2007
AR: Architecture and Planning

Duration : Three Hours

Maximum Marks :150

Read the following instructions carefully.

1. This question paper contains 85 objective type questions. Q.1 to Q.20 carry **one** mark each and Q.21 to Q.85 carry **two** marks each.

2. Attempt all the questions.

3. Questions must be answered on Objective **Response Sheet (ORS)** by darkening the appropriate bubble (marked A, B, C, D) using HB pencil against the question number on the left hand side of the **ORS**. **Each question has only one correct answer.** In case you wish to change an answer, erase the old answer completely.

4. Wrong answers will carry NEGATIVE marks. In Q.1 to Q.20, **0.25** mark will be deducted for each wrong answer. In Q.21 to Q.76, Q.78, Q.80, Q.82 and in Q.84, **0.5** mark will be deducted for each wrong answer. However, there is no negative marking in Q.77, Q.79, Q.81, Q.83 and in Q.85. More than one answer bubbled against a question will be taken as an incorrect response. Unattempted questions will not carry any marks.

5. Write your registration number, your name and name of the examination centre at the specified locations on the right half of the **ORS**.

6. Using HB pencil, darken the appropriate bubble under each digit of your registration number and the letters corresponding to your paper code.

7. Calculator is allowed in the examination hall.

8. Charts, graph sheets or tables are NOT allowed in the examination hall.

9. Rough work can be done on the question paper itself. Additionally blank pages are given at the end of the question paper for rough work.

10. This question paper contains **20** printed pages including pages for rough work. Please check all pages and report, if there is any discrepancy.

Q.1 **Ramsar** list is related to

(A) Wetlands
(B) Heritage buildings
(C) Seismic zones
(D) Special Economic Zones

Q.2 Hazen's-William's nomogram is used to calculate

(A) size of sanitary pipe lines
(B) size of water supply pipe lines
(C) capacity of overhead water reservoir
(D) capacity of water required for fire fighting

Q.3 A **woonerf** is a

(A) pavement pattern   (B) sanitation system element
(C) speed reducing element   (D) furniture detail

Q.4 In urban planning, **cohort** refers to

(A) age and sex classification of population
(B) contour levels in slope analysis
(C) land use classification of public and semi-public spaces
(D) soil layer classification

Q.5 The project **Habitat**, Montreal, designed by Moshe Safdie is an example of

(A) high rise apartments
(B) low rise detached dwellings
(C) organic architecture
(D) prefabricated housing

Q.6 The degree of freedom of a joint in a plane truss is

(A) two   (B) three   (C) four   (D) six

Q.7 A brick cut lengthwise into two pieces so that each piece is half as wide as the full brick is called a

(A) King closer   (B) Frog   (C) Quoin brick   (D) Queen closer

Q.8 The strength of concrete increases with

(A) increase in water cement ratio
(B) decrease in water cement ratio
(C) increase of workability
(D) decrease in cement aggregate ratio

Q.9 The point of contraflexure is the point where the

(A) shear force changes its sign   (B) deflection is zero
(C) bending moment changes its sign   (D) torque is zero

Q.10 When wind loads are accounted for in the design of structures, the permissible stresses in the material are increased by

(A) 10 %   (B) 16.33 %   (C) 33.33 %   (D) 50 %

Q.11 The term coined by Paolo Soleri that combines ecology with architecture and deals with habitats maintaining an extremely high population density is

(A) Archaeology   (B) Proxemics
(C) Arcology   (D) Utopia

Q.12 A dislocation of continuity in rock strata as a result of cracking of the earth's crust is called

(A) Fissure   (B) Fault   (C) Eluvium   (D) Drift

Q.13 **LEED** is the internationally accepted rating system for

(A) Green buildings   (B) Fire resistant buildings
(C) Intelligent buildings   (D) Tall buildings

Q.14 An architect of the **Chicago School** movement is

(A) Richard Boyle   (B) Louis Sullivan
(C) Hector Guimard   (D) William Morris

Q.15 **Surkhi** is obtained by grinding

(A) well burnt clay bricks   (B) slag from industry
(C) stone aggregate   (D) rice husk

