GATE Architecture and Planning

Sample Paper – 1

Duration: 128 Minutes **Maximum Marks: 72**

Instructions

- This paper contains **46 questions** covering the core **Architecture and Planning (AR)** subject of the GATE paper conducted by the IITs and IISc (General Aptitude and Engineering Mathematics are provided as separate papers).
- **Q1–Q20 carry 1 mark each** and **Q21–Q46 carry 2 marks each**, for a total of **72 marks**.
- Each question carries **negative marking of one-third of its allotted marks**: a wrong 1-mark question costs **0.33** and a wrong 2-mark question costs **0.67**. Unattempted questions carry no penalty.
- Every question here is a single-correct **MCQ**. The real GATE paper also has Multiple Select (MSQ) and Numerical Answer Type (NAT) questions, and **those carry no negative marking**.
- Attempt this paper in one timed sitting of about **128 minutes**, the share this core subject earns at GATE's overall pace of 180 minutes for 65 questions. Use standard code values (IS codes, NBC) and $g = 9.81$ m/s^2 unless stated otherwise.

Architecture, Design and History of Architecture

Q1. The Villa Savoye at Poissy (1931), which embodies the "Five Points of a New Architecture" – pilotis, free plan, free facade, ribbon windows and roof garden – was designed by: **[1 mark]**

(A) Walter Gropius

(B) Frank Lloyd Wright

(C) Mies van der Rohe

(D) Le Corbusier

Q2. The Sydney Opera House, celebrated for its sculptural shell-like roof forms, was designed by the architect: **[1 mark]**

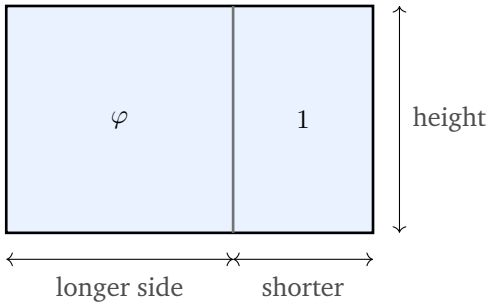
(A) Eero Saarinen

(B) Jørn Utzon

(C) Louis Kahn

(D) Kenzo Tange

Q3. The "Golden Ratio", a proportioning system used widely in classical and modern architecture, is defined by a rectangle in which the ratio of the longer side to the shorter side equals the ratio of the whole to the longer side, as shown. Its approximate numerical value is: **[1 mark]**



(A) 1.414

(B) 1.732

(C) 3.142

(D) 1.618

Q4. The Taj Mahal at Agra, with its central bulbous dome, four minarets and symmetrical char-bagh garden, is a celebrated example of which architectural style? **[1 mark]**

(A) Dravidian temple architecture

(B) Indo-Gothic colonial architecture

(C) Mughal architecture

(D) Nagara temple architecture

Q5. The Bauhaus school (founded 1919), which sought to unify art, craft and industrial technology and profoundly shaped the Modern Movement, was established by: **[1 mark]**

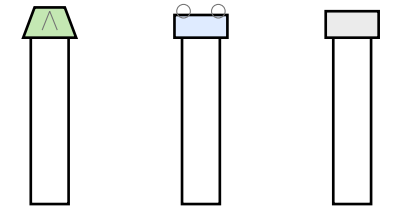
(A) Le Corbusier

(B) Mies van der Rohe

(C) Hannes Meyer

(D) Walter Gropius

Q6. Among the three classical Greek orders shown below, the one with the plainest, cushion-like capital carrying no scrolls or foliage (the simplest and sturdiest) is the: **[1 mark]**



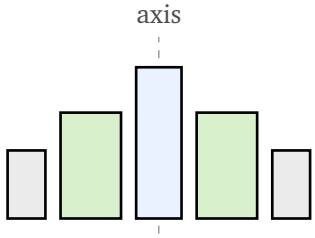
(A) Corinthian order (Order X)

(B) Ionic order (Order Y)

(C) Doric order (Order Z)

(D) Composite order

Q7. An ordering principle of composition in which identical elements are arranged in balanced fashion equally on either side of a common central axis, as sketched, is called: **[1 mark]**



(A) Rhythm

(B) Hierarchy

(C) Contrast

(D) Symmetry

Q8. Le Corbusier's anthropometric proportioning system, based on the measurements of the human body combined with the golden ratio and used to size architectural elements, is known as the: [1 mark]

(A) Ken system

(B) Vitruvian scale

(C) Modulor

(D) Metric handbook

Building Construction, Materials and Management

Q9. The chemical process of adding water to quicklime (calcium oxide, CaO) so that it turns into calcium hydroxide with the evolution of heat is called: [1 mark]

(A) Slaking

(B) Calcination

(C) Vitrification

(D) Efflorescence

Q10. A standard modular brick has an actual (nominal) size of 190 mm $\times$ 90 mm $\times$ 90 mm as per IS. Including the standard 10 mm mortar joints, the co-ordinating (modular) size of the brick becomes: [1 mark]

(A) 200 mm $\times$ 100 mm $\times$ 100 mm

(B) 190 mm $\times$ 90 mm $\times$ 90 mm

(C) 230 mm $\times$ 115 mm $\times$ 75 mm

(D) 210 mm $\times$ 110 mm $\times$ 110 mm

Q11. As per IS specifications, the *initial setting time* of ordinary Portland cement should not be less than: [1 mark]

(A) 10 minutes

(B) 30 minutes

(C) 60 minutes

(D) 600 minutes

Q12. In a project network analysed by the Critical Path Method, the amount of time by which an activity can be delayed without delaying the overall project completion (the difference between its latest and earliest occurrence times) is called its: [1 mark]

(A) Free float

(B) Independent float

(C) Interfering float

(D) Total float

Q13. The seasoning/growth defect in timber caused by the separation of the wood fibres along (between) the annual growth rings is known as a: [1 mark]

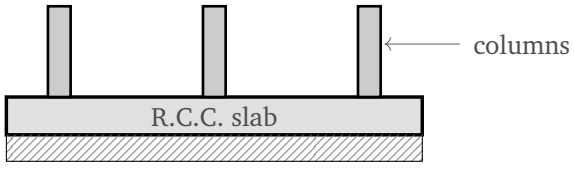
(A) Knot

(B) Shake

(C) Wane

(D) Burr

Q14. A shallow foundation consisting of a single thick slab that covers the entire footprint of the building and supports all the columns and walls together, as shown in section, is called a: [1 mark]



(A) Isolated (spread) footing

(B) Raft (mat) foundation

(C) Combined footing for two columns

(D) Pile foundation

Q15. Toughened (tempered) glass is several times stronger than ordinary annealed glass of the same thickness mainly because of: [1 mark]

(A) residual surface compressive stresses induced by rapid controlled cooling

(B) its greater thickness

(C) colour pigments added to the melt

(D) an embedded steel wire mesh

Building Structures and Systems

Q16. A cantilever beam of length 4 m carries a single point load of 10 kN at its free end, as shown. The magnitude of the bending moment at the fixed support is: [1 mark]

