

GATE Architecture and Planning

Sample Paper – 9

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 $g = 9.81 \text{ m/s}^2$ unless stated otherwise.

Architecture, Design and History of Architecture

Q1. The rallying slogan of the Postmodern movement, “Less is a bore”, framed as a deliberate rejection of the orthodox modernist creed “Less is more”, was coined by: [1 mark]

- (A) Mies van der Rohe
- (B) Louis Sullivan
- (C) Le Corbusier
- (D) Robert Venturi

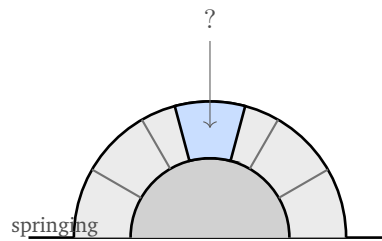


- Q2.** The Centre Pompidou in Paris (1977), the pioneering “inside-out” High-Tech building whose structure, ducts and escalators are pulled to the outside to free the interior floors, was designed by: [1 mark]
- (A) Renzo Piano and Richard Rogers
 - (B) Norman Foster and Ken Shuttleworth
 - (C) Frank Gehry
 - (D) I. M. Pei
- Q3.** The London office tower at 30 St Mary Axe, popularly called “The Gherkin”, a High-Tech tower with a diagonally braced (diagrid) glass skin and spiralling atria, was designed by: [1 mark]
- (A) Norman Foster
 - (B) Richard Rogers
 - (C) Renzo Piano
 - (D) Zaha Hadid
- Q4.** The AT&T Building in New York (1984), an emblem of Postmodernism famous for topping a modern skyscraper with a broken “Chippendale” pediment, was designed by: [1 mark]
- (A) Robert Venturi
 - (B) Michael Graves
 - (C) Charles Moore
 - (D) Philip Johnson
- Q5.** In the Vitruvian triad of the qualities of good architecture – “firmitas” (firmness) and “utilitas” (commodity/usefulness) – the third quality, “venustas”, is best translated as: [1 mark]
- (A) Economy



- (B) Delight (beauty)
- (C) Symmetry
- (D) Durability

Q6. In the masonry arch shown in the sketch, the single wedge-shaped voussoir at the very crown of the arch, which is set last and locks the whole ring in place, is called the: [1 mark]



- (A) Springer
- (B) Voussoir
- (C) Abutment
- (D) Keystone

Q7. The exuberant Postmodern public space “Piazza d’Italia” in New Orleans (1978), a stage-set collage of coloured classical colonnades, fountains and neon, was designed by: [1 mark]

- (A) Robert Venturi
- (B) Charles Moore
- (C) Aldo Rossi
- (D) Philip Johnson

Q8. The architectural movement that emerged in the 1970s celebrating exposed structural frames, ducts, lifts and other industrial components as the visible language of the building is known as: [1 mark]

- (A) Brutalism
- (B) High-Tech architecture

- (C) Deconstructivism
- (D) Art Nouveau

Building Construction, Materials and Management

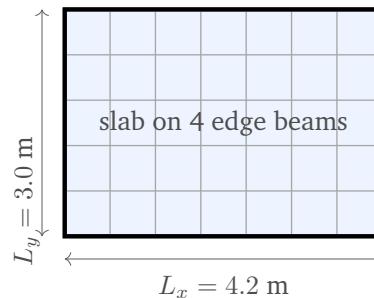
- Q9.** A thin metallic-oxide film applied to glazing that reflects long-wave infrared radiation while still transmitting most visible light, thereby cutting radiant heat gain in summer and heat loss in winter, is a: [1 mark]
- (A) Low-emissivity (low-E) coating
 - (B) Ordinary float glass
 - (C) Laminated (safety) glass
 - (D) Wired glass
- Q10.** A “smart” building material that stores and releases large quantities of latent heat as it melts and re-solidifies over a narrow temperature band, and is embedded in walls or ceilings to flatten indoor temperature swings, is a: [1 mark]
- (A) Fly-ash filler
 - (B) Phase Change Material (PCM)
 - (C) Geopolymer binder
 - (D) Air-entraining admixture
- Q11.** To lower the embodied carbon of concrete (“green concrete”) while improving its long-term durability, ordinary Portland cement is most commonly partially replaced by which industrial by-product? [1 mark]
- (A) Ground granulated blast-furnace slag (GGBS)
 - (B) Gypsum
 - (C) Bitumen
 - (D) Quicklime



Q12. In PERT, the expected time of an activity is $t_e = \frac{t_o + 4t_m + t_p}{6}$, where t_o , t_m and t_p are the optimistic, most-likely and pessimistic times. For $t_o = 3$ days, $t_m = 6$ days and $t_p = 15$ days, the expected time t_e is: [1 mark]

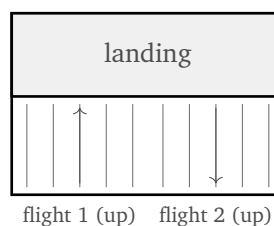
- (A) 6 days
- (B) 8 days
- (C) 9 days
- (D) 7 days

Q13. A reinforced-concrete floor slab supported on beams along all four edges, with the ratio of the longer span to the shorter span equal to 1.4 (i.e. ≤ 2) so that it bends in both directions, as shown in plan, is a: [1 mark]



- (A) Cantilever slab
- (B) One-way slab
- (C) Two-way slab
- (D) Flat plate

Q14. A dog-legged (half-turn) staircase connects two floors whose finished levels differ by 3.6 m, using two equal straight flights with a landing at mid-height, as shown in plan. The vertical rise of each single flight is: [1 mark]



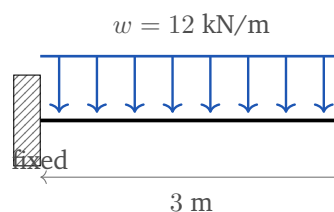
- (A) 3.6 m
- (B) 0.9 m
- (C) 1.8 m
- (D) 2.4 m

Q15. The tender document that lists, item by item, the measured quantities of every category of work together with their rates and amounts, and forms the basis for pricing and payment of a construction contract, is the: [1 mark]

- (A) Bar chart (Gantt chart)
- (B) Technical specification
- (C) Mood board
- (D) Bill of Quantities (BOQ)

Building Structures and Systems

Q16. A cantilever beam of length 3 m carries a uniformly distributed load of 12 kN/m over its entire length, as shown. The magnitude of the bending moment at the fixed support is: [1 mark]



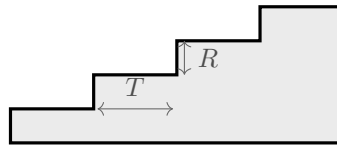
- (A) 18 kN·m
- (B) 36 kN·m
- (C) 54 kN·m
- (D) 108 kN·m

Q17. A vertical structural member whose main job is to carry axial compression, transferring the loads of the floors above down to the foundation, is a: [1 mark]



- (A) Column
- (B) Tie
- (C) Beam
- (D) Slab

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 tread of 250 mm, the corresponding riser is: [1 mark]



- (A) 300 mm
 - (B) 125 mm
 - (C) 150 mm
 - (D) 175 mm
- Q19.** On a tall building, the lateral (horizontal) load produced by moving air pressing on the windward face and suction on the leeward face is classified as the: [1 mark]
- (A) Live (imposed) load
 - (B) Wind load
 - (C) Dead load
 - (D) Impact load
- Q20.** In the limit-state design of reinforced concrete (IS 456), the partial safety factor applied to the characteristic loads for the basic combination of dead load plus imposed load is: [1 mark]

