane lines the joint everywhere except where the joint takes the load:** Where surfaces rub, there is no synovial membrane, and that is exactly why the fluid must feed them.

**Step 1 – state where the membrane is:** The synovial membrane lines the **inner aspect of the fibrous capsule** and the **non-articular surfaces** of the joint, including the loose posterior bilaminar zone, and it lines both the upper and lower joint compartments.

**Step 2 – state where it is not:** It does **not** cover the articular fibrocartilage of the condyle or of the articular eminence, and it does not cover the pressure-bearing central part of the disc. Any tissue caught between two loaded surfaces would be crushed, so the load-bearing surfaces are left bare.

**Step 3 – describe the membrane itself:** It is a delicate layer of **synovial intimal cells**, one to four cells thick, resting on a vascular subintima. The cells are not a true epithelium: there is no basement membrane and there are no tight junctions between them. Type A cells are macrophage-like and phagocytose debris, and type B cells are fibroblast-like and secrete **hyaluronan** into the fluid.

**Step 4 – describe the fluid:** Synovial fluid is a **dialysate of plasma** to which the type B cells add hyaluronan and lubricin. That is why it is viscous and slippery rather than watery.

**Step 5 – list its functions:** It **lubricates**, cutting friction between the surfaces to almost nothing. It **nourishes** the articular fibrocartilage and the disc, which are avascular and can be fed only by diffusion from the fluid, driven by the pumping of jaw movement. It also **clears debris and cellular waste** from the joint spaces through the phagocytic type A cells.

**Step 6 – draw the clinical conclusion:** Because nutrition depends on movement pumping the fluid through the tissue, prolonged immobilisation of the joint starves the disc and the fibrocartilage, and this is why controlled early movement is preferred to prolonged rest in TMJ management.

**Why the other options are wrong:**

- A: is wrong on both halves. The synovial membrane specifically **spares** the articular surfaces and the pressure-bearing disc, and lubrication is only one

of the fluid's roles: nutrition and debris clearance matter just as much.

- C: is wrong on both halves. The synovial membrane is a mesenchymal cell layer, **not an epithelium of any kind**, and certainly not keratinised. The fluid is not a plain ultrafiltrate: its **hyaluronan** and protein are exactly what make it viscous and lubricating.
- D: reverses the truth. The disc and the articular fibrocartilage are **avascular** and depend entirely on the fluid for nutrition, and the synovial membrane is definitely secretory, since its type B cells manufacture the hyaluronan.

**Final Answer:** Lines the capsule but not the articular surfaces or disc; fluid lubricates, nourishes and clears debris $\Rightarrow$ $\boxed{\text{B}}$

**Answer: (B)** Go Back to Q14

# Answer Key

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