Q.16 **Hemadpanthi** style of temples belongs to

(A) Himalaya   (B) Deccan   (C) Orissa   (D) Kerala

Q.17 A building in which the roof is perfectly hemispherical on the inside and a shallow dome on the outside is

(A) Hagia Sophia   (B) Pantheon
(C) Parthenon   (D) Gol Gumbaz

Q.18 National Science Centre at Pragati Maidan, New Delhi, is designed by

(A) J.A. Stein   (B) Anant Raje   (C) Raj Rewal   (D) A.P. Kanvinde

Q.19   In Islamic architecture, the device used for placing a perfect circular dome over a square plan is called a

(A) Mehrab   (B) Scroll   (C) Mastaba   (D) Squinch

Q.20   Parallel sound rays incident on a convex surface of a fibre-board will

(A) converge and reduce in intensity
(B) converge and increase in intensity
(C) disperse and reduce in intensity
(D) disperse and increase in intensity

Q. 21 to Q. 75 carry two marks each.

Q.21   Match the **architect-planners** in Group I with their **contributions** in Group II.

Group I
P. Hippodamus
Q. Michelangelo
R. Leon Battista Alberti
S. Daniel Burnham

Group II
1. City Beautiful
2. Star-shaped plan
3. Grid iron plan
4. Campidoglio
5. St. Peter's Square

(A) P-3, Q-4, R-2, S-1   (B) P-3, Q-5, R-2, S-4
(C) P-4, Q-1, R-5, S-3   (D) P-3, Q-2, R-1, S-5

Q.22   The characteristics of Japanese gardens are

P. Stepping stones
Q. Stone lanterns
R. Octagonal geometry

S. Miniature symbolic elements
T. Stone water basins
U. Monumental scale

(A) P, Q, S, T   (B) P, Q, U
(C) R, S, T   (D) Q, R, S, T

Q.23   Match the **styles of architecture** in Group I with the **elements** in Group II.

Group I
P. Khajuraho
Q. Dravidian
R. Hoysala
S. Himalayan

Group II
1. Star-shaped Garbhagriha
2. Gopuram
3. Pyramidal Roof
4. Urushringa

(A) P-1, Q-2, R-4, S-3   (B) P-4, Q-2, R-1, S-3
(C) P-2, Q-4, R-3, S-1   (D) P-3, Q-4, R-2, S-1

Q.24 A site has a uniform slope of 6 %. The site map has seven contour lines with the elevation of the highest contour as +53 metres. If the distance between the midpoints of the highest and the lowest contours is 700 metres, then the contour interval in metres is

(A) 6   (B) 7   (C) 11   (D) 42

Q.25 Match the statements about **thermal comfort** in Group I with **True/False** in Group II.

Group I
P. Low capacitance materials should be used to store heat gain
Q. Stack effect depends on temperature difference between indoor and outdoor air
R. Venturi effect is a passive cooling technique
S. Wind breaks are used to maximize winter wind turbulence

Group II
1. True
2. False

(A) P-1, Q-2, R-2, S-2   (B) P-1, Q-2, R-2, S-1
(C) P-2, Q-1, R-1, S-2   (D) P-2, Q-1, R-1, S-1

Q.26 A person standing at a point in a public plaza is observing a façade of height 40 metres from a distance of 120 metres. The sense of enclosure experienced by the person is equivalent to the limits of

(A) Loss of enclosure   (B) Minimal enclosure
(C) Full enclosure   (D) Threshold of enclosure

Q.27 Match the **Urban Planning Theories** in Group I with their **proponents** in Group II.

