

GATE 2023-CE

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I. Q. 1 – Q. 5 CARRY ONE MARK EACH.

- 1) A student is required to demonstrate a high level of comprehension of the subject, especially in the social sciences.

The word in meaning to comprehension is

(GATE AR 2014)

- a) understandng
- b) meaning
- c) concentration
- d) stability

- 2) Choose the most appropriate word from the options given below to complete the following sentence.
One of his biggest _____ was his ability to forgive.

(GATE AR 2014)

- a) vice
- b) virtues
- c) choices
- d) strength

- 3) Rajan was not happy that Sajan decided to do the project on his own. On observing his unhappiness, Sajan explained to Rajan that he preferred to work independently.

Which one of the statements below is logically valid and can be inferred from the above sentences?

(GATE AR 2014)

- a) Rajan has decided to work only in a group.
- b) Rajan and Sajan were formed into a group against their wishes.
- c) Sajan had decided to give in to Rajan's request to work with him.
- d) Rajan had believed that Sajan and he would be working together.

- 4) If $y = 5x^2 + 3$, then the tangent at $x = 0, y = 3$

(GATE AR 2014)

- a) passes through $x = 0, y = 0$
- b) has a slope of +1
- c) is parallel to the x-axis
- d) has a slope of -1

- 5) A foundry has a fixed daily cost of Rs 50,000 whenever it operates and a variable cost of Rs 800Q, where Q is the daily production in tonnes. What is the cost of production in Rs per tonne for a daily production of 100 tonnes?

(GATE AR 2014)

Q. 6 – Q. 10 CARRY TWO MARKS EACH.

- 6) Find the odd one in the following group: ALRVX, EPVZB, ITZDF, OYEIK

(GATE AR 2014)

- a) ALRVX
- b) EPVZB
- c) ITZDF
- d) OYEIK

- 7) Anuj, Bhola, Chandan, Dilip, Eswar and Faisal live on different floors in a six-storeyed building (the ground floor is numbered 1, the floor above it 2, and so on). Anuj lives on an even-numbered floor. Bhola does not live on an odd numbered floor. Chandan does not live on any of the floors below Faisal's floor. Dilip does not live on floor number 2. Eswar does not live on a floor immediately above or immediately below Bhola. Faisal lives three floors above Dilip. Which of the following floor-person combinations is correct?

(GATE AR 2014)

	Anuj	Bhola	Chandan	Dilip	Eswar	Faisal
a	6	2	5	1	3	4
b	2	6	5	1	3	4
c	4	2	6	3	1	5
d	2	4	6	1	3	5

- 8) The smallest angle of a triangle is equal to two thirds of the smallest angle of a quadrilateral. The ratio between the angles of the quadrilateral is 3:4:5:6. The largest angle of the triangle is twice its smallest angle. What is the sum, in degrees, of the second largest angle of the triangle and the largest angle of the quadrilateral?

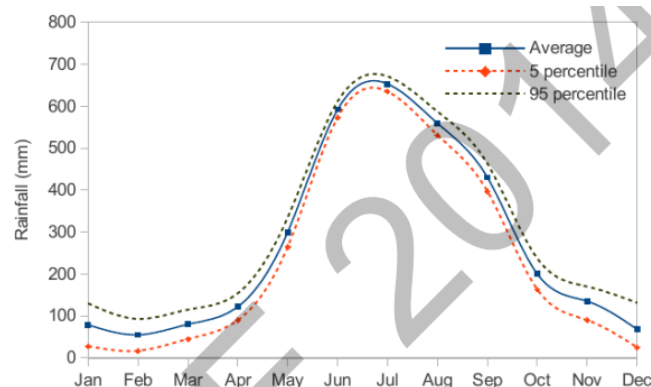
(GATE AR 2014)

- 9) One percent of the people of country X are taller than 6 ft. Two percent of the people of country Y are taller than 6 ft. There are thrice as many people in country X as in country Y. Taking both countries together, what is the percentage of people taller than 6 ft?

