

AR : ARCHITECTURE AND PLANNING

Duration: Three Hours

Maximum Marks: 100

Read the following instructions carefully.

1. This question paper contains 16 pages including blank pages for rough work. Please check all pages and report discrepancy, if any.
2. Write your registration number, your name and name of the examination centre at the specified locations on the right half of the Optical Response Sheet (ORS).
3. Using HB pencil, darken the appropriate bubble under each digit of your registration number and the letters corresponding to your paper code.
4. All questions in this paper are of objective type.
5. Questions must be answered on the 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. **For each question darken the bubble of the correct answer.** In case you wish to change an answer, erase the old answer completely. More than one answer bubbled against a question will be treated as an incorrect response.
6. There are a total of 65 questions carrying 100 marks.
7. Questions Q.1 – Q.25 will carry 1-mark each, and questions Q.26 – Q.55 will carry 2-marks each.
8. Questions Q.48 – Q.51 (2 pairs) are common data questions and question pairs (Q.52, Q.53) and (Q.54, Q.55) are linked answer questions. The answer to the second question of the linked answer questions depends on the answer to the first question of the pair. If the first question in the linked pair is wrongly answered or is un-attempted, then the answer to the second question in the pair will not be evaluated.
9. Questions Q.56 – Q.65 belong to General Aptitude (GA). Questions Q.56 – Q.60 will carry 1-mark each, and questions Q.61 – Q.65 will carry 2-marks each. The GA questions will begin on a fresh page starting from page 13.
10. Un-attempted questions will carry zero marks.
11. Wrong answers will carry **NEGATIVE** marks. For Q.1 – Q.25 and Q.56 – Q.60, $\frac{1}{2}$ mark will be deducted for each wrong answer. For Q.26 – Q.51 and Q.61 – Q.65, $\frac{2}{3}$ mark will be deducted for each wrong answer. The question pairs (Q.52, Q.53), and (Q.54, Q.55) are questions with linked answers. There will be negative marks only for wrong answer to the first question of the linked answer question pair i.e. for Q.52 and Q.54, $\frac{2}{3}$ mark will be deducted for each wrong answer. There is no negative marking for Q.53 and Q.55.
12. Calculator (without data connectivity) is allowed in the examination hall.
13. Charts, graph sheets or tables are NOT allowed in the examination hall.
14. Rough work can be done on the question paper itself. Additionally, blank pages are provided at the end of the question paper for rough work.

Q.1 – Q.25 carry one mark each.

- Q.1 Natural granite used for cladding in buildings belongs to the category of
(A) Igneous Rock (B) Acid Rock
(C) Sedimentary Rock (D) Metamorphic Rock
- Q.2 'Flying Buttress' is an architectural element of
(A) Indian Architecture (B) Greek Architecture
(C) Gothic Architecture (D) Byzantine Architecture
- Q.3 A major hole in the Ozone layer has been identified above the
(A) Amazon Forest (B) Arctic Region (C) Savannah Grasslands (D) Sahara Desert
- Q.4 A flat arch at the skewback should NOT have an angle less than
(A) 30° (B) 45° (C) 60° (D) 90°
- Q.5 Primary colours of natural light are
(A) Red, Blue, Yellow (B) Red, Green, Blue
(C) Red, Violet, Yellow (D) Red, Green, Yellow
- Q.6 Horizontal member of a shutter that subdivides a window is termed as
(A) Mullion (B) Transom (C) Reveal (D) Purlin
- Q.7 If the temperature of a composite bar made of copper and steel is raised, then the copper bar will be under
(A) Tension (B) Compression (C) Shear (D) Torsion
- Q.8 E.I.A. stands for
(A) East India Association (B) Environmental Impact Audit
(C) Environment Impact in Asia (D) Environmental Impact Assessment
- Q.9 A steel truss with parallel upper and lower chords and inclined connecting members forming a series of equilateral triangles is known as
(A) Bowstring Truss (B) Warren Truss
(C) Kingpost Truss (D) Scissors Truss
- Q.10 In water supply systems, the 'Reflux Valves' allow water to flow
(A) In one direction only (B) In both directions
(C) Through air locked joints (D) Only under low pressure
- Q.11 In Islamic Architecture, the circular dome was constructed over a square configuration through
(A) Grid Iron Coffered Slab
(B) Pendentives and Squinch Arches
(C) Double Barrel Vaults and Jack Arches
(D) Horizontal Cross Tie Members
- Q.12 With respect to energy conservation and cost efficiency, the nature of an ideal built form should be
(A) High Rise Low Density (B) Medium Rise High Density
(C) Low Rise High Density (D) Low Rise Low Density