(A) 10 kN·m

(B) 20 kN·m

(C) 40 kN·m

(D) 2.5 kN·m

Q17. A structural system in which straight members are arranged to form a network of triangles, joined at their ends so that the members carry only axial (tension or compression) forces, is a: [1 mark]

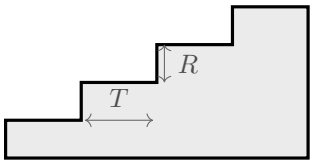
(A) Rigid (moment-resisting) frame

(B) Truss

(C) Shear wall

(D) Flat-slab floor

Q18. A comfortable stair is proportioned by the empirical rule $2R + T \approx 600$ mm, where R is the riser and T the tread (going), as shown in section. For a riser of 150 mm, the corresponding tread width is: **[1 mark]**



(A) 150 mm

(B) 450 mm

(C) 300 mm

(D) 250 mm

Q19. The permanent, static load on a building arising from the self-weight of its own structural and non-structural components (slabs, beams, walls, finishes) is classified as the: **[1 mark]**

(A) Dead load

(B) Live (imposed) load

(C) Wind load

(D) Seismic load

Q20. In a rigid framed building, the horizontal members that span between columns and transfer floor and roof loads to the columns primarily through bending are the: **[1 mark]**

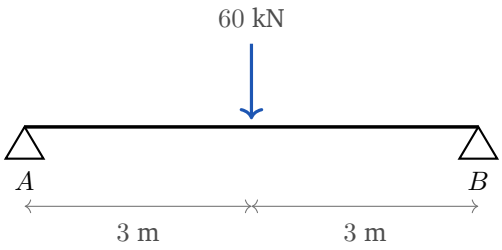
(A) Columns

(B) Footings

(C) Bracings

(D) Beams

Q21. A simply supported beam of span 6 m carries a single concentrated load of 60 kN at its midspan, as shown. The maximum bending moment in the beam is: **[2 marks]**



(A) 90 kN·m

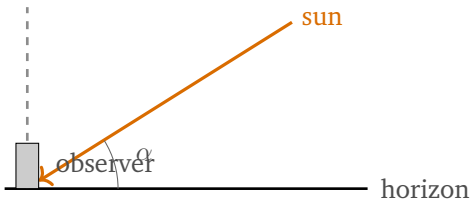
(B) 45 kN·m

(C) 180 kN·m

(D) 60 kN·m

Environmental Design and Building Services

Q22. At solar noon on an equinox day, the sun's rays are vertically overhead at the equator. For a location at latitude 28° N, the solar altitude angle of the noon sun on the equinox, measured from the horizontal as shown, is: **[2 marks]**



(A) 28°

(B) 90°

(C) 62°

(D) 45°

Q23. Using Sabine's formula, the reverberation time of a hall is $\mathrm{RT}_{60} = \dfrac{0.161\,V}{A}$, where V is the room volume in m^3 and A is the total absorption in metric sabins. For $V = 300$ m^3 and $A = 40$ sabins, the reverberation time is nearest to: **[2 marks]**

(A) 0.80 s

(B) 1.21 s

(C) 2.42 s

(D) 0.40 s

Q24. As per lighting design practice, the recommended maintained illuminance level for general office work involving continuous reading and writing on paper is of the order of: **[2 marks]**

(A) 50 lux

(B) 300–500 lux

(C) 20 lux

(D) 2000 lux

Q25. For the design of a municipal water-supply system for an Indian town, the average domestic per-capita water demand is commonly adopted as about: **[2 marks]**

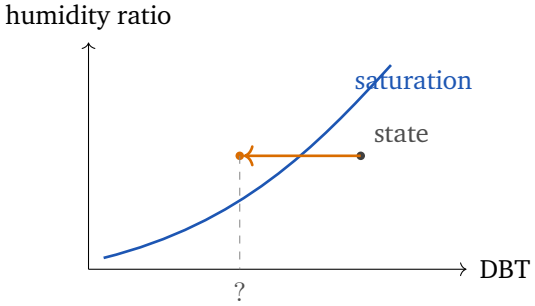
(A) 45 litres per capita per day

(B) 70 litres per capita per day

(C) 135 litres per capita per day

(D) 335 litres per capita per day

Q26. On the psychrometric chart shown, moist air at a given state is cooled at constant humidity ratio (horizontal line to the left) until it just reaches the saturation curve. The temperature at which condensation begins is the: **[2 marks]**



(A) Dew-point temperature

(B) Dry-bulb temperature

(C) Wet-bulb depression

(D) Globe temperature

Q27. In climate-responsive building design, the "Mahoney tables" take monthly climatic data (temperature, humidity, rainfall) as input and are used chiefly to arrive at: **[2 marks]**

(A) the structural loads on the building

(B) design recommendations for layout, orientation, spacing, size of openings and shading

(C) the daily water demand of the occupants

(D) the safe bearing capacity of the foundation soil

Q28. A plumbing fitting that retains a small quantity of water (a water seal) in a bend of the pipe so as to prevent foul gases from the drainage system from entering the building is called a: **[2 marks]**

(A) Trap

(B) Vent pipe

(C) Cleanout

(D) Inspection chamber

Urban Design and Landscape Architecture

Q29. In Kevin Lynch's book *The Image of the City*, the mental image people form of a city is built from five physical elements: paths, edges, districts, nodes and _____. The missing fifth element is: **[2 marks]**

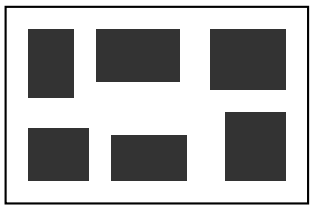
(A) Landmarks

(B) Plazas

(C) Corridors

(D) Skylines

Q30. An urban-design analytical drawing that renders the built mass as solid black and the open (unbuilt) space as white void, so as to reveal the pattern of the urban fabric, is called a: [2 marks]



(A) Contour map

(B) Figure-ground (Nolli) map

(C) Isometric projection

(D) Choropleth land-value map

Q31. In landscape architecture, the hard-surfaced, constructed elements of a site – paving, steps, walls, kerbs and pergolas – as opposed to the living plant material, are collectively referred to as the: [2 marks]

(A) Softscape

(B) Xeriscape

(C) Greenway

(D) Hardscape

Q32. The townscape technique, described by Gordon Cullen, of experiencing a town as a sequence of unfolding views revealed to a pedestrian moving through its spaces, is called: [2 marks]

(A) Serial vision

(B) Functional zoning

(C) Ribbon development

(D) Gridiron planning

Q33. In the composite/temperate climate of much of northern India, deciduous trees are often planted close to the south and west facades of a building because they: [2 marks]

(A) block the low winter sun and admit the high summer sun

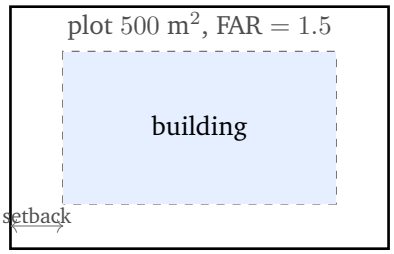
(B) are evergreen and give a uniform shade all year

(C) provide dense shade in summer yet, after shedding their leaves, let the winter sun through