(GATE AR 2014)

- a) 3.0
- b) 2.5
- c) 1.5
- d) 1.25

- 10) The monthly rainfall chart based on 50 years of rainfall in Agra is shown in the following figure. Which of the following are true? (k percentile is the value such that k percent of the data fall below that value)



- a) On average, it rains more in July than in December
- b) Every year, the amount of rainfall in August is more than that in January
- c) July rainfall can be estimated with better confidence than February rainfall

d) In August, there is at least 500 mm of rainfall

(GATE AR 2014)

- a) (i) and (ii)
- b) (i) and (iii)
- c) (ii) and (iii)
- d) (iii) and (iv)

END OF THE QUESTION PAPER

Q. 1 – Q. 25 CARRY ONE MARK EACH.

1) Toothling is a construction technique used in

(GATE AR 2014)

- a) Wood construction
- b) Steel construction
- c) Reinforced cement concrete construction
- d) Brick masonry

2) 'Skeleton and Skin' concept in building design and construction evolved during the

(GATE AR 2014)

- a) Roman period
- b) Renaissance period
- c) Gothic period
- d) Greek period

3) As per the IRC standards, the minimum width (in m) of a two lane urban carriageway without a raised kerb is

(GATE AR 2014)

- a) 6.0
- b) 6.5
- c) 7.0
- d) 8.0

4) Pritzker Architecture Prize 2013 has been awarded to

- a) Mario Botta
- b) Toyo Ito
- c) Rem Koolhaas
- d) Arata Isozaki

5) Hip roof is formed by surfaces sloping in

(GATE AR 2014)

- a) One direction
- b) Two directions
- c) Three directions
- d) Four directions

6) Hiroshima Peace Memorial Museum in Japan has been designed by

- a) Kenzo Tange
- b) Kisho Kurokawa
- c) Tadao Ando
- d) I M Pei

7) In AutoCAD, the maximum number of points which can be snapped in a circle using OSNAP command is

(GATE AR 2014)

- a) 1
- b) 3
- c) 4
- d) 5

8) Development authorities in India are established under the provision of

(GATE AR 2014)

- a) Municipal Act
- b) 74th Constitutional Amendment Act
- c) Town and Country Planning Act
- d) Land Acquisition Act

9) In escalators, the angle of inclination with the horizontal plane should be in the range of

(GATE AR 2014)

- a) $10^\circ - 20^\circ$
- b) $20^\circ - 30^\circ$
- c) $30^\circ - 35^\circ$
- d) $35^\circ - 45^\circ$

10) As per the Census of India 2011, 'Metropolitan Urban Agglomeration' is a contiguous spread of several urban settlements where the minimum population size (in Lakh) is

(GATE AR 2014)

- a) One
- b) Five
- c) Ten
- d) Fifty

11) BEES is an acronym for

(GATE AR 2014)

- a) Building for Environmental and Economic Sustainability
- b) Built Environment and Ecological Society
- c) Building for Energy and Environment Sustainability
- d) Built Environment and Engineering Services

12) In a single-stack system of plumbing

(GATE AR 2014)

- a) All the appliances and traps are fully ventilated
- b) Only WC branches are connected with anti-siphonage pipes
- c) Anti-siphonage pipes are omitted
- d) Only the stack is vented above the branch connection at each floor level

13) The maximum bending moment (kNm) in a simply supported beam of 8 m span subjected to a uniformly distributed load of 20 kN/m (inclusive of its self-weight) over the entire span is

(GATE AR 2014)

- a) 40
- b) 160
- c) 240
- d) 380

14) Criteria for background noise (in NC) in hospitals and apartments is inclusive of its self-weight

(GATE AR 2014)

- a) 10 – 20
- b) 20 – 30
- c) 30 – 40

d) 40 – 50

15) As per the National Building Code, the minimum width (in m) of a staircase flight in an educational building above 24 m height should be

(GATE AR 2014)

- a) 1.0
- b) 1.5
- c) 2.0
- d) 2.5

16) Among the following, the one that is NOT a land assembly technique is

(GATE AR 2014)

- a) Land Use Zoning
- b) Accommodation Reservation
- c) Town Planning Scheme
- d) Transfer of Development Right

17) The Grand Gallery in Egyptian Architecture is provided only at

(GATE AR 2014)

- a) Great Pyramid
- b) Temple
- c) Mastaba
- d) Bent Pyramid

18) In the Taipei 101 building, the steel sphere as TMD (Tuned Mass Damper) is suspended to reduce horizontal sway due to

(GATE AR 2014)

- a) Settlement & Wind Load
- b) Wind & Geothermal Load
- c) Seismic & Geothermal Load
- d) Seismic & Wind Load

19) 'Finger Plan' concept of urban planning was initially adopted in

(GATE AR 2014)

- a) Canberra
- b) Paris
- c) Copenhagen
- d) Tokyo

20) The most important property of concrete in its fresh state is

(GATE AR 2014)

- a) Compressive strength
- b) Tensile strength
- c) Elastic modulus
- d) Workability

21) An element constructed at intervals along the length of a wall to stabilize it against overturning is

(GATE AR 2014)