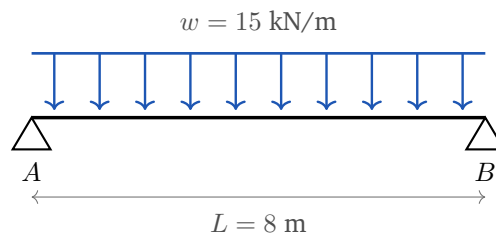
- (A) 1.0
- (B) 1.15



(C) 1.5

(D) 2.0

- Q21.** A simply supported beam of span 8 m carries a uniformly distributed load of 15 kN/m over its whole length, as shown. The maximum bending moment (at midspan) is: [2 marks]



(A) 120 kN·m

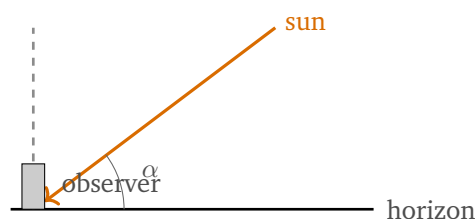
(B) 60 kN·m

(C) 240 kN·m

(D) 480 kN·m

Environmental Design and Building Services

- Q22.** At solar noon on an equinox day the sun stands vertically over the equator. For a location at latitude 23.5° N , the solar altitude angle of the noon sun on the equinox, measured up from the horizontal as shown, is: [2 marks]



(A) 23.5°

(B) 90°

(C) 45°

(D) 66.5°



Q23. Using Sabine's formula, the reverberation time of a hall is $RT_{60} = \frac{0.161 V}{A}$, where V is the room volume in m^3 and A is the total absorption in metric sabins. For $V = 600 m^3$ and $A = 120$ sabins, the reverberation time is nearest to: [2 marks]

- (A) 0.80 s
- (B) 1.61 s
- (C) 0.40 s
- (D) 3.22 s

Q24. In photometry, the SI unit of luminous flux – the total quantity of visible light emitted by a source per unit time – is the: [2 marks]

- (A) Lumen
- (B) Lux
- (C) Candela
- (D) Watt

Q25. In the hydraulic design of a sewer, the “self-cleansing velocity” – the minimum flow velocity that must be developed at least once a day so that suspended solids are not allowed to settle and choke the pipe – is usually taken as about: [2 marks]

- (A) 0.1 m/s
- (B) 3.0 m/s
- (C) 5.0 m/s
- (D) 0.6 m/s

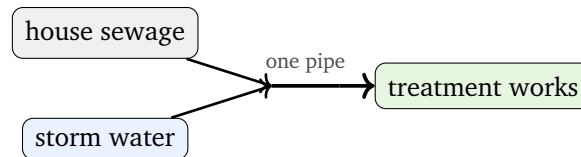
Q26. A buried two-chambered tank that gives on-site primary treatment of household sewage by letting solids settle and undergo anaerobic digestion while the clarified effluent flows on to a soak pit, used where no public sewer exists, is a: [2 marks]

- (A) Soak pit



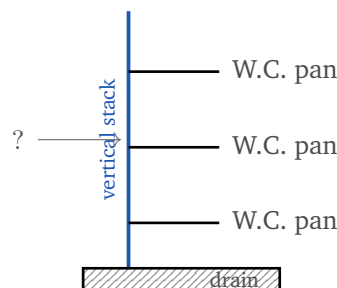
- (B) Septic tank
- (C) Manhole
- (D) Detritus tank

Q27. A town drainage arrangement in which domestic sewage and storm-water runoff are collected and carried together in one single set of pipes to the treatment works, as shown, is called the: [2 marks]



- (A) Separate system
- (B) Combined system
- (C) Partially separate system
- (D) Storm-only system

Q28. In the building drainage stack shown in section, the vertical pipe that conveys the discharge of water closets and urinals (containing human excreta) down to the drain is the: [2 marks]



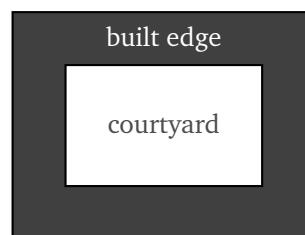
- (A) Vent pipe
- (B) Waste pipe
- (C) Soil pipe
- (D) Rainwater pipe



Q29. In Kevin Lynch's analysis of urban form, the quality of a physical environment that makes its parts vivid and easily organised into a clear, memorable mental picture is termed: [2 marks]

- (A) Permeability
- (B) Imageability
- (C) Accessibility
- (D) Density

Q30. An urban block form in which continuous buildings are arranged along the four street edges to enclose a shared open courtyard at the centre, giving a firm public street wall and a private inner space, as shown in plan, is a: [2 marks]



- (A) Ribbon development
- (B) Cul-de-sac cluster
- (C) Perimeter block
- (D) Linear superblock

Q31. In landscape architecture, a planting-design approach that selects native and drought-tolerant species and groups them by water need so as to minimise or eliminate supplementary irrigation, is called: [2 marks]

- (A) Hardscaping
- (B) Xeriscaping
- (C) Topiary
- (D) Softscaping

Q32. The influential 1961 book *The Death and Life of Great American Cities*, which attacked large-scale modernist urban renewal and championed



dense, mixed-use streets with “eyes on the street”, was written by: [2 marks]

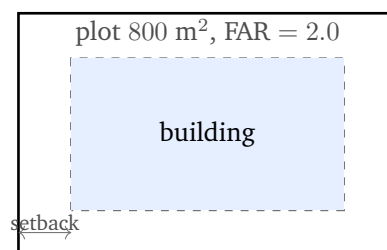
- (A) Camillo Sitte
- (B) Gordon Cullen
- (C) Jane Jacobs
- (D) Kevin Lynch

Q33. An extensive “green roof” (a roof covered with a growing medium and vegetation) benefits a building and its surroundings mainly because: [2 marks]

- (A) it increases the structural dead load and has no other effect
- (B) it blocks all daylight reaching the rooms below
- (C) it retains and slows storm-water runoff and, through evapotranspiration and insulation, moderates the roof-surface temperature
- (D) it prevents settlement of the building foundation

Urban and Regional Planning and Housing

Q34. A plot of area 800 m^2 is granted a Floor Area Ratio (FAR / FSI) of 2.0, with the setbacks shown around a rectangular building envelope. The maximum permissible total built-up (floor) area on the plot is: [2 marks]



- (A) 400 m^2
- (B) 800 m^2
- (C) 1200 m^2
- (D) 1600 m^2



- Q35.** The Smart Cities Mission launched by the Government of India in June 2015, which promotes area-based development and technology-enabled solutions for urban services, initially set out to develop how many cities selected through a competitive challenge? [2 marks]
- (A) 500
(B) 60
(C) 100
(D) 4041
- Q36.** The Atal Mission for Rejuvenation and Urban Transformation (AMRUT), launched in 2015, is directed chiefly at providing which of the following in the covered cities and towns? [2 marks]
- (A) basic urban services such as water supply, sewerage, storm-water drainage, urban transport and green/open spaces
(B) conservation of heritage monuments only
(C) construction of rural village roads only
(D) development of inter-state industrial corridors only
- Q37.** The Government of India's flagship "Housing for All" programme, which provides affordable housing to the urban poor partly through a credit-linked interest subsidy on home loans, is the: [2 marks]
- (A) Pradhan Mantri Awas Yojana (Urban)
(B) AMRUT
(C) HRIDAY
(D) Smart Cities Mission
- Q38.** A residential neighbourhood accommodates a population of 12,000 persons over a gross site area of 40 hectares. The gross residential density of the neighbourhood is: [2 marks]
- (A) 200 persons/ha