Q.13 Two default sequences P and Q are given below :

P: Specify height of extrusion or [Path]: 50
Specify angle of taper for extrusion <0>:

Q: Specify height of extrusion or [Path]: p
Select extrusion path or [Taper angle]:

The above mentioned sequences P and Q respectively, belong to

- (A) 2D AutoCAD and 2D AutoCAD (B) 2D and 3D AutoCAD
(C) 3D and 2D AutoCAD (D) 3D AutoCAD and 3D AutoCAD
- Q.14 When shear stress exceeds the permissible limit in a RCC slab, then this problem is solved by
(A) Increasing the slab depth (B) Providing shear reinforcement
(C) Using high strength steel (D) Using thinner bars but more in number
- Q.15 Considering the total heat losses from all fluorescent lamps to be 79%, the Heating load (Btu / hr) due to office illumination with 48 ceiling mounted luminaires, each containing four 40 W fluorescent lamps and flat surface diffusers will be
(A) 10000 Btu / hr (B) 15000 Btu / hr
(C) 17500 Btu / hr (D) 21000 Btu / hr
- Q.16 Prime resultant forces that develop in a structure due to an earthquake depend on
(A) Mass and Surface Area of structure
(B) Surface Area and Stiffness of structure
(C) Stiffness and Mass of structure
(D) Surface Area and Volume of structure
- Q.17 Concept of 'Serial Vision' has been applied to the approach layout of
(A) Victoria Memorial Complex, Kolkata (B) Umaid Bhawan Palace, Jodhpur
(C) Vidhan Soudha Precinct, Bangalore (D) Rashtrapati Bhawan Complex, New Delhi
- Q.18 Advanced Traffic Lane Information is an important feature of
(A) Para Transit system (B) Intelligent Transportation system
(C) High Level Cable Car system (D) Pedestrian Travellator system
- Q.19 A local authority can go for Urban Development through
(A) Land Acquisition (B) Land Pooling
(C) Transferable Development Rights (D) All the above
- Q.20 The Planning document submitted for the selected cities under JNNURM is
(A) Master Plan (B) Basic Development Plan
(C) City Development Plan (D) Outline Development Plan
- Q.21 Excessive tilt of the Leaning Tower of Pisa has been checked by
(A) Pumping cement concrete mix under the dipping foundation
(B) Relocating heavier furniture to the rising side of the tower
(C) Raising the dipping side by massive Jack screws
(D) Pumping out mud and slurry from the foundation base of the rising side

- Q.22 The Pritzker Prize 2009 has been awarded to
 (A) Zaha Hadid (B) Peter Zumthor
 (C) Jean Nouvel (D) Norman Foster
- Q.23 The age of a tree is determined by
 (A) Counting the number of rings in the stem cross section
 (B) Counting the number of leaves on the main branches
 (C) Measuring the height of the tree from the rootball
 (D) Measuring the canopy circumference of the tree
- Q.24 Nakagin Capsule Tower, Tokyo famous for its spatial modular approach was designed by
 (A) Arata Isozaki (B) Tadao Ando
 (C) Kisho Kurokawa (D) Minoru Yamasaki
- Q.25 Proportioning system used in the layout of Mughal Gardens is derived from
 (A) Rational number system
 (B) Constants of equilateral triangle
 (C) Irrational number system
 (D) Constants of right angled isosceles triangle

Q.26 – Q.55 carry two marks each.