(D) serve only to reduce soil erosion and have no thermal role

Urban and Regional Planning and Housing

Q34. A plot of area 500 m^2 is permitted a Floor Area Ratio (FAR / FSI) of 1.5, with the setbacks shown around a rectangular building envelope. The maximum permissible total built-up (floor) area on the plot is: **[2 marks]**



(A) 750 m^2

(B) 333 m^2

(C) 500 m^2

(D) 1500 m^2

Q35. The "Garden City" concept, which proposed planned, self-contained towns of limited size, surrounded by permanent agricultural greenbelts and combining the benefits of town and country, was put forward in 1898 by: **[2 marks]**

(A) Patrick Geddes

(B) Le Corbusier

(C) Clarence Perry

(D) Ebenezer Howard

Q36. The "Neighbourhood Unit" concept, in which a residential cell is sized around the catchment (walking distance) of a single elementary school

placed at its centre, with through-traffic kept to the periphery, was formulated by: [2 marks]

(A) Ebenezer Howard

(B) Patrick Geddes

(C) Clarence Perry

(D) Constantinos Doxiadis

Q37. The planning dictum "Diagnosis before treatment / Survey before Plan" and the analytical framework of "Place – Work – Folk" are associated with the pioneering planner and biologist: [2 marks]

(A) Le Corbusier

(B) Clarence Stein

(C) Constantinos Doxiadis

(D) Patrick Geddes

Q38. A residential development houses a population of 5000 persons over a gross site area of 25 hectares. The gross residential density of the development is: [2 marks]

(A) 100 persons/ha

(B) 200 persons/ha

(C) 125 persons/ha

(D) 500 persons/ha

Q39. The science of human settlements – their study, planning and development at all scales from a single room to the whole ecumene – developed by Constantinos A. Doxiadis, is known as: [2 marks]

(A) Ekistics

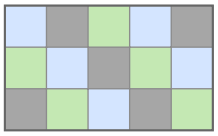
(B) Geomatics

(C) Conurbation theory

(D) Metabolism

Planning Techniques, Surveying and GIS

Q40. In a Geographic Information System, spatial data represented as a regular grid of cells (pixels), where each cell stores a single value for the phenomenon being mapped, as shown, belongs to the: **[2 marks]**



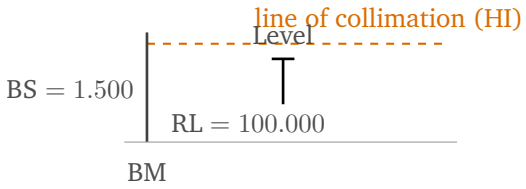
(A) Vector data model

(B) Topological data model

(C) Attribute (tabular) data model

(D) Raster data model

Q41. In differential levelling, a level is set up and a staff reading (back sight) of 1.500 m is taken on a benchmark whose reduced level is 100.000 m, as shown. The height of the instrument (line of collimation) is: **[2 marks]**



(A) 98.500 m

(B) 100.000 m

(C) 101.500 m

(D) 1.500 m

Q42. The method of population forecasting that assumes the population increases by a constant *percentage* in each successive decade (that is, at a constant rate of compound growth) is the: **[2 marks]**

(A) Arithmetic increase method

(B) Geometric increase method

(C) Incremental increase method

(D) Graphical extension method

Q43. In the vector data model of a GIS, a road centreline running across a city is most appropriately represented as a: [2 marks]

(A) Line (polyline) feature

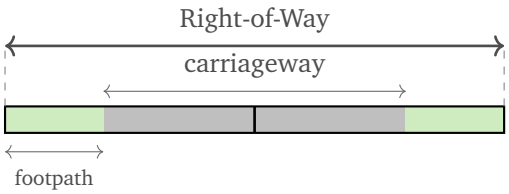
(B) Polygon feature

(C) Single raster cell

(D) Point feature

Infrastructure, Services and Transportation Planning

Q44. In the road cross-section shown, the term "right-of-way" (ROW) of the road denotes: [2 marks]



(A) the width of the carriageway (paved travel lanes) only

(B) the width of the central median only

(C) the width of one footpath only

(D) the total width of land acquired and reserved for the road, including carriageway, shoulders, footpaths, drains and future widening

Q45. In designing the pumping and treatment units of a municipal water-supply scheme, the "maximum daily demand" is usually taken as approximately how many times the average daily demand? [2 marks]

(A) 1.0 times

(B) 1.8 times

(C) 2.7 times

(D) 3.0 times

Q46. In the classical four-stage urban transportation planning process (four-step model), the stage that estimates the total number of trips produced by and attracted to each traffic-analysis zone is called: **[2 marks]**

(A) Trip distribution

(B) Modal split

(C) Trip generation

(D) Traffic assignment

Detailed Solutions

Q1.

Solution

Concept – the Five Points and the pioneers of the Modern Movement: The "Five Points of a New Architecture" were a manifesto for a new building language made possible by the reinforced-concrete frame.

Step 1 – recall the author of the Five Points: The pilotis (slender columns lifting the mass off the ground), the free plan, the free facade, the horizontal ribbon window and the roof garden were all set out by **Le Corbusier**.

Step 2 – match them to the building: The Villa Savoye at Poissy is the canonical demonstration of all five points in a single house, and it is a Le Corbusier work.

Why the other options are wrong:

- Gropius founded the Bauhaus but did not author the Five Points.
- Wright is known for organic architecture and the Prairie house (for example Fallingwater), a different idiom.
- Mies van der Rohe is associated with "less is more" and the steel-and-glass pavilion, not the Five Points.

Final Answer: Le Corbusier $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q1

Q2.

Solution

Concept – iconic 20th-century architecture and its authors: The Sydney Opera House is one of the most recognisable buildings of the modern era, defined by its interlocking precast concrete "shells".

Step 1 – recall the design competition: The 1957 international competition for the Sydney Opera House was won by the Danish architect **Jørn Utzon**.

Step 2 – confirm the attribution: Utzon's shell geometry (later rationalised as segments of a single sphere) is the building's signature, so he is the correct author.

Why the other options are wrong:

- Eero Saarinen designed the TWA Terminal, another expressive shell form, but not this building.

- Louis Kahn is known for monumental masonry works such as the IIM Ahmedabad and the Salk Institute.
- Kenzo Tange was a leading Japanese Metabolist (for example the Yoyogi gymnasia), not the Opera House architect.

Final Answer: Jørn Utzon $\Rightarrow$ B

Answer: (B) Go Back to Q2

Q3.

Solution

Concept – the golden ratio as a proportioning system: The golden ratio φ is defined so that dividing a line so the whole is to the larger part as the larger part is to the smaller part gives the same ratio.

Step 1 – write the defining equation: $\frac{a+b}{a} = \frac{a}{b} = \varphi$

Step 2 – solve for φ: This leads to $\varphi^2 = \varphi + 1$, whose positive root is $\varphi = \frac{1+\sqrt{5}}{2}$.

Step 3 – evaluate: $\varphi = \frac{1+2.236}{2} = \frac{3.236}{2} = 1.618$

Why the other options are wrong:

- $1.414 = \sqrt{2}$, the ratio of the sides of an A-series (ISO 216) paper sheet.
- $1.732 = \sqrt{3}$, a different irrational.
- $3.142 = \pi$, the circle constant.