- (B) 480 persons/ha
- (C) 300 persons/ha
- (D) 150 persons/ha

Q39. A long-range statutory document, usually with a horizon of about 20 years, that guides the physical growth of a city by allocating land to broad use zones (residential, commercial, industrial, recreational) and reserving land for major roads and public facilities, is called a: [2 marks]

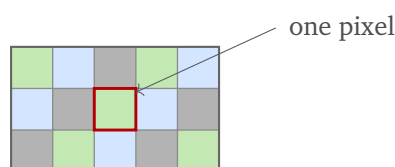
- (A) Layout plan
- (B) Master plan (development plan)
- (C) Action-area plan
- (D) Structure sketch

Planning Techniques, Surveying and GIS

Q40. Remote sensing, as used in urban and regional planning, is best defined as the science and art of obtaining information about an object or area on the Earth's surface: [2 marks]

- (A) by direct soil sampling in the field
- (B) only during night-time hours
- (C) without being in physical contact with it, by sensing the reflected or emitted electromagnetic radiation
- (D) only through manual chain-and-tape ground surveys

Q41. In a satellite image made of a regular grid of pixels, as shown, the ground area represented by one single pixel defines which characteristic of the sensor? [2 marks]

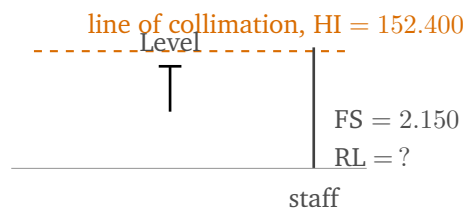


- (A) Radiometric resolution



- (B) Temporal resolution
- (C) Spectral resolution
- (D) Spatial resolution

Q42. During differential levelling, the height of instrument (line of collimation) is established at $HI = 152.400$ m. A foresight staff reading of 2.150 m is then taken on a change point, as shown. The reduced level (RL) of that change point is: [2 marks]



- (A) 150.250 m
- (B) 154.550 m
- (C) 2.150 m
- (D) 152.400 m

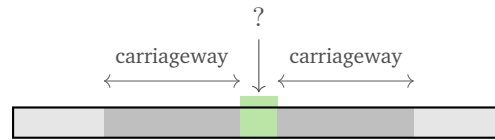
Q43. The Indian earth-observation satellite programme, whose multispectral sensors (for example on the Resourcesat platforms) are widely used for natural-resource mapping and urban land-use studies, is the: [2 marks]

- (A) IRS (Indian Remote Sensing) / Resourcesat series
- (B) INSAT communication satellite series
- (C) GSAT communication satellite series
- (D) IRNSS (NavIC) navigation series

Infrastructure, Services and Transportation Planning

Q44. In the cross-section of the divided urban arterial shown, the raised central strip that physically separates the two opposing streams of traffic is called the: [2 marks]





- (A) Shoulder
- (B) Median (central divider)
- (C) Footpath
- (D) Carriageway

Q45. In the classical four-stage urban transportation planning process, the stage that takes the trip-ends produced by and attracted to each zone and links origins to destinations, yielding an origin–destination trip matrix, is: [2 marks]

- (A) Trip generation
- (B) Modal split
- (C) Traffic assignment
- (D) Trip distribution

Q46. The “Level of Service” (LOS) of a road, graded on a scale from A (free-flow) to F (breakdown/forced-flow), is a qualitative measure of: [2 marks]

- (A) the thickness of the pavement layers
- (B) the quality of traffic flow and operating conditions (speed, delay, comfort) experienced by road users
- (C) the total construction cost of the road
- (D) the width of the right-of-way



Detailed Solutions**Q1.****Solution**

Concept – the slogans that mark the shift from Modernism to Postmodernism: Each phase of the Modern Movement carried a compact catch-phrase that summed up its attitude.

Step 1 – recall the modernist creed being attacked: Mies van der Rohe's minimalist ideal was captured in the phrase "Less is more".

Step 2 – recall the Postmodern reply: In *Complexity and Contradiction in Architecture* (1966), **Robert Venturi** answered "Less is a bore", defending richness, ambiguity and historical reference against the stripped-down box.

Step 3 – match to the option: The author of "Less is a bore" is therefore Robert Venturi.

Why the other options are wrong:

- Mies van der Rohe coined the opposite line, "Less is more".
- Louis Sullivan is remembered for "form follows function".
- Le Corbusier described the house as "a machine for living in".

Final Answer: Robert Venturi ⇒

Answer: (D) [Go Back to Q1](#)

Q2.**Solution**

Concept – the birth of High-Tech architecture: High-Tech buildings put structure and services on show as the architecture itself.

Step 1 – recall the competition: The 1971 competition for a new cultural centre in the Beaubourg quarter of Paris was won by a young partnership.

Step 2 – name the architects: The Centre Pompidou was designed by **Renzo Piano and Richard Rogers**, who pushed the trusses, ducts, coloured service pipes and the external escalator tube to the outside so the interior floors could be wholly free and flexible.

Why the other options are wrong:

- Norman Foster is a leading High-Tech architect but was not a designer of the Pompidou.



- Frank Gehry is associated with Deconstructivist, sculptural forms (for example the Guggenheim Bilbao).
- I. M. Pei designed the Louvre Pyramid, a different Paris landmark.

Final Answer: Renzo Piano and Richard Rogers ⇒

Answer: (A) [Go Back to Q2](#)

Q3.

Solution

Concept – signature High-Tech towers and their authors: The Gherkin is a landmark of environmentally-tuned High-Tech design.

Step 1 – read the described features: A tapering, bullet-shaped glass tower with an external diagonal (diagrid) brace and spiralling light-wells that ventilate the office floors.

Step 2 – attribute the design: 30 St Mary Axe, “The Gherkin”, was designed by **Norman Foster** (Foster + Partners), completed in 2004.

Why the other options are wrong:

- Richard Rogers designed the nearby Lloyd’s of London and the Leadenhall (“Cheesegrater”) building, not the Gherkin.
- Renzo Piano designed The Shard in London, a different tower.
- Zaha Hadid is known for fluid Parametric forms, not this diagrid tower.

Final Answer: Norman Foster ⇒

Answer: (A) [Go Back to Q3](#)

Q4.

Solution

Concept – Postmodern historicism on the skyline: Postmodernism re-introduced ornament and historical quotation onto otherwise modern buildings.

Step 1 – read the defining feature: A tall modern office slab crowned by a giant split (broken) pediment, echoing an 18th-century Chippendale cabinet top.

Step 2 – attribute the building: The AT&T Building (1984, now 550 Madison Avenue, New York) with its Chippendale top was designed by **Philip Johnson** (with John Burgee). It is a textbook icon of architectural Postmodernism.