Group I
P. Sector Theory
Q. Multiple Nuclei Theory
R. Neighbourhood Theory
S. Central Place Theory

Group II
1. Walter Christaller
2. Clarence Perry
3. Ebenezer Howard
4. Harris & Ullman
5. Homer Hoyt

(A) P-1, Q-4, R-5, S-3   (B) P-4, Q-2, R-3, S-1
(C) P-5, Q-1, R-2, S-3   (D) P-5, Q-4, R-2, S-1

Q.28 The plan of a residential area with small houses on small plots has an urban fabric with

(A) fine grain and uniform texture
(B) coarse grain and uniform texture
(C) fine grain and uneven texture
(D) coarse grain and uneven texture

Q.29 Match the 'Change Properties' command in AutoCAD (Group I) with the actions (Group II) it can perform on a given dashed line.

Group I
P. Elev
Q. LType
R. Thickness
S. LtScale

Group II
1. Changes the dashed line to a non-dashed line
2. Changes the size and spacing of the dashes
3. Changes the position along the Z axis
4. Changes the width of the line on the screen
5. Changes the height along the Z axis
6. Changes the position along the Y axis

(A) P-6, Q-1, R-4, S-2   (B) P-5, Q-2, R-6, S-4
(C) P-3, Q-1, R-5, S-2   (D) P-6, Q-4, R-3, S-1

Q.30 Match the statements on intelligent buildings in Group I with True/False in Group II.

Group I
P. All intelligent buildings are examples of high-tech architecture
Q. An intelligent building is synonymous with a smart building
R. An intelligent building need not deploy a building automation system
S. High-tech architecture always results in intelligent buildings

Group II
1. True
2. False

(A) P-1, Q-1, R-2, S-2   (B) P-1, Q-2, R-2, S-2
(C) P-2, Q-2, R-1, S-1   (D) P-2, Q-1, R-1, S-1

Q.31 The correct sequence of various components of a house water connection from the municipal water main is

(A) Stop cock → Water meter → Goose neck → Service pipe → Ferrule connection
(B) Ferrule connection → Stop cock → Goose neck → Service pipe → Water meter
(C) Goose neck → Ferrule connection → Service pipe → Water meter → Stop cock
(D) Ferrule connection → Goose neck → Service Pipe → Stop cock → Water meter

Q.32 The figure that will be generated by the following sequence of commands in AutoCAD is
```
Command: pline
Specify start point: 0,0
Specify next point: @50,0
Specify next point: @0,-25
Specify next point: @25<180
Specify next point: c
```

(A)   (B)   (C)   (D)
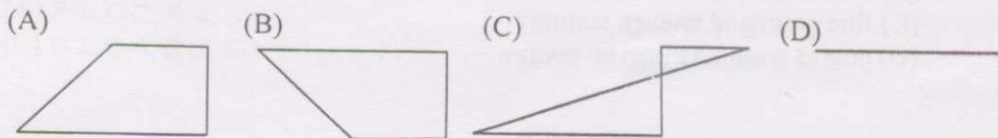
Q.33 A sector has a gross density of 250 persons per hectare and a net density of 400 persons per hectare. If the area of the sector is 120 hectares, then the percentage of non-residential area is

(A) 30   (B) 35.5   (C) 37.5   (D) 40

Q.34 Match the **systems of plumbing** for building drainage in Group I with their **descriptions** in Group II.

Group I
P. One-pipe system
Q. Two-pipe system
R. Single stack system

Group II
1. Minimum two pipes, one for soil and the other for sullage
2. Single pipe for soil and sullage, and serving as vent for all traps
3. Minimum two pipes, one for soil and sullage and the other for vent
4. Single pipe for soil and sullage, and serving as vent for soil traps only

(A) P-4, Q-3, R-2   (B) P-3, Q-2, R-1
(C) P-2, Q-3, R-4   (D) P-3, Q-1, R-2

Q.35 In a plane truss, the equation in terms of **m** and **j** is used to check its determinacy and stability, where **m** = number of members and **j** = number of joints. The truss is deficient and unstable when

(A) $m < 2j - 3$
(B) $m = 2j - 3$
(C) $m > 2j - 3$
(D) both (A) and (B) are correct

Q.36 Match the **functions** in Group I with the **numbers** shown in the given figure of Concentric Zone Theory by Burgess.