- Q.26 Match the cities in **Group I** with their form in **Group II**

Group I

- P. Detroit
 Q. Copenhagen
 R. Stalingrad
 S. San Francisco

Group II

1. Star Form
 2. Polycentred Net
 3. Linear City
 4. Ring Form
 5. Galaxy

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

- Q.27 Match the visionaries in **Group I** with their concepts in **Group II**

Group I

- P. Clarence A. Perry
 Q. Constantinos Doxiadis
 R. Paul Davidoff
 S. Walter Gropius

Group II

1. Post Modernism
 2. Bauhaus
 3. Advocacy Planning
 4. Dynopolis
 5. Neighborhood Unit

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

Q.28 Match the trees in **Group I** with their botanical names in **Group II**

Group I

- P. Neem
Q. Amaltas
R. Pipal
S. Asoka

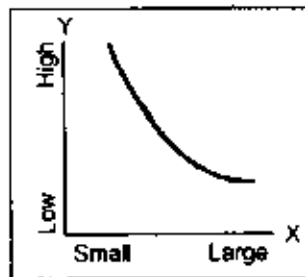
Group II

1. Cassia Fistula
2. Azadirachta Indica
3. Ficus Bengalensis
4. Ficus Religiosa
5. Saraca Indica

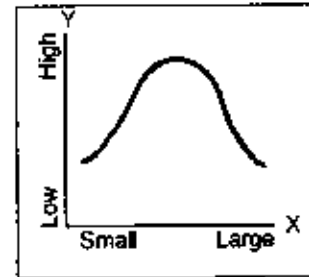
- (A) P - 1, Q - 2, R - 3, S - 4
(C) P - 2, Q - 1, R - 4, S - 5

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

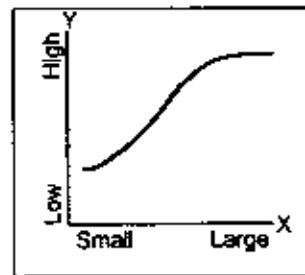
Q.29 Following graphs represent the relationship between city size (in terms of population) on X-axis and area under residential use (in percent) on Y-axis. Identify the correct graph.



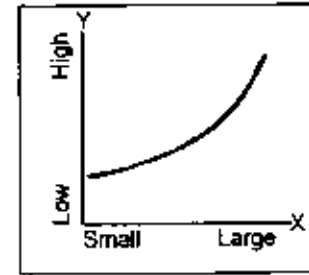
(A)



(B)



(C)



(D)

Q.30 Global climate change is expected to bring about a combination of the following changes. Identify the correct combination.

- P. Increase in Biodiversity
R. Loss of Biodiversity
T. Sea Level Rise
V. Emergence of New Islands

- Q. Emergence of New Diseases
S. Loss of all Rocky Outcrops
U. Extinction of Polar Bears

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

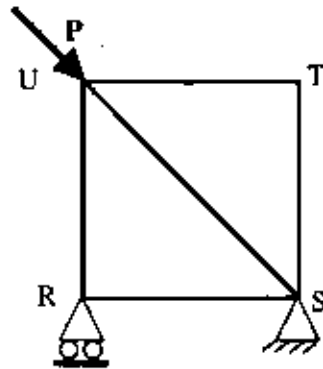
Q.31 Annual housing demand of a metropolitan city is estimated through the combination of the following components. Identify the correct combination.

- P. New Entrants to the City
R. New Relocated Slum Dwellers
T. Unauthorized Dwelling Units
V. Part of Backlog

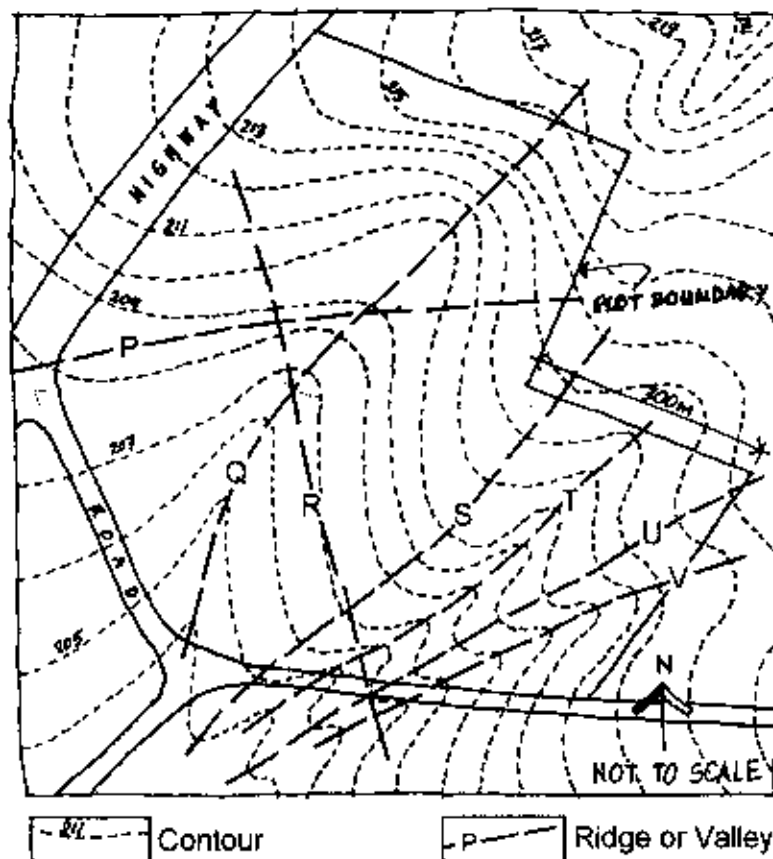
- Q. Elderly Population Living in Cities
S. Slum Squatter Dwellers
U. Dilapidated Houses
W. Any Other Houses