Final Answer: $\varphi \approx 1.618 \Rightarrow$ D

Answer: (D) Go Back to Q3

Q4.

Solution

Concept – classifying historic Indian architecture by dynasty and idiom: Styles are grouped by the period, patrons and formal vocabulary (domes, arches, temple towers, gardens).

Step 1 – read the key features named: A large bulbous double dome, four detached minarets, pointed arches, white marble inlay and a formal four-quartered (char-bagh) garden.

Step 2 – match to a style: These are hallmarks of **Mughal architecture**, the Indo-

Islamic idiom of the 16th–17th centuries; the Taj Mahal (built under Shah Jahan) is its most famous monument.

Why the other options are wrong:

- Dravidian architecture is the South Indian temple style of towering gopurams and pyramidal vimanas.
- Indo-Gothic is a colonial-era British hybrid (for example the CSMT railway station, Mumbai).
- Nagara is the North Indian temple style with a curvilinear shikhara, not a dome-and-minaret tomb.

Final Answer: Mughal architecture $\Rightarrow$ C

Answer: (C) Go Back to Q4

Q5.

Solution

Concept – the Bauhaus and its founder: The Bauhaus was a German school that fused fine art, craft and industrial design and became the crucible of the Modern Movement.

Step 1 – recall the founding: The Bauhaus was founded at Weimar in **1919** by **Walter Gropius**, who wrote its founding manifesto.

Step 2 – confirm the succession: Gropius was its first director; he was later followed by Hannes Meyer and then Mies van der Rohe, but the *founder* was Gropius.

Why the other options are wrong:

- Le Corbusier was a contemporary pioneer in France, not connected with founding the Bauhaus.
- Mies van der Rohe was the third and last director, not the founder.
- Hannes Meyer was the second director, again not the founder.

Final Answer: Walter Gropius $\Rightarrow$ D

Answer: (D) Go Back to Q5

Q6.

Solution

Concept – distinguishing the classical Greek orders by their capitals: The order is read most easily from the capital that crowns the column.

Step 1 – describe the three capitals: The **Doric** capital is a plain, unadorned cushion (echinus) under a square abacus; the **Ionic** has a pair of spiral volutes (scrolls); the **Corinthian** has slender bell-shaped foliage of acanthus leaves.

Step 2 – pick the plainest: The simplest and sturdiest, with no scroll or leaf ornament, is the **Doric** order (Order Z in the figure).

Why the other options are wrong:

- Corinthian (Order X) is the most ornate, with acanthus foliage.
- Ionic (Order Y) carries the scroll-like volutes.
- Composite is a later Roman order combining Ionic volutes with Corinthian leaves, hence not the plainest.

Final Answer: Doric order $\Rightarrow$ C

Answer: (C) Go Back to Q6

Q7.

Solution

Concept – the ordering principles of architectural composition: Standard principles include axis, symmetry, hierarchy, rhythm, datum and transformation.

Step 1 – read the arrangement: Identical elements are placed in balance, at equal distances, on both sides of a single central axis.

Step 2 – name the principle: A balanced, mirror-image arrangement about a common axis is **symmetry** (here bilateral symmetry).

Why the other options are wrong:

- Rhythm is the regular repetition of elements, which need not be mirrored about an axis.
- Hierarchy is the emphasis of one element over others by size, shape or placement.
- Contrast relies on marked difference between elements, the opposite of the identical balance described.

Final Answer: Symmetry $\Rightarrow$ D

Answer: (D) Go Back to Q7

Q8.

Solution

Concept – Le Corbusier's anthropometric proportioning system: Le Corbusier sought a scale of measurement that was both based on the human body and mathematically harmonious.

Step 1 – recall the system: He devised the **Modulor**, taking a standing man (later fixed at 1.83 m with an upraised arm at 2.26 m) and subdividing his height using the golden ratio to produce a series of harmonious dimensions.

Step 2 – note its use: The Modulor was applied to size doors, ceiling heights and furniture, notably at the Unité d'Habitation, Marseille.

Why the other options are wrong:

- The Ken is a traditional Japanese unit of length, not Le Corbusier's system.
- "Vitruvian scale" is not a defined proportioning system; Vitruvius wrote on proportion but this is not the term.
- "Metric handbook" is a general architectural data reference, not a proportioning system.

Final Answer: Modulor $\Rightarrow$ C

Answer: (C) Go Back to Q8

Q9.

Solution

Concept – the lime cycle: Limestone is processed through burning and then hydration before use in mortar.

Step 1 – name the reaction: Adding water to quicklime (CaO) gives $CaO + H_2O \rightarrow Ca(OH)_2$ with a strong release of heat. This step is called **slaking**, and the product is slaked (hydrated) lime.

Step 2 – contrast with the earlier step: Burning limestone $CaCO_3 \rightarrow CaO + CO_2$ (driving off carbon dioxide) is *calcination*, which happens *before* slaking.

Why the other options are wrong:

- Calcination is the burning of limestone to quicklime, not the addition of water.

- Vitrification is the fusing of clay into a glassy mass at high temperature (in bricks/tiles).
- Efflorescence is the white salt deposit on a masonry surface from soluble salts, unrelated to slaking.

Final Answer: Slaking $\Rightarrow$ A

Answer: (A) Go Back to Q9

Q10.

Solution

Concept – actual size versus modular (co-ordinating) size of a brick: The modular size adds the thickness of the mortar joint to each dimension of the brick.

Step 1 – list the actual size and the joint: Actual size $= 190 \times 90 \times 90$ mm; standard mortar joint $= 10$ mm.

Step 2 – add the joint to each dimension: Length $= 190 + 10 = 200$ mm; width $= 90 + 10 = 100$ mm; height $= 90 + 10 = 100$ mm.

Step 3 – write the modular size: Modular (nominal) size $= 200 \times 100 \times 100$ mm.

Step 4 – note the convenience: This round modular size lets bricks and joints stack neatly on a 100 mm planning grid.

Why the other options are wrong:

- $190 \times 90 \times 90$ is the actual size without the joint.
- $230 \times 115 \times 75$ is the older "traditional" (non-modular) Indian brick.
- $210 \times 110 \times 110$ wrongly adds a 20 mm joint to the length.

Final Answer: $200 \times 100 \times 100$ mm $\Rightarrow$ A

Answer: (A) Go Back to Q10

Q11.

Solution

Concept – setting-time limits for ordinary Portland cement: IS specifications set a minimum initial setting time and a maximum final setting time.

Step 1 – recall the initial setting time limit: For ordinary Portland cement the initial setting time must *not be less than* **30 minutes**.

Step 2 – recall the final setting time for context: The final setting time must not

be more than 600 minutes (10 hours).

Step 3 – explain the reason: A minimum initial set of 30 minutes leaves enough time to mix, transport, place and compact the concrete before it stiffens.

Why the other options are wrong:

- 10 minutes is too short and would not allow placing.
- 60 minutes is above the specified minimum; the code sets 30 minutes as the limit.
- 600 minutes is the limit for the *final* setting time, not the initial.