Group I
P. Central Business District
Q. Commuters' Zone
R. Workingmen's Homes
S. Zone of Better residences
T. Zone of Transition
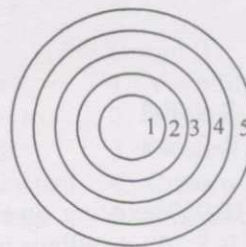
(A) P-1, Q-2, R-5, S-4, T-3   (B) P-1, Q-5, R-3, S-4, T-2
(C) P-2, Q-4, R-5, S-3, T-1   (D) P-3, Q-5, R-1, S-4, T-2

Q.37 For a PERT activity, the optimistic time, most likely time and pessimistic time are 1, 2 and 9 days respectively. The expected time for the activity (in days) is

(A) 9   (B) 6   (C) 4   (D) 3

Q.38 Zoning regulations deal with

P. Density   S. Minimum areas of rooms
Q. Land use   T. Height
R. Building materials   U. Reserved land areas

(A) P, Q, T   (B) P,Q, R,U   (C) Q, S, U   (D) Q, R, S, T

Q.39 Match the **temples** in Group I with their **distinguishing features** in Group II.

Group I   Group II
P. Konark   1. Golden Lily Pond
Q. Madurai   2. Sculpted Marble Ceiling
R. Dilwara   3. Twin Vimanas
S. Mamallapuram   4. Chariot
                                    5. Torana

(A) P-3, Q-1, R-2, S-5   (B) P-4, Q-1, R-2, S-3
(C) P-2, Q-3, R-5, S-1   (D) P-3, Q-4, R-1, S-2

Q.40 The correct sequence of generic elements in a **Classical Order** arranged from top to bottom is

(A) Architrave → Frieze → Capital → Cornice → Shaft → Pedestal → Base
(B) Architrave → Capital → Cornice → Frieze → Base → Shaft → Pedestal
(C) Cornice → Frieze → Architrave → Capital → Shaft → Base → Pedestal
(D) Cornice → Capital → Frieze → Architrave → Shaft → Pedestal → Base

Q.41 Match the **tree forms** in Group I with their **common examples** in Group II.

Group I   Group II
P. Broad   1. False Acacia
Q. Tapering   2. Holly
R. Conical   3. Lombardy Poplar
S. Columnar   4. Oak
                                    5. Silver Maple

(A) P-1, Q-5, R-4, S-2   (B) P-1, Q-3, R-4, S-5
(C) P-4, Q-1, R-2, S-3   (D) P-4, Q-5, R-2, S-1

Q.42 A town has 16,000 existing dwelling units of which 10 % are dilapidated. If the housing need is 8,700 dwellings units and the average household size is 4.5, then the population of the town is

(A) 64,800   (B) 1,03,950   (C) 1,11,150   (D) 1,18,350

Q.43 Match the **descriptions** in Group I with the elements of **Ornamentation** in Group II.

Group I
P. Painting on a freshly spread moist plaster surface with powdered pigments
Q. Figure incised into a stone surface or a metal plate yielding an impression in relief
R. Delicate or intricate design on lattice work allowing light through openings
S. Artistic composition consisting of motifs borrowed from different sources

Group II
1. Chiaroscuro
2. Emboss
3. Filigree
4. Fresco
5. Intaglio
6. Pastiche

(A) P-1, Q-2, R-3, S-5   (B) P-1, Q-5, R-4, S-6
(C) P-4, Q-2, R-3, S-1   (D) P-4, Q-5, R-3, S-6

Q.44 Match the **city plans** in Group I with their **designers** in Group II.

Group I
P. London
Q. Berlin
R. Helsinki
S. Tokyo

Group II
1. Eliel Saarinen
2. Kenzo Tange
3. Alvar Aalto
4. Tadao Ando
5. Martin Machler
6. Patrick Abercrombie

(A) P-6, Q-5, R-1, S-2   (B) P-1, Q-3, R-5, S-2
(C) P-6, Q-3, R-1, S-4   (D) P-5, Q-6, R-3, S-4

Q.45 On a door opening with effective span L, the total weight (W) of an equilateral triangle on the base L is considered as a uniformly distributed load over the span. The bending moment for the door opening is given by

(A) WL / 2   (B) WL / 4   (C) WL / 6   (D) WL / 8

Q.46 Match the **descriptions** in Group I with the **traffic terminology** in Group II.