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

- Q.32 A square pin jointed truss is subjected to a load P , acting in the direction of member US , at joint U . The force in member UR is



- (A) $1.414 P$ (B) $1.000 P$ (C) $0.707 P$ (D) $0.000 P$
- Q.33 Given below is the sketch plan of a site showing contours. The broken lines show valleys and ridges. Identify the ridges and valleys.



- (A) Ridges: P, Q, R
Valleys: S, T
- (B) Ridges: T, V
Valleys: R, T, U
- (C) Ridges: S, U
Valleys: Q, T, V
- (D) Ridges: R, V, U
Valleys: P, T

- Q.34 From the following, identify the factors which influence the loudness of sound to a listener in an enclosure
- P. Loudness of sound at source
 Q. Directivity factor
 R. Length/Width ratio of the enclosure
 S. Distance between sound source and listener
 U. Sound absorption co-efficient of all enclosing surfaces
 V. Surface area of enclosing surfaces
 Y. Inside temperature level of the enclosure
- (A) P, Q, S, Y, V (B) Q, R, S, U, Y (C) P, R, S, U, V (D) P, Q, S, U, V
- Q.35 Match the lamps in **Group I** with their Colour Rendering Index (CRI) in **Group II**
- | <u>Group I</u> | <u>Group II</u> |
|-------------------------|-----------------|
| P. Mercury Vapour | 1. 65 - 70 |
| Q. Metal Halide | 2. 40 - 55 |
| R. High-pressure sodium | 3. 20 - 25 |
| S. Low-pressure sodium | 4. 60 - 64 |
- (A) P - 4, Q - 2, R - 1, S - 3 (B) P - 3, Q - 2, R - 4, S - 1
 (C) P - 2, Q - 1, R - 4, S - 3 (D) P - 4, Q - 3, R - 2, S - 1
- Q.36 Match the terms in **Group I** with the architectural elements in **Group II**
- | <u>Group I</u> | <u>Group II</u> |
|----------------|----------------------------------|
| P. Tympanum | 1. Auditorium Stage |
| Q. Proscenium | 2. Door or Window Bands |
| R. Campanile | 3. Circular House |
| S. Dymaxion | 4. Church Tower |
| | 5. Horizontal Space for Services |
- (A) P - 1, Q - 3, R - 2, S - 4 (B) P - 2, Q - 3, R - 4, S - 1
 (C) P - 2, Q - 1, R - 4, S - 3 (D) P - 1, Q - 2, R - 3, S - 5
- Q.37 Identify the most representative percentage distribution of landuse for a medium urban centre, according to UDPFI guidelines, where
- Residential = R, Commercial = C, Transport = T, Industry = I.
- (A) R = 30%, C = 20%, T = 12%, I = 10%
 (B) R = 45 %, C = 4%, T = 14%, I = 8%
 (C) R = 30%, C = 4%, T = 14%, I = 15%
 (D) R = 45%, C = 10%, T = 12%, I = 10%
- Q.38 If the area of a plot is 1000 sq.m, area of its adjoining roads is 500 sq.m., maximum permissible FAR is 150 and maximum permissible Ground Coverage is 50%, then utilizing fullest ground coverage and assuming floors of equal area, the number of storeys that can be built on the plot is
- (A) 6 (B) 4 (C) 3 (D) 2