Why the other options are wrong:

- Robert Venturi is a Postmodern theorist but did not design the AT&T Building.
- Michael Graves designed the Portland Building, another Postmodern work, but not this one.
- Charles Moore designed the Piazza d'Italia, not the AT&T Building.

Final Answer: Philip Johnson ⇒

Answer: (D) [Go Back to Q4](#)

Q5.

Solution

Concept – the Vitruvian triad: The Roman writer Vitruvius, in *De architectura*, gave three conditions that good architecture must satisfy.

Step 1 – list the three Latin terms: Firmitas, utilitas and venustas.

Step 2 – translate each: Firmitas = firmness/strength; utilitas = commodity/usefulness; **venustas = delight**, that is beauty or aesthetic pleasure.

Step 3 – pick the option: The third quality is delight (beauty).

Why the other options are wrong:

- Economy is not part of Vitruvius's triad of quality (though he discussed it separately).
- Symmetry is one of the ordering ideas of design, not the third triad term.
- Durability overlaps with firmitas, which is already the first term; venustas is specifically delight.

Final Answer: Delight (beauty) ⇒

Answer: (B) [Go Back to Q5](#)

Q6.

Solution

Concept – the parts of a masonry arch: An arch is built of wedge-shaped stones that convert vertical load into compression along the ring.

Step 1 – name the general stone: Every wedge-shaped stone forming the ring is a *vousoir*.



Step 2 – identify the special central voussoir: The one voussoir placed at the very crown (the highest point), inserted last to wedge the ring tight and make the arch self-supporting, is the **keystone**.

Step 3 – read the figure: The highlighted wedge at the apex marked “?” is exactly this crown stone, so it is the keystone.

Why the other options are wrong:

- The springer is the lowest voussoir, where the curve of the arch begins from the support.
- “Voussoir” is the generic name for any of the wedge stones, not specifically the crown one.
- The abutment is the solid masonry or pier that resists the outward thrust of the arch, not a voussoir.

Final Answer: Keystone ⇒

Answer: (D) [Go Back to Q6](#)

Q7.

Solution

Concept – Postmodern urban set-pieces: Postmodernism produced theatrical public spaces that treated the city as stage scenery.

Step 1 – read the description: Coloured classical colonnades, water, a map of Italy on the pavement and neon lighting, assembled as a scenographic “stage set”.

Step 2 – attribute the work: The Piazza d’Italia in New Orleans (1978) was designed by **Charles Moore**. It is one of the most cited examples of Postmodern urban design.

Why the other options are wrong:

- Robert Venturi wrote the theory of Postmodernism but did not design this piazza.
- Aldo Rossi is linked with the sober Italian “Neo-Rationalist” tendency, a different strand.
- Philip Johnson designed the AT&T Building, not the Piazza d’Italia.

Final Answer: Charles Moore ⇒

Answer: (B) [Go Back to Q7](#)



Q8.

Solution

Concept – naming the 1970s movement of exposed technology: Architectural movements are grouped by their shared attitude to structure and imagery.

Step 1 – read the defining traits: A style that puts the steel frame, trusses, ducts, lifts and service runs on open display and celebrates them as the building's aesthetic.

Step 2 – name it: This is **High-Tech architecture** (also called Structural Expressionism), with the Centre Pompidou and the Lloyd's building as its manifestos.

Why the other options are wrong:

- Brutalism celebrates raw exposed concrete (béton brut), not exposed industrial services.
- Deconstructivism fragments and distorts geometry (Gehry, Libeskind), a later 1980s idea.
- Art Nouveau is a turn-of-the-20th-century decorative style of flowing plant-like forms.

Final Answer: High-Tech architecture $\Rightarrow$ **B**

Answer: (B) [Go Back to Q8](#)

Q9.

Solution

Concept – performance coatings on architectural glass: Glazing can be tuned to control the flow of radiant heat while staying transparent.

Step 1 – read the described behaviour: A film that reflects long-wave infrared but lets visible light pass, so it reduces heat gain in summer and heat loss in winter.

Step 2 – name it: This is a **low-emissivity (low-E) coating**. "Emissivity" is the ability to radiate heat; a low-E surface radiates little long-wave heat, so it acts as a radiant-heat mirror while remaining clear.

Why the other options are wrong:

- Plain float glass has no such selective coating and transmits infrared freely.
- Laminated glass has a plastic interlayer for safety and sound, not for infrared control.
- Wired glass carries an embedded mesh for fire integrity, not a low-E function.



Final Answer: Low-emissivity (low-E) coating $\Rightarrow$ A

Answer: (A) [Go Back to Q9](#)

Q10.

Solution

Concept – latent-heat thermal storage in buildings: Some materials absorb a lot of heat at almost constant temperature by changing state.

Step 1 – read the described behaviour: A material that melts and re-solidifies over a narrow temperature band, storing and releasing large amounts of *latent* heat to damp indoor temperature swings.

Step 2 – name it: This is a **Phase Change Material (PCM)**. As indoor air warms past its melting point the PCM absorbs heat by melting; when the air cools it releases that heat by freezing, flattening the daily peaks.

Why the other options are wrong:

- Fly ash is a pozzolanic filler used in concrete, not a latent-heat store.
- A geopolymers is an alternative low-carbon binder, again not a phase-change store.
- An air-entraining admixture deliberately introduces tiny air bubbles into concrete for frost resistance.

Final Answer: Phase Change Material (PCM) $\Rightarrow$ B

Answer: (B) [Go Back to Q10](#)

Q11.

Solution

Concept – supplementary cementitious materials for green concrete: Cement manufacture is carbon-intensive, so part of the cement is replaced by industrial by-products.

Step 1 – identify a suitable by-product: **Ground granulated blast-furnace slag (GGBS)** is a by-product of iron making. Blended into concrete it replaces a large fraction of cement.

Step 2 – state the twin benefits: Using GGBS lowers the embodied CO₂ of the mix and, through a slower secondary hydration, refines the pore structure to give lower permeability and better durability (for example against sulphate and chlo-



ride attack).

Why the other options are wrong:

- Gypsum is added in small amounts only to control the setting time of cement, not as a bulk cement replacement.
- Bitumen is a bituminous binder for roads and waterproofing, not a cement substitute.
- Quicklime (CaO) is a lime product; it is not the carbon-saving slag replacement described.

Final Answer: Ground granulated blast-furnace slag (GGBS) $\Rightarrow$ A

Answer: (A) [Go Back to Q11](#)

Q12.

Solution

Concept – expected activity time in PERT: PERT models the uncertain duration of an activity with a weighted average of three estimates.

Step 1 – write the formula: $t_e = \frac{t_o + 4t_m + t_p}{6}$

Step 2 – substitute the given values: $t_o = 3, t_m = 6, t_p = 15$.

Step 3 – compute the numerator: $t_o + 4t_m + t_p = 3 + 4(6) + 15$

$$= 3 + 24 + 15$$

$$= 42$$

Step 4 – divide by 6: $t_e = \frac{42}{6} = 7$ days

Why the other options are wrong:

- 6 days is the most-likely time t_m , not the weighted expected time.
- 8 and 9 days come from arithmetic slips (for example forgetting the factor 4 on t_m).

Final Answer: 7 days $\Rightarrow$ D

Answer: (D) [Go Back to Q12](#)



Q13.

Solution

Concept – one-way versus two-way slabs: Whether a slab bends in one or two directions is decided by its edge support and its span ratio.