Final Answer: 30 minutes $\Rightarrow$ B

Answer: (B) Go Back to Q11

Q12.

Solution

Concept – floats in network (CPM) analysis: Float measures how much an activity can be shifted without affecting other activities or the project.

Step 1 – define total float: Total float = (latest finish − earliest finish) = (latest start − earliest start). It is the maximum delay an activity can absorb *without delaying project completion*.

Step 2 – match to the description: The question describes exactly this: delay possible without pushing the project end date. That is **total float**.

Why the other options are wrong:

- Free float is the delay possible without disturbing the *early start of the following* activity, a stricter (usually smaller) quantity.
- Independent float is the delay possible with predecessors late and successors early; smaller still.
- Interfering float is the part of total float that, if used, delays a following activity (total − free).

Final Answer: Total float $\Rightarrow$ D

Answer: (D) Go Back to Q12

Q13.

Solution

Concept – naming common defects in timber: Defects are grouped by their cause (growth, seasoning, conversion).

Step 1 – describe a shake: A **shake** is a lengthwise separation (crack) of the wood fibres, and a *ring* or *cup* shake runs *along* (between) the annual growth rings.

Step 2 – match to the description: The question specifies separation of fibres along the annual rings, which is precisely a shake.

Why the other options are wrong:

- A knot is the hard, cross-grained base of a branch embedded in the trunk.
- A wane is the original rounded (bark) surface left on the edge of a sawn piece.
- A burr is a swelling/knotty growth on the trunk, not a fibre separation.

Final Answer: Shake $\Rightarrow$ B

Answer: (B) Go Back to Q13

Q14.

Solution

Concept – classifying shallow foundations by their form: The foundation type is read from how many columns it serves and its shape.

Step 1 – read the section: A single continuous reinforced-concrete slab spreads under the whole building and supports every column and wall.

Step 2 – name it: A foundation slab covering the entire plan area is a **raft (mat) foundation**. It is used where soil bearing capacity is low or column loads are heavy and close, so that individual footings would overlap.

Why the other options are wrong:

- An isolated footing supports a single column only.
- A combined footing supports just two (or a few) columns on one pad.
- A pile foundation is a deep foundation carrying loads to firm strata below, not a surface slab.

Final Answer: Raft (mat) foundation $\Rightarrow$ B

Answer: (B) Go Back to Q14

Q15.

Solution

Concept – why tempered (toughened) glass is stronger: The strengthening comes from how the glass is cooled, not from its composition or thickness.

Step 1 – describe the process: The glass is heated and then chilled rapidly at its surfaces. The surfaces solidify first and, as the core cools and contracts, it pulls the already-set surfaces into **permanent compression**.

Step 2 – explain the effect: Glass fails in tension by crack growth. An applied tensile load must first overcome the built-in surface compression before any tension can develop, so the glass can carry far higher loads and, on failure, dices into small blunt fragments.

Why the other options are wrong:

- Thickness is not changed by tempering; toughened and annealed sheets of equal thickness differ only in the stress state.
- Colour pigments do not add strength.
- An embedded wire mesh describes *wired* glass, a different product used for fire integrity.

Final Answer: residual surface compressive stresses $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q15

Q16.

Solution

Concept – bending moment at the fixed end of a cantilever: For a cantilever with an end point load, the fixed support carries the full moment of that load about the support.

Step 1 – list the data: Load $W = 10$ kN at the free end; length (lever arm) $L = 4$ m.

Step 2 – take moments about the fixed support: $M = W \times L$

Step 3 – substitute: $M = 10 \times 4$

Step 4 – evaluate: $M = 40$ kN·m (hogging).

Why the other options are wrong:

- 10 kN·m and 20 kN·m use a wrong (too short) lever arm.
- 2.5 kN·m divides the load by the length instead of multiplying.

Final Answer: $M = 40$ kN·m $\Rightarrow$ C

Answer: (C) Go Back to Q16

Q17.

Solution

Concept – structural systems and how their members carry load: Systems differ in whether members carry load by bending or by pure axial force.

Step 1 – read the description: Straight members are triangulated and pin-connected so that each member carries only axial tension or compression.

Step 2 – name the system: This is a **truss**. Triangulation makes it geometrically stable, and with loads applied at the joints, bending in the members is negligible.

Why the other options are wrong:

- A rigid frame carries load through bending and shear at its rigid joints, not pure axial force.
- A shear wall is a solid planar element resisting in-plane (lateral) loads, not a triangulated set of bars.
- A flat slab is a two-way concrete plate carrying load in flexure.

Final Answer: Truss $\Rightarrow$ B

Answer: (B) Go Back to Q17

Q18.

Solution

Concept – the stair comfort rule relating riser and tread: Comfortable stairs follow $2R + T \approx 600$ mm (values around 550–650 mm are acceptable).

Step 1 – write the rule with the given riser: $2R + T = 600$, with $R = 150$ mm.

Step 2 – substitute the riser: $2(150) + T = 600$

Step 3 – compute $2R$: $2 \times 150 = 300$

Step 4 – solve for T: $T = 600 - 300$

$T = 300$ mm

Why the other options are wrong:

- 150 mm equals the riser, not the tread, and would make a very steep stair.
- 450 mm ignores the $2R$ term.

- 250 mm does not satisfy $2R + T = 600$ with $R = 150$.

Final Answer: $T = 300$ mm $\Rightarrow$ C

Answer: (C) Go Back to Q18

Q19.

Solution

Concept – classifying building loads: Loads are grouped by their nature: permanent self-weight, movable occupancy loads, and environmental loads.

Step 1 – read the description: A permanent, fixed, static load arising from the self-weight of the building's own components.

Step 2 – name it: This is the **dead load** – the weight of slabs, beams, columns, walls, floor finishes and fixed services.

Why the other options are wrong:

- Live (imposed) loads are movable occupancy loads (people, furniture) that vary in place and time.
- Wind load is a lateral environmental load from air pressure.
- Seismic load arises from ground shaking during an earthquake.

Final Answer: Dead load $\Rightarrow$ A

Answer: (A) Go Back to Q19

Q20.

Solution

Concept – the roles of members in a framed structure: Each member type has a primary structural function.

Step 1 – identify horizontal load-carrying members: Horizontal members that span between columns and carry floor/roof loads mainly by bending are **beams**.

Step 2 – trace the load path: Slab $\rightarrow$ beams (bending) $\rightarrow$ columns (axial compression) $\rightarrow$ footings $\rightarrow$ soil.

Why the other options are wrong:

- Columns are vertical members carrying axial load, not horizontal spanning members.
- Footings spread the column load onto the soil.

- Bracings are diagonal members that resist lateral (sway) loads, not the primary vertical-load carriers.

Final Answer: Beams $\Rightarrow$ D

Answer: (D) Go Back to Q20

Q21.

Solution

Concept – maximum moment for a simply supported beam with a central point load: $M_{\max} = \dfrac{WL}{4}$, occurring under the load at midspan.

Step 1 – list the data: $W = 60$ kN, span $L = 6$ m.

Step 2 – find the support reactions: By symmetry $R_A = R_B = \dfrac{60}{2} = 30$ kN.