Q.39 Match the buildings in Group I with their architects in Group II

Group I

- P. British Council Library, New Delhi
 Q. Osho Commune Campus, Pune
 R. CII Sohrabji Godrej Green Business Centre, Hyderabad
 S. IIM New Campus, Ahmedabad

Group II

1. Hasmukh C. Patel
 2. Charles Correa
 3. Hafeez Contractor
 4. Karan Grover
 5. Balkrishna V. Doshi

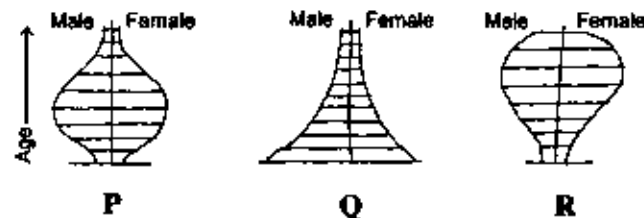
(A) P - 1, Q - 2, R - 3, S - 4

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

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

(D) P - 5, Q - 4, R - 3, S - 2

Q.40 The age-sex compositions of three communities are represented by the diagrams P, Q and R as shown below.



Each of them implies a strong socio-economic characteristic as indicated below.

1. Aging community
 2. Economically vibrant community
 3. Multi ethnic community
 4. Young community with high birth rate

Identify the correct set out of the following

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

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

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

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

Q.41 The correct requirements provided to seek permission from the local authority for constructing a small residential building are

- P - Key Plan
 R - Zonal Plan
 T - Power of Attorney
 V - Transport Plan
 X - Solid waste disposal plan
- Q - Site Plan
 S - Building Plan
 U - Ownership Title
 W - Drainage / Sewerage/ Water Supply Plan

(A) P, Q, R, S, W

(B) P, Q, S, U, W

(C) P, S, V, W, X

(D) Q, S, T, V, X

Q.42 Two commands P and Q, in AutoCAD are given below.

P: Current settings: Mode = TRIM, Radius = 0.0000
 Select first object or [Polyline/Radius/Trim/mUltiple]:

Q: (TRIM mode) Current chamfer Dist1 = 0.0000, Dist2 = 0.0000
 Select first line or [Polyline/Distance/Angle/Trim/Method/mUltiple]:

The above mentioned commands are used for

(A) P: Trim and Q: Trim

(B) P: Fillet and Q: Trim

(C) P: Fillet and Q: Chamfer

(D) P: Trim and Q: Chamfer

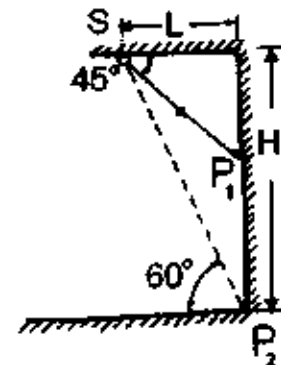
Q.43 A 'T- beam slab' is cast and cured. The shuttering has to be removed. The right sequence for removal of shuttering is

- (A) Base of beam → Sides of beam → Base of slab → Vertical support under beam
 (B) Base of slab → Sides of beam → Base of beam → Vertical support under beam
 (C) Base of slab → Sides of beam → Vertical support under beam → Base of beam
 (D) Base of beam → Base of slab → Sides of beam → Vertical support under beam

Q.44 Bioclimatic chart developed by Victor Olgyay shows the relationship between

- (A) Temperature and Precipitation
 (B) Relative Humidity and Precipitation
 (C) Air Movement and Temperature
 (D) Temperature and Relative Humidity

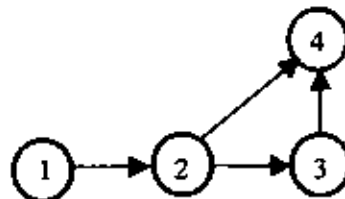
Q.45 In a display window of height $H = 8.66$ m, of a retail store, a luminaire of intensity L is mounted at a distance $L = 5$ m away from the rear. Its light beam is cast at an angle of 45° from the ceiling, as shown in the figure alongside.