Step 1 – read the support and ratio: The slab is supported by beams on all four edges, and the longer-to-shorter span ratio is $L_x/L_y = 4.2/3.0 = 1.4$.

Step 2 – apply the rule: When a slab is supported on all four sides and the span ratio is ≤ 2 , it deflects and carries load in *both* directions; it is a **two-way slab**.

Step 3 – confirm: Here $1.4 \leq 2$, so the slab is two-way and is reinforced in both directions.

Why the other options are wrong:

- A cantilever slab is supported on one edge only and projects out.
- A one-way slab occurs when it is supported on two opposite edges, or the span ratio exceeds 2, so it bends essentially in one direction.
- A flat plate is supported directly on columns with no beams; here beams are present on all four edges.

Final Answer: Two-way slab $\Rightarrow$ C

Answer: (C) [Go Back to Q13](#)

Q14.

Solution

Concept – geometry of a dog-legged stair: A half-turn (dog-legged) stair climbs the floor-to-floor height in two equal flights with a mid-landing.

Step 1 – note the total rise: Floor-to-floor height to be climbed = 3.6 m.

Step 2 – split it between the two flights: The two flights are equal and the landing sits at mid-height, so each flight climbs half of the total.

Step 3 – compute the rise per flight: Rise per flight = $\frac{3.6}{2} = 1.8$ m

Why the other options are wrong:

- 3.6 m is the full floor-to-floor height, climbed by both flights together, not one.
- 0.9 m would be one flight only if there were four equal flights, which there are not.
- 2.4 m does not correspond to an equal two-flight split of 3.6 m.



Final Answer: 1.8 m $\Rightarrow$ C

Answer: (C) [Go Back to Q14](#)

Q15.

Solution

Concept – construction contract documents: Different documents describe the quality, the drawings and the measured quantities of work.

Step 1 – read what is described: An item-by-item list of measured quantities of every kind of work, with rates and amounts, used to price and to pay for the contract.

Step 2 – name it: This is the **Bill of Quantities (BOQ)**. Contractors quote unit rates against its items to arrive at the tender total, and interim payments are made by re-measuring against it.

Why the other options are wrong:

- A bar (Gantt) chart is a time-schedule of activities, not a priced quantity list.
- A technical specification states the quality and workmanship required, but not the quantities and rates.
- A mood board is a visual collage of design intent, unrelated to contract pricing.

Final Answer: Bill of Quantities (BOQ) $\Rightarrow$ D

Answer: (D) [Go Back to Q15](#)

Q16.

Solution

Concept – bending moment in a cantilever under a UDL: For a cantilever the maximum bending moment occurs at the fixed support.

Step 1 – find the total load: Total UDL = $w \times L = 12 \times 3 = 36$ kN.

Step 2 – locate its resultant: The resultant of a uniform load acts at the centre of the span, i.e. at $L/2 = 1.5$ m from the fixed end.

Step 3 – take moment about the fixed end: $M = (\text{total load}) \times (\text{lever arm}) = 36 \times 1.5$

Step 4 – or use the standard formula directly: $M = \frac{wL^2}{2} = \frac{12 \times 3^2}{2} = \frac{12 \times 9}{2} =$



$$\frac{108}{2} = 54 \text{ kN} \cdot \text{m}$$

Why the other options are wrong:

- 18 kN·m uses $wL/2$, forgetting to square the length.
- 36 kN·m is the total load, not the moment.
- 108 kN·m forgets to divide by 2 (that is wL^2).

Final Answer: 54 kN·m $\Rightarrow$

Answer: (C) [Go Back to Q16](#)

Q17.

Solution

Concept – classifying members by the force they mainly carry: Structural members are named by their dominant internal action.

Step 1 – read the described action: A vertical member that mainly carries axial *compression* and passes the loads of the floors above down to the foundation.

Step 2 – name it: This is a **column**. A column is a compression member; when it also resists bending it is still a column (a beam-column).

Why the other options are wrong:

- A tie carries axial *tension*, not compression.
- A beam carries transverse load mainly by bending, not axial compression.
- A slab is a plate element that spans horizontally, not a vertical compression member.

Final Answer: Column $\Rightarrow$

Answer: (A) [Go Back to Q17](#)

Q18.

Solution

Concept – the rise-tread proportioning rule for stairs: Comfortable stairs keep the pace-and-climb effort constant, captured by $2R + T \approx 600 \text{ mm}$.

Step 1 – write the rule: $2R + T = 600 \text{ mm}$

Step 2 – substitute the given tread: $T = 250 \text{ mm}$, so $2R + 250 = 600$.

Step 3 – solve for the riser: $2R = 600 - 250 = 350$



$$R = \frac{350}{2} = 175 \text{ mm}$$

Step 4 – sanity check: A riser of 175 mm with a 250 mm tread is a normal, comfortable interior stair.

Why the other options are wrong:

- 300 mm is the value of the tread region, not the riser.
- 125 mm and 150 mm do not satisfy $2R + 250 = 600$.

Final Answer: 175 mm $\Rightarrow$

Answer: (D) [Go Back to Q18](#)

Q19.

Solution

Concept – classifying loads on a building: Loads are grouped by their nature: gravity, imposed, and environmental lateral loads.

Step 1 – read the described load: A horizontal (lateral) load produced by moving air, pressing on the windward face and sucking on the leeward face of a tall building.

Step 2 – name it: This is the **wind load**. It is a lateral, dynamic environmental load and often governs the design of tall and light structures.

Why the other options are wrong:

- Live (imposed) load is the movable gravity load of occupants and furniture, acting downward.
- Dead load is the permanent self-weight of the structure, again acting downward.
- Impact load is a short, sudden dynamic load (for example a crane or vehicle), not steady air pressure.

Final Answer: Wind load $\Rightarrow$

Answer: (B) [Go Back to Q19](#)



Q20.

Solution

Concept – partial safety factors in limit-state design: IS 456 factors up the characteristic loads to obtain design (ultimate) loads.

Step 1 – recall the load factor: For the basic combination of dead load plus imposed (live) load at the ultimate limit state, the partial safety factor on the loads is 1.5.

Step 2 – write the design load: Design load = 1.5 (DL + LL).

Step 3 – note the purpose: The factor of 1.5 covers the possibility that the actual loads exceed the characteristic values and provides a margin against collapse.

Why the other options are wrong:

- 1.0 is used for serviceability checks (deflection, cracking), not for the ultimate DL+LL combination.
- 1.15 is the partial safety factor on the strength of steel (γ_s), a material factor, not a load factor.
- 2.0 is larger than the code value of 1.5 for this combination.

Final Answer: 1.5 $\Rightarrow$ C

Answer: (C) [Go Back to Q20](#)

Q21.

Solution

Concept – maximum bending moment in a simply supported beam under a UDL: For a UDL over the full span, the maximum bending moment is at midspan.

Step 1 – write the standard formula: $M_{\max} = \frac{wL^2}{8}$

Step 2 – list the data: $w = 15 \text{ kN/m}$, $L = 8 \text{ m}$.