Step 3 – take the moment at midspan: $M_{\max} = R_A \times \dfrac{L}{2} = 30 \times 3 = 90$ kN·m.

Step 4 – confirm with the standard formula: $M_{\max} = \dfrac{WL}{4} = \dfrac{60 \times 6}{4} = \dfrac{360}{4} = 90$ kN·m, which agrees.

Why the other options are wrong:

- 45 kN·m halves the correct value.
- 180 kN·m uses $WL/2$, appropriate to a different load case.
- 60 kN·m simply repeats the load magnitude.

Final Answer: $M_{\max} = 90$ kN·m $\Rightarrow$ A

Answer: (A) Go Back to Q21

Q22.

Solution

Concept – solar altitude of the noon sun on the equinox: On an equinox the sun's declination is $0°$, so at solar noon the altitude depends only on the latitude.

Step 1 – write the noon-altitude relation for the equinox: $\alpha = 90° - \phi$, where ϕ is the latitude of the place.

Step 2 – substitute the latitude: $\alpha = 90° - 28°$

Step 3 – evaluate: $\alpha = 62°$

Step 4 – interpret: The noon sun stands $62°$ above the horizon (equivalently $28°$

from the vertical, since the zenith angle equals the latitude on the equinox).

Why the other options are wrong:

- 28° is the zenith angle (from vertical), not the altitude.
- 90° would require the place to be on the equator.
- 45° corresponds to a latitude of 45°, not 28°.

Final Answer: $\alpha = 62^\circ \Rightarrow$ C

Answer: (C) Go Back to Q22

Q23.

Solution

Concept – Sabine's reverberation-time formula: $\mathrm{RT}_{60} = \dfrac{0.161\,V}{A}$, with V in m^3 and A the total absorption in sabins.

Step 1 – list the data: $V = 300\ \mathrm{m}^3$, $A = 40$ sabins.

Step 2 – compute the numerator: $0.161 \times 300 = 48.3$

Step 3 – divide by the absorption: $\mathrm{RT}_{60} = \dfrac{48.3}{40}$

Step 4 – evaluate: $\mathrm{RT}_{60} = 1.2075 \approx 1.21$ s

Why the other options are wrong:

- 0.80 s and 0.40 s would need a much larger absorption.
- 2.42 s is double the correct value (as if $A = 20$).

Final Answer: $\mathrm{RT}_{60} \approx 1.21$ s $\Rightarrow$ B

Answer: (B) Go Back to Q23

Q24.

Solution

Concept – recommended illuminance for visual tasks: Lighting standards prescribe higher lux for finer, more sustained visual work.

Step 1 – recall the office value: General office work involving continuous reading and writing needs a maintained illuminance of about **300–500 lux** (commonly ~300 lux for routine work, ~500 lux for demanding tasks).

Step 2 – place it in the scale: This sits between low-demand circulation lighting

($\sim$100–150 lux) and very fine work such as drawing or inspection (≥ 750 lux).

Why the other options are wrong:

- 50 lux and 20 lux suit only corridors, storage or emergency lighting; far too dim for reading.
- 2000 lux is for very fine detailed work (fine assembly, operating theatres), well above general office needs.

Final Answer: 300–500 lux $\Rightarrow$ B

Answer: (B) Go Back to Q24

Q25.

Solution

Concept – per-capita water demand for town water supply: Design manuals split the total demand into domestic and other (industrial, public, fire, losses) shares.

Step 1 – recall the domestic figure: The average *domestic* per-capita demand adopted for Indian towns is about **135 litres per capita per day (lpcd)**.

Step 2 – note the total: Adding institutional, industrial and public uses plus unavoidable losses raises the *total* adopted demand to roughly 200–270 lpcd, but the domestic component alone is about 135 lpcd.

Why the other options are wrong:

- 45 lpcd and 70 lpcd are minimum/low-service or rural figures, not the standard town domestic demand.
- 335 lpcd overstates domestic use; it is closer to a very high total including all uses.

Final Answer: 135 lpcd $\Rightarrow$ C

Answer: (C) Go Back to Q25

Q26.

Solution

Concept – reading a psychrometric process: On the psychrometric chart the horizontal axis is dry-bulb temperature and the vertical axis is humidity ratio (moisture content).

Step 1 – describe the process: Cooling moist air *at constant humidity ratio* moves the state point horizontally to the left, keeping the moisture content fixed.

Step 2 – identify where condensation begins: Moisture starts to condense the instant the state point reaches the saturation (100% relative humidity) curve. The temperature at that point is the **dew-point temperature**.

Why the other options are wrong:

- Dry-bulb temperature is the starting (measured) air temperature, higher than the dew point.
- Wet-bulb depression is the difference between dry-bulb and wet-bulb temperatures, not a temperature itself.
- Globe temperature is a comfort/radiant index from a black globe thermometer, unrelated to condensation onset.

Final Answer: Dew-point temperature $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q26

Q27.

Solution

Concept – the purpose of the Mahoney tables: The Mahoney tables are a climatic design tool used early in the design of buildings for warm climates.

Step 1 – describe the input: They take monthly climatic data – mean maximum and minimum temperatures, humidity and rainfall – and compare them against comfort limits to flag stress (too hot, too humid, too cold).

Step 2 – describe the output: From those "indicators" the tables yield qualitative **design recommendations**: building layout and orientation, spacing for air movement, size and position of openings, need for shading, and the character of walls and roofs.

Why the other options are wrong:

- Structural loads come from structural codes, not the Mahoney tables.
- Water demand is a public-health/utilities calculation.

- Soil bearing capacity is a geotechnical property, unrelated to climate tables.

Final Answer: climate-based design recommendations $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q27

Q28.

Solution

Concept – the water seal in a drainage system: Sanitary fittings must stop foul sewer gases from rising back into occupied spaces.

Step 1 – describe the device: A **trap** is a U-, P- or S-shaped bend that retains a small standing column of water. This water seal physically blocks the passage of gas while still letting waste water flow through.

Step 2 – note typical traps: The bend below a water closet or a gully, and the bottle trap under a wash basin, are all traps providing this seal (commonly 50 mm deep).

Why the other options are wrong:

- A vent pipe admits air to protect the seal from siphonage; it does not itself hold the seal.
- A cleanout is an access point for rodding a blockage.
- An inspection chamber is a manhole-like access on the drain line, not the fitting that holds the water seal at the appliance.

Final Answer: Trap $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q28

Q29.

Solution

Concept – Kevin Lynch's five elements of the city image: In *The Image of the City*, Lynch showed that people read a city through five kinds of physical element.

Step 1 – list the four given: Paths (channels of movement), edges (linear boundaries), districts (areas with a common character) and nodes (strategic focal points).

Step 2 – supply the fifth: The fifth element is **landmarks** – prominent point references (a tower, dome or hill) that people use as external orientation cues.

Why the other options are wrong:

- Plazas and corridors are types of urban space, not part of Lynch's five-element set.
- Skylines are a visual impression, not one of the five named elements.

Final Answer: Landmarks $\Rightarrow$ A

Answer: (A) Go Back to Q29

Q30.