The ratio of illumination at points P_1 and P_2 is

- (A) $1:\sqrt{3}$ (B) $\sqrt{3}:2$ (C) $\sqrt{2}:1$ (D) $1:2$

Q.46 Following figure shows network for a particular project consisting of four activities.



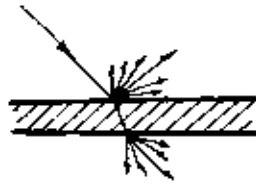
Normal duration and crash time for each activity are given below.

Activity	Normal duration (in days)	Crash time (in days)
1 - 2	3	2
2 - 3	4	2
2 - 4	5	4
3 - 4	7	5

The minimum time required for completion of project is

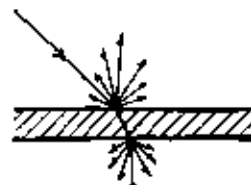
- (A) 9 days (B) 13 days (C) 14 days (D) 19 days

Q.47 Pick the **ODD** one from the figures given below with respect to Reflection and Transmission of light.



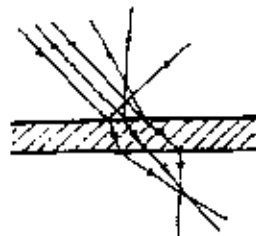
Preferential Reflection and Transmission

P



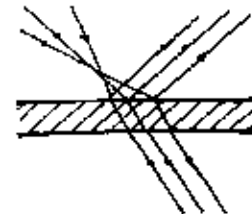
Diffused Reflection and Transmission

Q



Scattered Reflection and Transmission

R



Controlled Reflection and Transmission

S

(A) P

(B) Q

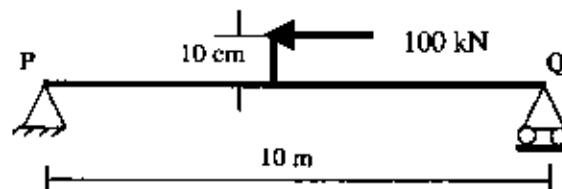
(C) R

(D) S

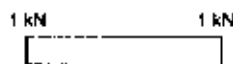
Common Data Questions

Common Data for Questions 48 and 49:

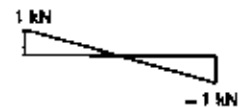
A simply supported beam PQ is subjected to a load of 100 kN through a rigid link at the centre of the beam as shown in the figure below



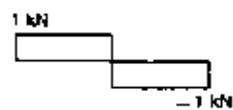
Q.48 Correct shear force diagram for the beam is



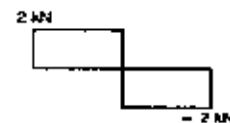
(A)



(B)

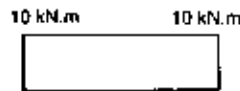


(C)

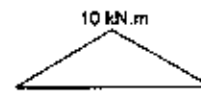


(D)

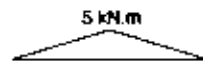
Q.49 Bending moment diagram for the above beam is



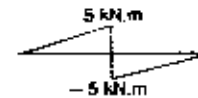
(A)



(B)



(C)



(D)

Common Data for Questions 50 and 51:

A plot of land is to be developed as a residential neighbourhood. The key development conditions and project requirements are given below

Plot area : 1.25 Hectares

Maximum permissible ground coverage : 30%

Density of population : 800 ppHa

Maximum permissible FAR : 350

Maximum permissible height : 45 m

Average household size : 3.55

Building Type	Percentage of Dwelling Units	Total Built up Area (in sq. m)
L.I.G.	20	4480
M.I.G.	55	18600
H.I.G.	25	14200

Q.50 The total number of dwelling units under L.I.G., M.I.G. and H.I.G. respectively, are

	L.I.G.	M.I.G.	H.I.G.
P	56	155	71
Q	60	142	71
R	56	150	63
S	59	155	63

(A) P

(B) S

(C) Q

(D) R

Q.51 With the above data, the covered area of each flat (in sq. m) under L.I.G., M.I.G. and H.I.G. respectively are

	L.I.G.	M.I.G.	H.I.G.
P	70	130	200
Q	80	120	200
R	70	130	220
S	80	120	220

(A) Q

(B) S

(C) R

(D) P

Linked Answer Questions

Statement for Linked Answer Questions 52 and 53:

A person has purchased an old building at a cost of Rs. 2,50,000/-, excluding the cost of land. The scrap value of the building is 10 % of the cost of purchase and the future life of the building is 20 years.