Step 3 – compute L^2 : $L^2 = 8^2 = 64 \text{ m}^2$

Step 4 – compute the numerator: $wL^2 = 15 \times 64 = 960$

Step 5 – divide by 8: $M_{\max} = \frac{960}{8} = 120 \text{ kN} \cdot \text{m}$

Why the other options are wrong:

- 60 kN·m halves the correct value (using $wL^2/16$).
- 240 kN·m uses $wL^2/4$ (the formula for a central point load pattern).
- 480 kN·m uses $wL^2/2$ (the cantilever fixed-end value), which does not apply



to a simply supported beam.

Final Answer: $120 \text{ kN}\cdot\text{m} \Rightarrow \boxed{\text{A}}$

Answer: (A) [Go Back to Q21](#)

Q22.

Solution

Concept – solar altitude at noon on the equinox: On an equinox the sun is overhead at the equator, so noon altitude depends only on latitude.

Step 1 – state the rule for the equinox: At solar noon on the equinox, the solar altitude $\alpha = 90^\circ - \phi$, where ϕ is the latitude of the place.

Step 2 – substitute the latitude: $\phi = 23.5^\circ$

$$\alpha = 90^\circ - 23.5^\circ$$

Step 3 – evaluate: $\alpha = 66.5^\circ$

Step 4 – interpret: At latitude 23.5° N (about the Tropic of Cancer) the equinox noon sun stands 66.5° above the horizon, i.e. 23.5° from the vertical.

Why the other options are wrong:

- 23.5° is the latitude itself (the angle from the vertical), not the altitude from the horizontal.
- 90° would need the observer to be on the equator ($\phi = 0$).
- 45° would require a latitude of 45° .

Final Answer: $66.5^\circ \Rightarrow \boxed{\text{D}}$

Answer: (D) [Go Back to Q22](#)

Q23.

Solution

Concept – Sabine's reverberation-time formula: Reverberation time falls as the room absorption rises.

Step 1 – write the formula: $RT_{60} = \frac{0.161 V}{A}$

Step 2 – list the data: $V = 600 \text{ m}^3$, $A = 120 \text{ sabins}$.

Step 3 – compute the numerator: $0.161 \times 600 = 96.6$

Step 4 – divide by the absorption: $RT_{60} = \frac{96.6}{120} = 0.805 \text{ s}$



Step 5 – round: $RT_{60} \approx 0.80$ s, a value typical of a good speech room.

Why the other options are wrong:

- 1.61 s uses $A = 60$ sabins (half the given absorption).
- 0.40 s uses $A = 240$ sabins (double the given absorption).
- 3.22 s drops the factor 0.161 scaling and mis-divides.

Final Answer: 0.80 s $\Rightarrow$

Answer: (A) [Go Back to Q23](#)

Q24.

Solution

Concept – the photometric quantities and their units: Lighting design distinguishes flux, illuminance and intensity, each with its own unit.

Step 1 – define luminous flux: Luminous flux is the total amount of visible light emitted by a source per unit time (weighted by the eye's sensitivity).

Step 2 – give its unit: Its SI unit is the **lumen (lm)**.

Step 3 – relate the others for clarity: Illuminance (flux falling per unit area) is measured in lux ($1 \text{ lux} = 1 \text{ lm/m}^2$); luminous intensity (flux per unit solid angle) is measured in candela.

Why the other options are wrong:

- Lux is the unit of illuminance, not of total flux.
- Candela is the unit of luminous intensity (per solid angle).
- Watt is the unit of radiant/electrical power, not of luminous flux (which is weighted for vision).

Final Answer: Lumen $\Rightarrow$

Answer: (A) [Go Back to Q24](#)

Q25.

Solution

Concept – self-cleansing velocity in sewers: Sewers must run fast enough at least once a day to scour out settled solids.

Step 1 – recall the design value: The self-cleansing velocity for a sanitary sewer



is commonly taken as about **0.6 m/s** (the usual range quoted is 0.6 to 0.9 m/s for the daily maximum flow).

Step 2 – explain the purpose: Below this velocity, grit and organic solids settle and gradually choke the pipe; the sewer gradient is therefore fixed so that this minimum velocity is reached at peak daily flow.

Step 3 – note the upper bound: The velocity is also capped (around 3 m/s) to avoid scouring and abrasion of the pipe, but the *minimum* self-cleansing value is about 0.6 m/s.

Why the other options are wrong:

- 0.1 m/s is far too slow and would let solids deposit at once.
- 3.0 m/s is near the *maximum* permissible (non-scouring) velocity, not the minimum self-cleansing value.
- 5.0 m/s is excessive and would abrade the sewer.

Final Answer: 0.6 m/s $\Rightarrow$ D

Answer: (D) [Go Back to Q25](#)

Q26.

Solution

Concept – on-site sanitation where no public sewer exists: An unsewered building treats its own sewage before disposing of the effluent to the ground.

Step 1 – read the described unit: A buried, usually two-chambered watertight tank in which solids settle and are digested anaerobically, while clarified effluent overflows to a soak pit.

Step 2 – name it: This is a **septic tank**. It provides primary treatment: sludge settles at the bottom, scum floats on top, and partly clarified liquid flows out for further soil disposal.

Why the other options are wrong:

- A soak pit only receives and disperses the septic-tank effluent into the soil; it does not settle and digest the raw sewage.
- A manhole is an access chamber on a sewer line, not a treatment unit.
- A detritus tank is a grit-removal unit at a large treatment works, not the household two-chamber tank described.

Final Answer: Septic tank $\Rightarrow$ B



Answer: (B) [Go Back to Q26](#)

Q27.

Solution

Concept – classifying town drainage systems: Sewerage systems are classed by whether sewage and storm water share the pipes.

Step 1 – read the arrangement: Domestic sewage and storm-water runoff are collected together and carried in a single set of pipes to the treatment works.

Step 2 – name it: Carrying both flows in one common pipe is the **combined system**.

Step 3 – note its trade-off: It is cheaper to lay one set of pipes, but the treatment works must handle very large, dilute wet-weather flows and overflows may occur in storms.

Why the other options are wrong:

- In the separate system sewage and storm water run in two distinct pipe networks.
- In the partially separate system only part of the storm water (for example roof drainage) is admitted to the sewage pipe.
- A “storm-only” network carries storm water alone and is not the combined system described.

Final Answer: Combined system $\Rightarrow$ **B**

Answer: (B) [Go Back to Q27](#)

Q28.

Solution

Concept – pipes in a building drainage stack: Drainage pipes are named by the kind of discharge they carry.

Step 1 – read what is carried: The vertical pipe takes the discharge of water closets and urinals, i.e. wastewater that contains human excreta.

Step 2 – name it: A pipe carrying foul discharge containing excreta is the **soil pipe**.

Why the other options are wrong:

- A vent pipe carries no wastewater; it only admits air to preserve the trap



seals and let sewer gases escape above roof level.

- A waste pipe carries used water *without* excreta, from basins, baths and sinks.
- A rainwater pipe carries only roof storm water.

Final Answer: Soil pipe $\Rightarrow$

Answer: (C) [Go Back to Q28](#)

Q29.

Solution

Concept – Kevin Lynch on the readability of cities: Lynch studied how clearly people can form a mental map of a city.

Step 1 – read the described quality: The property that makes the parts of an environment vivid and easily organised into a coherent, memorable mental image.

Step 2 – name it: Lynch called this **imageability** (closely tied to “legibility”). A highly imageable city has strong, distinct paths, edges, districts, nodes and landmarks that lodge easily in the mind.