Solution

Concept – the figure-ground technique of urban analysis: Urban form can be read by showing built mass and open space as a two-tone (solid/void) plan.

Step 1 – describe the drawing: Buildings (the "figure") are filled solid black and the unbuilt space (the "ground") is left white. The resulting pattern reveals the grain, density and continuity of the urban fabric.

Step 2 – name it: This is the **figure-ground map**, the type made famous by Giambattista Nolli's 1748 plan of Rome.

Why the other options are wrong:

- A contour map shows ground elevation with contour lines, not solid/void built form.
- An isometric projection is a 3D pictorial view, not a solid-void plan.
- A choropleth land-value map shades zones by an attribute value, a different technique.

Final Answer: Figure-ground (Nolli) map $\Rightarrow$ B

Answer: (B) Go Back to Q30

Q31.

Solution

Concept – the two families of landscape material: Landscape elements are broadly split into the living and the constructed.

Step 1 – define the term: The constructed, non-living, hard-surfaced elements – paving, steps, retaining walls, kerbs, pergolas and water features – are collectively the **hardscape**.

Step 2 – contrast with softscape: The living plant material – trees, shrubs, groundcover, lawns – is the *softscape*. A good landscape balances the two.

Why the other options are wrong:

- Softscape is the living, planted material, the opposite of what is described.
- Xeriscape is a low-water planting approach, not the hard elements.
- A greenway is a linear open-space corridor, not a material category.

Final Answer: Hardscape $\Rightarrow$ D

Answer: (D) Go Back to Q31

Q32.

Solution

Concept – Gordon Cullen's townscape idea of serial vision: Cullen argued that a town is experienced not as a static plan but as a moving sequence of views.

Step 1 – describe the idea: As a pedestrian walks through a town, existing and emerging views are revealed one after another. Each turn brings a fresh picture, so the townscape unfolds as a series of contrasts.

Step 2 – name it: Cullen called this **serial vision**, a central concept of his book *The Concise Townscape*.

Why the other options are wrong:

- Functional zoning separates land uses; it is a planning device, not a way of experiencing views.
- Ribbon development is uncontrolled linear growth along a road.
- Gridiron planning is a rectangular street layout, not a visual-sequence concept.

Final Answer: Serial vision $\Rightarrow$ A

Answer: (A) Go Back to Q32

Q33.

Solution

Concept – deciduous trees as seasonal solar controls: A deciduous tree changes its shading behaviour with the seasons because it drops its leaves.

Step 1 – summer behaviour: In summer the tree is in full leaf. Its dense canopy intercepts the strong overhead sun and shades the south/west facade, cutting heat gain.

Step 2 – winter behaviour: In winter the tree is bare. The low winter sun passes through the leafless branches and warms the building, which is desirable in a composite/temperate climate.

Step 3 – state the combined benefit: Thus the same tree gives shade when it is wanted (summer) and lets the sun in when it is wanted (winter).

Why the other options are wrong:

- Blocking the winter sun is the opposite of the desired (and actual) behaviour.
- Deciduous trees are not evergreen; that is what lets them shed leaves.
- Reducing soil erosion is a side benefit but not the thermal reason given.

Final Answer: summer shade yet winter sun after leaf-fall $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q33

Q34.

Solution

Concept – Floor Area Ratio (FAR / FSI): FAR is the ratio of the total built-up (floor) area of all floors to the plot area: $\text{FAR} = \dfrac{\text{total floor area}}{\text{plot area}}$.

Step 1 – rearrange for the floor area: Total floor area $=$ FAR $\times$ plot area.

Step 2 – list the data: Plot area $= 500$ m^2, FAR $= 1.5$.

Step 3 – substitute: Total floor area $= 1.5 \times 500$

Step 4 – evaluate: Total floor area $= 750$ m^2.

Step 5 – interpret: The 750 m^2 may be distributed over several floors within the setback envelope (for example two floors of 375 m^2 each), but the total is capped at 750 m^2.

Why the other options are wrong:

- 333 m^2 divides by FAR instead of multiplying.

- $500\ \text{m}^2$ is the plot area (FAR $= 1$).
- $1500\ \text{m}^2$ uses FAR $= 3$.

Final Answer: $750\ \text{m}^2 \Rightarrow$ A

Answer: (A) Go Back to Q34

Q35.

Solution

Concept – the Garden City movement: The Garden City was a reformist answer to the overcrowded, polluted 19th-century industrial city.

Step 1 – recall the proposal: Planned towns of limited population, self-contained for living and work, ringed by permanent agricultural greenbelts, combining the amenities of town with the healthfulness of country.

Step 2 – name the author: This was set out by **Ebenezer Howard** in *To-morrow: A Peaceful Path to Real Reform* (1898), later *Garden Cities of To-morrow*. Letchworth and Welwyn were built on his ideas.

Why the other options are wrong:

- Patrick Geddes contributed "survey before plan" and regional survey, not the Garden City.
- Le Corbusier proposed the high-density Radiant City (Ville Radieuse), a contrasting model.
- Clarence Perry authored the Neighbourhood Unit, a different concept.

Final Answer: Ebenezer Howard $\Rightarrow$ D

Answer: (D) Go Back to Q35

Q36.

Solution

Concept – the Neighbourhood Unit: This is a planning cell organised around the daily needs and safe movement of residents, especially children.

Step 1 – recall the sizing principle: The unit is sized so that an elementary school at its centre lies within a comfortable walking radius (about 400 m / quarter-mile) of every home, and arterial through-traffic is routed to the edges.

Step 2 – name the author: This is **Clarence Perry**'s Neighbourhood Unit (1929), developed for the Regional Plan of New York.

Why the other options are wrong:

- Ebenezer Howard proposed the Garden City, a whole-town concept.
- Patrick Geddes is known for regional survey and conservative surgery.
- Doxiadis developed Ekistics, the science of settlements, not this specific cell.

Final Answer: Clarence Perry $\Rightarrow$ C

Answer: (C) Go Back to Q36

Q37.

Solution

Concept – Patrick Geddes and the survey-based method of planning: Geddes, a biologist turned planner, insisted that planning must grow out of a thorough understanding of a place.

Step 1 – recall his dictum: "Diagnosis before treatment" / "Survey before Plan": study the town's geography, economy and society before proposing changes.

Step 2 – recall his triad: His analytical framework was **Place – Work – Folk** (adapted from Le Play's Lieu – Travail – Famille), linking environment, economy and people.

Step 3 – attribute: Both ideas belong to **Patrick Geddes**, who also advocated "conservative surgery" for old towns.

Why the other options are wrong:

- Le Corbusier is associated with the Radiant City and tabula-rasa planning.
- Clarence Stein is linked to Radburn and the superblock.
- Doxiadis developed Ekistics, a different framework.

Final Answer: Patrick Geddes $\Rightarrow$ D

Answer: (D) Go Back to Q37

Q38.

Solution

Concept – gross residential density: Density = population per unit area of land.

Step 1 – write the relation: $\text{Density} = \dfrac{\text{population}}{\text{gross area}}$

Step 2 – list the data: Population $= 5000$ persons; gross area $= 25$ ha.