Group I
P. The length of a road ahead of the vehicle which should be visible to enable a driver to stop in case of an obstruction on the road
Q. Distance covered by a vehicle from the instant a driver sees an obstruction ahead and brings the vehicle to a stop
R. Distance required for a vehicle to overtake and safely pass another vehicle moving in the same direction but at a lower speed

Group II
1. Visibility distance
2. Sighting distance
3. Overtaking sight distance
4. Cross over distance
5. Stopping distance

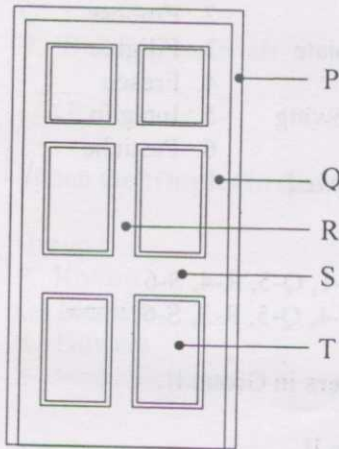(A) P-1, Q-3, R-4   (B) P-4, Q-3, R-5
(C) P-2, Q-5, R-4   (D) P-2, Q-5, R-3

AR   9/20

Q.47 Match the **labels** on a panelled door in Group I with their names in Group II.

Group I

Group II
1. Jamb
2. Muntin
3. Panel
4. Rail
5. Saddle
6. Stile

(A) P-1, Q-6, R-5, S-4, T-2   (B) P-1, Q-6, R-2, S-4, T-3
(C) P-5, Q-3, R-1, S-6, T-2   (D) P-5, Q-6, R-1, S-4, T-3

Q.48 A house was constructed 20 years ago at a cost of Rs. 1,00,000. The estimated life of the building is 50 years, at the end of which it will have a 15 % scrap value of its cost of construction. Its present value in Rupees is

(A) 36,000   (B) 66,000   (C) 75,000   (D) 85,000

Q.49 A typical roof top **Rainwater Harvesting System** essentially comprises of

P. Roof catchment
Q. Down pipes
R. Rain gauge
S. Filter chamber

(A) P,R   (B) P,R,S   (C) Q,R,S   (D) P,Q,S

Q.50 Match the **architects** in Group I with their **works** in Group II.

Group I
P. Norman Foster
Q. Cesar Pelli
R. Richard Meier
S. Renzo Piano

Group II
1. Petronas Towers
2. Kansai Airport
3. HSBC, Hongkong
4. The Atheneum
5. Sydney Opera House

(A) P-3, Q-1, R-4, S-2   (B) P-4, Q-1, R-2, S-3
(C) P-3, Q-2, R-5, S-1   (D) P-5, Q-3, R-1, S-2

Q.51 A single room of 3 metres x 5 metres enclosed by 20 cm thick walls has to be constructed. The required foundation trench is 80 cm wide and 80 cm deep. The quantity of earthwork in excavation in cubic metres is

(A) 10.75 (B) 12.80 (C) 18.70 (D) 20.24

Q.52 Match the parts of a **tree log** in Group I with their **descriptions** in Group II.

Group I
P. Heartwood
Q. Sapwood
R. Cambium Layer
S. Medullary Rays

Group II
1. Outer annual rings of the tree
2. Thin horizontal veins radiating from the pith towards the bark
3. Outermost protective covering of the log
4. Innermost rings surrounding the pith
5. Outermost one ring between the bark and sapwood

(A) P-4, Q-2, R-5, S-3 (B) P-3, Q-5, R-4, S-1
(C) P-4, Q-1, R-5, S-2 (D) P-5, Q-1, R-4, S-2

Q.53 The quantity of plastering in sq.m required for both sides of a wall 5.0 m x 0.30 m x 3.0 m (L x B x H) with a window opening 2.0 m x 0.30 m x 1.2 m is

(A) 25.2 (B) 27.6 (C) 30.0 (D) 34.8

Q.54 Match the **urban theorists** in Group I with the **planning concepts** in Group II.