- Q.52 The total amount of sinking fund at the end of 20 years will be
 (A) Rs. 1,35,000/- (B) Rs. 1,90,000/- (C) Rs. 2,25,000/- (D) Rs. 2,30,000/-
- Q.53 If the rate of interest is 7 %, then the annual installment of sinking fund will be
 (A) Rs. 4,583/- (B) Rs. 4,855/- (C) Rs. 5,507/- (D) Rs. 5,640/-

Statement for Linked Answer Questions 54 and 55:

A standpipe system in a 39 m tall building has a rooftop reservoir for fire fighting containing 1/2 hour water supply.

- Q.54 Assuming that each floor has one hose, the delivery rate (in litre per second) of the fire hose at greatest pressure is
 (A) 75 (B) 78
 (C) 81 (D) 84
- Q.55 The volume of water (in cubic metre) required for the reservoir is
 (A) 105 (B) 110
 (C) 120 (D) 130

General Aptitude (GA) Questions

Q.56 – Q.60 carry one mark each.

- Q.56 25 persons are in a room. 15 of them play hockey, 17 of them play football and 10 of them play both hockey and football. Then the number of persons playing neither hockey nor football is:
 (A) 2 (B) 17 (C) 13 (D) 3
- Q.57 Choose the most appropriate word from the options given below to complete the following sentence:
If we manage to _____ our natural resources, we would leave a better planet for our children.
 (A) uphold
 (B) restrain
 (C) cherish
 (D) conserve
- Q.58 The question below consists of a pair of related words followed by four pairs of words. Select the pair that best expresses the relation in the original pair.
Unemployed : Worker
 (A) fallow : land
 (B) unaware : sleeper
 (C) wit : jester
 (D) renovated : house
- Q.59 Which of the following options is the closest in meaning to the word below:
Circuitous
 (A) cyclic
 (B) indirect
 (C) confusing
 (D) crooked
- Q.60 Choose the most appropriate word from the options given below to complete the following sentence:
His rather casual remarks on politics _____ his lack of seriousness about the subject.
 (A) masked
 (B) belied
 (C) betrayed
 (D) suppressed

Q.61 – Q.65 carry two marks each.

- Q.61 Hari (H), Gita (G), Irfan (I) and Saira (S) are siblings (i.e. brothers and sisters). All were born on 1st January. The age difference between any two successive siblings (that is born one after another) is less than 3 years. Given the following facts:
 i. Hari's age + Gita's age > Irfan's age + Saira's age.
 ii. The age difference between Gita and Saira is 1 year. However, Gita is not the oldest and Saira is not the youngest.
 iii. There are no twins.
 In what order were they born (oldest first)?
 (A) HSGI (B) SGHI (C) IGSH (D) IHSG

- Q.62 5 skilled workers can build a wall in 20 days; 8 semi-skilled workers can build a wall in 25 days; 10 unskilled workers can build a wall in 30 days. If a team has 2 skilled, 6 semi-skilled and 5 unskilled workers, how long will it take to build the wall?
- (A) 20 days (B) 18 days (C) 16 days (D) 15 days
- Q.63 **Modern warfare has changed from large scale clashes of armies to suppression of civilian populations. Chemical agents that do their work silently appear to be suited to such warfare; and regrettably, there exist people in military establishments who think that chemical agents are useful tools for their cause.**
- Which of the following statements best sums up the meaning of the above passage:*
- (A) Modern warfare has resulted in civil strife.
(B) Chemical agents are useful in modern warfare.
(C) Use of chemical agents in warfare would be undesirable.
(D) People in military establishments like to use chemical agents in war.
- Q.64 Given digits 2, 2, 3, 3, 3, 4, 4, 4, 4 how many distinct 4 digit numbers greater than 3000 can be formed?
- (A) 50 (B) 51 (C) 52 (D) 54
- Q.65 If $137 + 276 = 435$ how much is $731 + 672$?
- (A) 534 (B) 1403 (C) 1623 (D) 1513

END OF THE QUESTION PAPER

Space for Rough Work

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SEAL