Why the other options are wrong:

- Permeability is the degree to which a layout offers people a choice of routes through it (a Responsive Environments term), not the memorability of the image.
- Accessibility is the ease of reaching a place, a locational measure.
- Density is a quantity of people or built mass per unit area, unrelated to mental imagery.

Final Answer: Imageability $\Rightarrow$

Answer: (B) [Go Back to Q29](#)

Q30.

Solution

Concept – urban block typologies: Blocks differ in how the building mass relates to the street and to open space.

Step 1 – read the described form: Continuous buildings ranged along all four street edges, enclosing a shared open courtyard at the centre, giving a firm street wall outside and privacy inside.



Step 2 – name it: This is the **perimeter block**. It clearly separates the public street front from the semi-private inner court and is a classic device of traditional European urban form.

Why the other options are wrong:

- Ribbon development is thin building growth strung out along a highway, not an enclosed block.
- A cul-de-sac cluster is a group of houses around a dead-end access, a suburban layout.
- A linear superblock is a large block crossed by no through streets, not the four-sided courtyard form described.

Final Answer: Perimeter block ⇒

Answer: (C) [Go Back to Q30](#)

Q31.

Solution

Concept – water-wise planting in landscape design: Some planting strategies are chosen specifically to save irrigation water.

Step 1 – read the described approach: Selecting native and drought-tolerant species and grouping plants by their water need so that little or no extra watering is required.

Step 2 – name it: This is **xeriscaping** (from Greek *xeros*, dry). It is a sustainable, low-water landscape approach well suited to hot, dry climates.

Why the other options are wrong:

- Hardscaping is the design of paved and built site elements, not a planting strategy.
- Topiary is the ornamental clipping of shrubs into shapes, unrelated to water saving.
- Softscaping refers broadly to the living plant material of a site, not specifically the drought-tolerant, low-irrigation method.

Final Answer: Xeriscaping ⇒

Answer: (B) [Go Back to Q31](#)



Q32.

Solution

Concept – landmark texts of 20th-century urbanism: Certain books reshaped how planners think about streets and city life.

Step 1 – read the argument of the book: A 1961 work attacking sweeping modernist urban renewal and celebrating dense, mixed-use, walkable streets kept safe by “eyes on the street”.

Step 2 – name the author: *The Death and Life of Great American Cities* was written by Jane Jacobs.

Why the other options are wrong:

- Camillo Sitte wrote *City Planning According to Artistic Principles* (1889), on the art of the public square.
- Gordon Cullen wrote *Townscape* (1961), on serial vision, a different book.
- Kevin Lynch wrote *The Image of the City* (1960), on the mental image of the city.

Final Answer: Jane Jacobs ⇒

Answer: (C) [Go Back to Q32](#)

Q33.

Solution

Concept – the environmental role of a green roof: A vegetated roof changes both the water and the heat behaviour of a building.

Step 1 – consider storm water: The growing medium soaks up and holds rainfall, then releases it slowly, so peak storm-water runoff is retained and delayed.

Step 2 – consider heat: The soil and plants insulate the roof and cool it by evapotranspiration, so the roof-surface temperature and the heat reaching the rooms below are moderated; at city scale this also eases the urban heat-island effect.

Step 3 – combine: The main benefits are therefore reduced and slowed runoff together with a cooler, steadier roof.

Why the other options are wrong:

- The added dead load is a design consideration, not the *benefit*; it is not “no other effect”.
- A green roof sits above the roof slab and does not block daylight to the rooms.



- Foundation settlement is a soil/structural matter unrelated to the roof planting.

Final Answer: It reduces and slows storm-water runoff and moderates the roof-surface temperature $\Rightarrow$

Answer: (C) [Go Back to Q33](#)

Q34.

Solution

Concept – Floor Area Ratio (FAR / FSI): FAR fixes how much total floor area may be built on a plot.

Step 1 – write the definition:
$$\text{FAR} = \frac{\text{total built-up (floor) area}}{\text{plot area}}$$

Step 2 – rearrange for floor area: Maximum built-up area = FAR $\times$ plot area.

Step 3 – substitute the data: $= 2.0 \times 800 \text{ m}^2$

Step 4 – evaluate: $= 1600 \text{ m}^2$

Step 5 – interpret: The 1600 m^2 may be distributed over several storeys within the setback-defined envelope shown; the setbacks limit the footprint but not the FAR total.

Why the other options are wrong:

- 400 and 800 m^2 correspond to FAR values of 0.5 and 1.0, not 2.0.
- 1200 m^2 corresponds to FAR 1.5, not 2.0.

Final Answer: $1600 \text{ m}^2 \Rightarrow$

Answer: (D) [Go Back to Q34](#)

Q35.

Solution

Concept – the Smart Cities Mission of India: This central mission targeted a fixed number of cities chosen by competition.

Step 1 – recall the launch and aim: Launched in June 2015, the Smart Cities Mission promotes area-based development (retrofitting, redevelopment, greenfield) and pan-city technology solutions for urban services.

Step 2 – recall the number of cities: The mission set out to develop **100** smart cities, selected through the “Smart City Challenge” competition among urban local



bodies.

Why the other options are wrong:

- 500 is the approximate number of cities covered by AMRUT, a different mission.
- 60 is too few; the target was 100.
- 4041 is roughly the number of statutory towns in India, not the Smart Cities target.

Final Answer: 100 $\Rightarrow$

Answer: (C) [Go Back to Q35](#)

Q36.

Solution

Concept – the focus of the AMRUT mission: AMRUT is a basic-infrastructure mission for a large set of cities and towns.

Step 1 – recall its objective: The Atal Mission for Rejuvenation and Urban Transformation (2015) aims to ensure a tap and a sewer connection to every household and to improve the quality of urban life.

Step 2 – list its thrust areas: Its priority sectors are **water supply, sewerage and septage management, storm-water drainage, urban transport (non-motorised and public), and green/open spaces.**

Step 3 – match the option: Option A names exactly these basic urban services.

Why the other options are wrong:

- Conservation of heritage monuments is the focus of the separate HRIDAY scheme.
- Rural village roads fall under rural programmes (for example PMGSY), not AMRUT.
- Inter-state industrial corridors are a different, industry-led programme.

Final Answer: Basic urban services (water supply, sewerage, drainage, urban transport, green spaces) $\Rightarrow$

Answer: (A) [Go Back to Q36](#)



Q37.

Solution

Concept – India’s affordable-housing mission: The “Housing for All” goal is delivered through a named central scheme.

Step 1 – recall the scheme: The **Pradhan Mantri Awas Yojana (Urban)**, launched in 2015, seeks to provide housing to all eligible urban households.

Step 2 – recall its instruments: It works through verticals such as in-situ slum redevelopment, affordable housing in partnership, beneficiary-led construction, and the Credit-Linked Subsidy Scheme (CLSS) that gives an interest subsidy on home loans.

Step 3 – match the clue: The “credit-linked interest subsidy” clue points squarely to PMAY (Urban).

Why the other options are wrong:

- AMRUT funds basic urban infrastructure, not household housing subsidies.
- HRIDAY is a heritage-city development scheme.
- The Smart Cities Mission funds area-based smart development, not a home-loan subsidy.

Final Answer: Pradhan Mantri Awas Yojana (Urban) $\Rightarrow$ A

Answer: (A) [Go Back to Q37](#)

Q38.