Group I
P. Patrick Geddes
Q. Charles Abrams
R. Constantine Doxiadis
S. Lewis Mumford

Group II
1. Cities in evolution and their relationship with man
2. Judicious use of technological power
3. Role of housing in urban development
4. The science of human settlements called Ekistics

(A) P-1, Q-3, R-4, S-2 (B) P-4, Q-2, R-3, S-1
(C) P-3, Q-4, R-1, S-2 (D) P-2, Q-1, R-4, S-3

Q.55 If the reinforcement steel provided for a RCC slab of volume 15.0 cu.m. is @ 1%, then the quantity of steel required in kilograms is

(A) 655.5 (B) 1,000.0
(C) 1,177.5 (D) 1,500.0

Q.56 The **Prairie House** design of Frank Lloyd Wright is characterised by

P. Horizontal planes
Q. Extended roofs
R. Focal fire place
S. Steel columns
T. Vertical screen windows

(A) P, R, S (B) P, Q, S (C) Q, R, S, T (D) P, Q, R, T

Q.57 Match the **window types** in Group I with their **descriptions** in Group II.

Group I
P. Bay window
Q. Pivoted window
R. Dormer window

Group II
1. Horizontal louvers pivoting simultaneously in a common frame
2. A sash that rotates 90° or 180° about a vertical or horizontal axis at or near its centre
3. Projecting outward from the main wall of a building, forming an alcove within a room
4. Vertical window projecting out of a sloping roof

(A) P-3, Q-2, R-4   (B) P-2, Q-3, R-1

(C) P-1, Q-4, R-2   (D) P-4, Q-2, R-3

Q.58 Match the **housing projects** in Group I with the **architects** in Group II.

Group I
P. Tara Group Housing, New Delhi
Q. Marine Front Housing, Cochin
R. Aranya Community Housing, Indore
S. Asiad Village, New Delhi

Group II
1. Balkrishna Doshi
2. Charles Correa
3. Hasmukh Patel
4. Kuldip Singh
5. Laurie Baker
6. Raj Rewal

(A) P-2, Q-4, R-1, S-6   (B) P-3, Q-4, R-2, S-6

(C) P-2, Q-5, R-6, S-1   (D) P-1, Q-5, R-3, S-6

Q.59 A beam of 50 mm diameter is simply supported at both ends and has an effective span of 6 metres. It carries two loads of 50 kN each at one-third span. The section modulus (in cm^3) of the beam at the quarter span is

(A) 11.17   (B) 12.27   (C) 13.37   (D) 14.47

Q.60 Match the **Earthquake related terms** in Group I with their **definitions** in Group II.

Group I
P. Focus
Q. Epicentre
R. Centre of Mass
S. Centre of Stiffness

Group II
1. The geographical point on the earth' surface vertically above the originating source
2. The originating source of the seismic waves inside the earth
3. The point corresponding to the centre of gravity of a structural system
4. The point through which the resultant of the restoring forces of a structural system act

(A) P-1, Q-2, R-3, S-4   (B) P-1, Q-2, R-4, S-3

(C) P-2, Q-1, R-3, S-4   (D) P-2, Q-1, R-4, S-3

Q.61 Match the **architectural styles** in Group I with the **construction systems** in Group II.

Group I
P. Greek
Q. Roman
R. Indian
S. Gothic

Group II
1. Semi-circular arch
2. Trabeation
3. Corbelling
4. Pointed arch

(A) P-2, Q-4, R-3, S-1

(B) P-1, Q-2, R-4, S-3

(C) P-2, Q-1, R-3, S-4

(D) P-3, Q-1, R-2, S-4

Q.62 For incandescent lamps the distribution of total energy emission is

(A) 5 % light & 95 % heat
(B) 25 % light & 75 % heat
(C) 50 % light & 50 % heat
(D) 75 % light & 25 % heat

Q.63 Match the **characteristics** in Group I with the **climate types** in Group II.