Step 3 – substitute: Density $= \dfrac{5000}{25}$

Step 4 – evaluate: Density $= 200$ persons/ha.

Why the other options are wrong:

- 100 persons/ha uses 50 ha or half the population.
- 125 persons/ha does not follow from the given figures.
- 500 persons/ha divides by 10 ha instead of 25 ha.

Final Answer: 200 persons/ha $\Rightarrow$ B

Answer: (B) Go Back to Q38

Q39.

Solution

Concept – Doxiadis and the science of settlements: Doxiadis sought a systematic, multi-scale science covering all human settlements.

Step 1 – name the science: He called it **Ekistics**, the science of human settlements, spanning scales from the individual room and dwelling up to the metropolis and the worldwide "Ecumenopolis".

Step 2 – note its structure: Ekistics analyses settlements through five elements – Nature, Man, Society, Shells (buildings) and Networks.

Why the other options are wrong:

- Geomatics is the discipline of gathering and managing spatial data (surveying, GIS, remote sensing).
- A conurbation is a merged urban region (a term from Geddes), not Doxiadis's science.
- Metabolism was a 1960s Japanese architectural movement, unrelated to Ekistics.

Final Answer: Ekistics $\Rightarrow$ A

Answer: (A) Go Back to Q39

Q40.

Solution

Concept – the two data models in a GIS: Spatial data are stored either as discrete vector features or as a continuous grid of cells.

Step 1 – describe the grid: Data held as a regular matrix of cells (pixels), each cell carrying one value for the mapped variable, is the **raster data model**. Satellite images, elevation surfaces and land-cover grids are typical rasters.

Step 2 – contrast with vector: The vector model instead stores discrete features as points, lines and polygons defined by coordinates.

Why the other options are wrong:

- The vector model uses coordinate geometry, not a cell grid.
- The topological model records adjacency/connectivity relationships, not the cell structure itself.
- The attribute (tabular) model is the table of feature properties, not the spatial grid.

Final Answer: Raster data model $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q40

Q41.

Solution

Concept – height of instrument in the line-of-collimation method: The height of instrument (HI) is the reduced level of the line of sight: HI $=$ RL of point $+$ back sight on that point.

Step 1 – list the data: RL of benchmark $= 100.000$ m; back sight on it BS $= 1.500$ m.

Step 2 – add the back sight to the known RL: HI $= 100.000 + 1.500$

Step 3 – evaluate: HI $= 101.500$ m.

Step 4 – interpret: A back sight is added because the staff reading on the benchmark measures how far the line of sight is *above* the benchmark.

Why the other options are wrong:

- 98.500 m subtracts the back sight, which is the operation for a fore sight, not a back sight.
- 100.000 m ignores the back sight entirely.

- 1.500 m is just the staff reading, not a reduced level.

Final Answer: HI $= 101.500$ m $\Rightarrow$ C

Answer: (C) Go Back to Q41

Q42.

Solution

Concept – methods of population forecasting: The methods differ in the assumed pattern of decade-to-decade growth.

Step 1 – describe the geometric method: The **geometric increase method** assumes the population grows by a constant *percentage* each decade, i.e. compound growth: $P_n = P_0(1 + r)^n$.

Step 2 – match to the statement: "Constant percentage / constant rate of compound growth" is exactly the geometric increase (geometric progression) method.

Why the other options are wrong:

- The arithmetic increase method assumes a constant *absolute* increment per decade (linear growth).
- The incremental increase method assumes the increment itself changes by a constant amount each decade.
- The graphical method extends the past growth curve by eye, with no fixed rate assumption.

Final Answer: Geometric increase method $\Rightarrow$ B

Answer: (B) Go Back to Q42

Q43.

Solution

Concept – vector feature types in a GIS: The vector model represents real-world objects as points, lines or polygons according to their geometry.

Step 1 – classify a road centreline: A road is a long, essentially one-dimensional linear feature, so it is best represented as a **line (polyline)** defined by an ordered string of coordinates.

Step 2 – relate to attributes: Attributes such as name, width and surface type are then attached to that line feature.

Why the other options are wrong:

- A polygon represents an area feature (a lake, a parcel), not a linear road.
- A single raster cell is not a vector feature at all.
- A point represents a location with no length (a well, a bus stop), which cannot capture a road's linear extent.

Final Answer: Line (polyline) feature $\Rightarrow$ A

Answer: (A) Go Back to Q43

Q44.

Solution

Concept – right-of-way of a road: Road cross-section terms distinguish the paved travel way from the full land reservation.

Step 1 – define right-of-way: The **right-of-way (ROW)** is the *total width of land* acquired and legally reserved for the road, measured between the boundary lines on either side.

Step 2 – list what it contains: Within the ROW lie the carriageway, shoulders, medians, footpaths, cycle tracks, drains, verges, utility strips and space kept for future widening and services.

Step 3 – distinguish from the carriageway: The carriageway is only the paved portion for moving vehicles and is narrower than the ROW.

Why the other options are wrong:

- Options A, B and C each name only one component (carriageway, median or footpath) inside the ROW, not the whole reserved width.

Final Answer: total width of land reserved for the road $\Rightarrow$ D

Answer: (D) Go Back to Q44

Q45.

Solution

Concept – demand variation factors in water supply: Water demand fluctuates by season, day and hour, so design flows are multiples of the average.

Step 1 – recall the maximum-daily factor: The maximum daily demand is commonly taken as about **1.8 times** the average daily demand.

Step 2 – place it among the factors: For reference, the maximum hourly demand of the maximum day is about 2.7 times the average, and coincident draft/fire allowances raise design further. The maximum-*daily* factor specifically is ≈ 1.8.

Why the other options are wrong:

- 1.0 would ignore any variation and undersize the works.
- 2.7 is the maximum-*hourly* (peak-hour) factor, used to size distribution mains, not the maximum-daily factor.
- 3.0 overstates the daily peaking factor.

Final Answer: 1.8 times $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q45

Q46.

Solution

Concept – the four-step urban transportation planning model: The classical sequence is trip generation $\rightarrow$ trip distribution $\rightarrow$ modal split $\rightarrow$ traffic assignment.

Step 1 – identify the first stage: The stage that estimates *how many* trips are produced by and attracted to each traffic-analysis zone is **trip generation**. It answers "how many trips?" using land use, population and employment data.

Step 2 – contrast the later stages: Trip distribution links origins to destinations ("from where to where"); modal split divides trips among modes ("by which mode"); traffic assignment loads trips onto specific network routes ("by which path").

Why the other options are wrong:

- Trip distribution deals with pairing origins and destinations, not counting the totals per zone.
- Modal split allocates trips among transport modes.
- Traffic assignment routes the trips onto the network links.

Final Answer: Trip generation $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q46

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	D	2	B	3	D	4	C	5	D
6	C	7	D	8	C	9	A	10	A
11	B	12	D	13	B	14	B	15	A
16	C	17	B	18	C	19	A	20	D
21	A	22	C	23	B	24	B	25	C
26	A	27	B	28	A	29	A	30	B
31	D	32	A	33	C	34	A	35	D
36	C	37	D	38	B	39	A	40	D
41	C	42	B	43	A	44	D	45	B
46	C								