Solution

Concept – gross residential density: Density measures how many people occupy a unit of land area.

Step 1 – write the definition: $\text{Gross density} = \frac{\text{population}}{\text{gross site area}}$

Step 2 – list the data: Population = 12,000 persons; gross area = 40 hectares.

Step 3 – substitute: $= \frac{12,000}{40}$ persons/ha

Step 4 – evaluate: = 300 persons/ha

Why the other options are wrong:

- 200 persons/ha would need 8,000 persons on the same area.
- 480 persons/ha would need 19,200 persons.
- 150 persons/ha halves the correct figure (using 80 ha).



Final Answer: 300 persons/ha $\Rightarrow$

Answer: (C) [Go Back to Q38](#)

Q39.

Solution

Concept – the hierarchy of statutory plans: Physical planning uses documents of different scale and time horizon.

Step 1 – read the description: A long-range statutory document, about a 20-year horizon, allocating land to broad use zones and reserving land for major roads and public facilities.

Step 2 – name it: This is the **master plan** (also called the development plan or comprehensive plan). It is the statutory framework that guides a city's physical growth and controls development through zoning.

Why the other options are wrong:

- A layout plan is a detailed subdivision drawing of a single site or colony, of much smaller scale.
- An action-area plan is a short-term, project-level plan for a specific zone within the master plan.
- A “structure sketch” is not the statutory long-range instrument described.

Final Answer: Master plan (development plan) $\Rightarrow$

Answer: (B) [Go Back to Q39](#)

Q40.

Solution

Concept – the definition of remote sensing: Remote sensing gathers data about the Earth from a distance using electromagnetic energy.

Step 1 – read the key phrase: Obtaining information about a surface *without touching it*.

Step 2 – complete the definition: Remote sensing is the science of obtaining information about an object or area **without being in physical contact with it**, by measuring the electromagnetic radiation it reflects (for example sunlight) or emits (for example thermal energy), typically from aircraft or satellites.

Step 3 – match the option: Option C states exactly this non-contact, electromag-



netic definition.

Why the other options are wrong:

- Direct soil sampling is a contact, ground-based method, the opposite of remote sensing.
- Remote sensing is not restricted to night-time; passive optical sensing needs daylight, and active sensors work any time.
- Manual ground surveys are field methods, not remote sensing.

Final Answer: Without physical contact, by sensing reflected or emitted electromagnetic radiation ⇒ **C**

Answer: (C) [Go Back to Q40](#)

Q41.

Solution

Concept – the four “resolutions” of a remote-sensing sensor: Sensor performance is described by spatial, spectral, radiometric and temporal resolution.

Step 1 – read what the pixel represents: The ground area covered by one single pixel of the image.

Step 2 – name the matching resolution: The size of the ground area seen by one pixel is the **spatial resolution** (for example a 10 m or 30 m pixel). A smaller ground cell means finer spatial resolution and more detail.

Why the other options are wrong:

- Radiometric resolution is the number of brightness levels (bits) the sensor can distinguish.
- Temporal resolution is how often the satellite revisits the same area.
- Spectral resolution is the number and narrowness of the wavelength bands recorded.

Final Answer: Spatial resolution ⇒ **D**

Answer: (D) [Go Back to Q41](#)



Q42.

Solution

Concept – reduced level from the height of instrument: In the height-of-instrument method, a foresight is subtracted from HI to get the point's RL.

Step 1 – write the relation: $RL \text{ of point} = HI - FS$

Step 2 – list the data: $HI = 152.400 \text{ m}$, foresight $FS = 2.150 \text{ m}$.

Step 3 – substitute: $RL = 152.400 - 2.150$

Step 4 – evaluate: $RL = 150.250 \text{ m}$

Step 5 – sanity check: The staff reading is positive, so the point lies below the line of collimation, and its RL (150.250) is indeed less than HI (152.400).

Why the other options are wrong:

- 154.550 m wrongly *adds* the foresight instead of subtracting it.
- 2.150 m is the staff reading, not a reduced level.
- 152.400 m is the height of instrument itself, not the RL of the point.

Final Answer: 150.250 m $\Rightarrow$ A

Answer: (A) [Go Back to Q42](#)

Q43.

Solution

Concept – Indian satellite series and their purposes: ISRO runs distinct satellite families for imaging, communication and navigation.

Step 1 – identify the resource-mapping family: The **IRS (Indian Remote Sensing) series**, including the Resourcesat satellites, carries multispectral imaging sensors (such as LISS and AWiFS) used for land-use, agriculture, forestry and urban studies.

Step 2 – match the description: Multispectral natural-resource and urban land-use mapping points to the IRS / Resourcesat series.

Why the other options are wrong:

- INSAT is a communication and meteorology satellite series, not a resource-imaging one.
- GSAT is a communication satellite series.
- IRNSS (NavIC) is a regional navigation (positioning) system, not an imaging one.



Final Answer: IRS (Indian Remote Sensing) / Resourcesat series $\Rightarrow$ **A**

Answer: (A) [Go Back to Q43](#)

Q44.

Solution

Concept – elements of a divided-road cross-section: A road cross-section names the carriageway, shoulders, footpaths and the central separator.

Step 1 – read the described element: A raised central strip that physically separates the two opposing streams of traffic on a divided road.

Step 2 – name it: This central separator is the **median** (also called the central divider or central verge). It prevents head-on conflicts, can house lighting and signs, and offers a pedestrian refuge.

Why the other options are wrong:

- A shoulder is the strip alongside the carriageway edge for stopped or emergency vehicles, not the central separator.
- A footpath is the pedestrian way at the edge of the road, not in the centre.
- The carriageway is the paved travel lane itself, which the median separates.

Final Answer: Median (central divider) $\Rightarrow$ **B**

Answer: (B) [Go Back to Q44](#)

Q45.

Solution

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

Step 1 – identify the required stage: The stage that links the trip-ends of each zone to destinations and produces an origin–destination (O–D) matrix answers “from where to where”.

Step 2 – name it: This is **trip distribution**. It takes the productions and attractions from trip generation and allocates the trips between zone pairs (often with a gravity model).

Why the other options are wrong:

- Trip generation only estimates *how many* trips each zone produces and at-



tracts, not their O–D pairing.

- Modal split divides the distributed trips among transport modes (“by which mode”).
- Traffic assignment loads the trips onto specific network routes (“by which path”).

Final Answer: Trip distribution $\Rightarrow$

Answer: (D) [Go Back to Q45](#)

Q46.

Solution

Concept – Level of Service (LOS) of a road: LOS is a letter grade summarising how a road feels to use.

Step 1 – read the scale: LOS runs from A (free-flow, little interaction between vehicles) down to F (forced or breakdown flow, stop-and-go congestion).

Step 2 – state what it measures: LOS is a *qualitative* measure of the **quality of traffic flow and operating conditions** experienced by road users, reflecting factors such as speed, travel time, freedom to manoeuvre, delay and comfort.

Why the other options are wrong:

- Pavement layer thickness is a structural design output, not a measure of flow quality.
- Construction cost is an economic figure, unrelated to the LOS grade.
- Right-of-way width is a land-reservation dimension, not the operating quality of traffic.

Final Answer: The quality of traffic flow and operating conditions experienced by road users $\Rightarrow$

Answer: (B) [Go Back to Q46](#)



Answer Key

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