Group I
P. High humidity accelerates rusting and rotting
Q. High daytime temperature and rapid cooling at night cause materials to crack
R. Seasonal changes in relative humidity cause rapid weakening of building materials

Group II
1. Composite or monsoon
2. Hot dry desert
3. Hot dry maritime
4. Tropical Upland
5. Warm humid

(A) P-5, Q-2, R-1

(B) P-4, Q-1, R-3

(C) P-5, Q-3, R-4

(D) P-4, Q-3, R-5

Q.64 The architectural projects of the **International Style** are

P. Aurora House by Aldo Rossi
Q. Schroder House by Gerrit Reitveld
R. Thematic House by Jencks & Farrell
S. Tugendhat House by Mies van der Rohe
T. Villa Savoye by Le Corbusier

(A) P, Q, R, T   (B) P, S   (C) Q, S, T   (D) Q, R, T

Q.65 Tactile flooring with guiding blocks, an element of Barrier Free Design, is used to aid

P. ambulant disabled
Q. non-ambulant disabled
R. partially sighted
S. totally blind

(A) P, Q, S   (B) P, Q, R   (C) R, S   (D) Q, S

Q.66 Match the **characteristics of vaults** in Group I with their **names** in Group II.

Group I
P. Uniform semi-circular cross section
Q. Semi-circular cross section larger at one end than the other
R. Compound vault formed by perpendicular intersection of two vaults
S. Compound vault formed by four coves meeting along diagonal vertical planes

Group II
1. Barrel
2. Cloister
3. Conical
4. Groin
5. Rampant
6. Stilted

(A) P-1, Q-6, R-5, S-2 (B) P-6, Q-3, R-4, S-2
(C) P-4, Q-5, R-2, S-6 (D) P-1, Q-3, R-4, S-2

Q.67 A 60° segmental arch is provided over a door of 1.0 m width. The wall thickness is 30 cm and the arch thickness is 20 cm. The mean length of the arch in metres is

(A) 1.00 (B) 1.15 (C) 1.20 (D) 1.30

Q.68 Match the statements about **elevators & escalators** in Group I with **True/False in Group II.**

Group I
P. Handling capacity of elevators for residential buildings as per Indian standards is 7.5 %
Q. Minimum height from the top floor to the bottom of the lift machine room should be 3,000 mm
R. Minimum width for escalators as per Indian standards is 1,000 mm
S. Recommended angle with the horizontal for escalators is 30°

Group II
1. True
2. False

(A) P-1, Q-2, R-1, S-2 (B) P-2, Q-2, R-2, S-1
(C) P-2, Q-1, R-1, S-1 (D) P-1, Q-2, R-2, S-1

Q.69 The slenderness ratio for a cantilever prismatic column of length **L** with a circular cross section having radius **r** is

(A) L / r (B) 2L / r (C) 3L / r (D) 4L / r

Q.70 Match the **designers** in Group I with the **terms** in Group II

Group I
P. Max Dubois
Q. Joseph Paxton
R. Victor Horta

Group II
1. Prefabrication
2. Domino System
3. Minimalism
4. Vegetal Ornamentation

(A) P-2, Q-1, R-4 (B) P-4, Q-1, R-3
(C) P-2, Q-4, R-3 (D) P-1, Q-3, R-4

Common Data Questions

Common Data for Questions 71,72,73:

The continuous utility data for a construction project is as follows:

Activity	Duration (days)		Immediate
	Normal	Crash	Predecessors
P	3	3	-
Q	4	4	P
R	2	1	P
S	3	3	P
T	0	0	Q
U	6	5	R, T
V	4	2	S

Q.71 The normal project time for the given network is

    (A) 11   (B) 12   (C) 13   (D) 14

Q.72 For the all-normal solution, the total float and free float for the activity S are

    (A) 1, 1   (B) 0, 3   (C) 3, 3   (D) 3, 0

Q.73 While crashing the project, the first step of compression would involve the activity

    (A) R   (B) U   (C) T   (D) V

Common Data for Questions 74, 75:

A room measuring 10 m x 10 m has to be illuminated to a level of 200 lux by a single electrical lamp. The coefficient of utilization is 0.75 and the maintenance factor is 0.8.

Q.74 The lumen output required for the above lamp is

    (A) 12,000   (B) 16,666   (C) 30,000   (D) 33,333

Q.75 The depreciation factor for the above lamp is

    (A) 0.6   (B) 1.25   (C) 1.33   (D) 1.66

Linked Answer Questions: Q.76 to Q.85 carry two marks each.

Statement for Linked Answer Questions 76 & 77:

The following data is related to the design of a septic tank for a housing complex:
Population of housing complex = 150
Water supply / person / day = 130 litres
Waste water flow = 80 % of water supply
Detention period = 1 day
Sludge production = 0.045 cu.m / person / year
Storage capacity for sludge = $1/3^{rd}$ of septic tank capacity

Q.76   Total capacity of septic tank in cubic metres is

(A) 31.70   (B) 23.40   (C) 20.80   (D) 15.60

Q.77   De-sludging interval (to the nearest year) is

(A) 1   (B) 2   (C) 3   (D) 4

Statement for Linked Answer Questions 78 & 79:

A residential plot measuring 12 metres x 15 metres abuts a road on its smaller side. Permissible ground coverage = 50 %, Floor Space Index (FSI) = 2.5 and maximum permissible floors = 4.

Q.78   Maximum total buildable area in sq.m is

(A) 180   (B) 225   (C) 360   (D) 450

Q.79   As per revised building bye-laws, if the required setbacks are – Front 3 metres, each Side 2 metres and Rear 2 metres, then the maximum total buildable area will

(A) increase by 248 sq.m   (B) increase by 40 sq.m
(C) decrease by 30 sq.m   (D) decrease by 40 sq.m

Statement for Linked Answer Questions 80 & 81:

An aerial photograph is taken from a plane with a camera lens of focal length 305 mm. The desired scale of the photograph is 1: 25,000 and the height of the terrain above mean sea level is 300 metres.

Q.80   The flying height of the plane above mean sea level is

(A) 7,625   (B) 7,925   (C) 8,562   (D) 8,965

Q.81   If the above photograph is taken by a camera lens of focal length 210 mm from the same flying height, then the scale of the photograph will be

(A) 1 : 45,000   (B) 1 : 37,740   (C) 1: 36,310   (D) 1 : 19,050

Statement for Linked Answer Questions 82 & 83:

A beam of cross section 300 mm x 400 mm has overhangs at both ends. The beam has a simple support of 10 metres and an overhang of 5 metres each at both ends and carrying a load of 10 kN on both the free ends.

Q.82   The maximum values of shear force and bending moment in the beam are

(A) 5 kN,   50 kN-m   (B) 20 kN,   80 kN-m
(C) 15 kN,   45 kN-m   (D) 10 kN,   50 kN-m

Q.83   The maximum values of bending stress and shear stress developed in the beam in N/mm^2 are

(A) 5.15,   0.1   (B) 6.25,   0.125   (C) 7.35,   0.15   (D) 8.45,   0.175

Statement for Linked Answer Questions 84 & 85:

An auditorium has a volume of 3000 m^3 with optimum reverberation time of 0.8 seconds.

Q.84   The sound absorption power required in the auditorium in m^2-sabins is approximately

(A) 250   (B) 400   (C) 600   (D) 800

Q.85   During a convocation programme in the same auditorium, the absorption power increases by 200 m^2-sabins. The reverberation time in seconds will now be

(A) 0.4   (B) 0.6   (C) 0.8   (D) 1.2

END OF THE QUESTION PAPER