- a) Barrel Vault
- b) Pilaster
- c) Squinch Arch
- d) Buttress

22) Landscape design of Shakti Sthal, the 'Samadhi' of late Prime Minister Smt. Indira Gandhi, was done by architect

(GATE AR 2014)

- a) Ram Sharma
- b) Mohammad Shaheer
- c) Ravindra Bhan
- d) Raj Rewal

23) Horizontally Wedge-shaped Treads in stairways are termed as

(GATE AR 2014)

- a) Stringers
- b) Winders
- c) Scotia
- d) Newel

24) The sequence of development in a Site-and-Services scheme is

(GATE AR 2014)

- a) Land – Service – House – Occupant
- b) Occupant – Land – House – Service
- c) Occupant – Land – Service – House
- d) Land – Occupant – House – Service

25) Which of the following is NOT a classical spatial theory of land use planning?

(GATE AR 2014)

- a) Concentric Zone theory
- b) Multiple Nuclei Theory
- c) Centripetal Theory
- d) Sector Theory

Q. 26 – Q. 55 CARRY TWO MARKS EACH.

26) A housing project is proposed to be designed in a plot of 2 hectare. Maximum permissible FAR is 2. The share of the numbers of dwelling units (DU) for MIG, LIG and EWS is 1:2:3 having sizes of 55, 35 and 25 sq.m respectively. The maximum number of DU which can be accommodated in the plot is _____

27) Arrange the following in ascending order of width

- P. Collector Street
- Q. Arterial Road
- R. Local Street
- S. Sub-Arterial Road

(GATE AR 2014)

- a) P, Q, S, R
- b) R, P, S, Q
- c) Q, S, R, P
- d) Q, S, P, R

28) Out of the following, the maximum points in the LEED (New construction) rating system can be earned through

(GATE AR 2014)

- a) Sustainable Sites
- b) Water Efficiency
- c) Materials and Resources
- d) Energy and Atmosphere

29) Which of the following is NOT a mechanism of bond resistance in reinforced concrete?

(GATE AR 2014)

- a) Chemical adhesion
- b) Friction
- c) Mechanical interlock
- d) Aggregate interlock

30) A neighborhood has 250 units of 80 sq.m each and 200 units of 100 sq.m each. If the mandatory parking requirement is one per 100 sq.m of built space then, the total area (sq.m) required for parking considering 30 percent additional area for circulation is _____

(GATE AR 2014)

31) A brick wall 19 cm thick has a thermal conductivity $0.811 \text{ W/m}^\circ\text{C}$. The outside and inside surface conductance of the wall are $16 \text{ W/m}^2^\circ\text{C}$ and $8 \text{ W/m}^2^\circ\text{C}$ respectively, then the U-value of the wall in $\text{W/m}^2^\circ\text{C}$ is _____

32) Match the contemporary buildings in Group I with their architects in Group II

Group I	Group II
Vitra Design Museum, Basel	Adrian Smith
Turning Torso, Malmö	Jean Nouvel
Burj Khalifa, Dubai	Herzog de Meuron
Tate Modern, London	Santiago Calatrava
	Frank O Gehry

(GATE AR 2014)

- a) P-3, Q-4, R-2, S-5
- b) P-5, Q-4, R-1, S-3
- c) P-5, Q-3, R-2, S-1
- d) P-5, Q-3, R-1, S-2

33) From the following cost components of a building construction project which is not a direct cost combination?

- P. Labour cost
- Q. Equipment cost
- R. Material cost
- S. Establishment cost
- T. Supervision cost

(GATE AR 2014)

- a) P and Q
- b) Q and R
- c) P and R
- d) S and T

34) A house located in Delhi has 111 m^2 of flat terrace area (runoff coefficient = 0.85) and 55 m^2 of ground area covered with grass (runoff coefficient = 0.15). If annual average rainfall is 611.8 mm, then rain water harvesting potential (L/year) from runoff will be _____

(GATE AR 2014)

35) Match the elements in Group I with the structures in Group II

Group I	Group II
Harmika	Dilwara Temple, Mount Abu
Sixteen Vidyadevis	sun Temple, Modhera
Lat pillar	Stupa of sanchi
Urushringa	Lauriya, Nandangarh
	Great Kailash Temple, Ellora

(GATE AR 2014)

- a) P-5, Q-1, R-4, S-3
- b) P-1, Q-2, R-4, S-3
- c) P-3, Q-5, R-4, S-2
- d) P-3, Q-1, R-4, S-2

36) A site, based on percolation test, the allowable rate of treated sewage application was determined as 65 L/m²/day. The effective depth (m) of a soak pit with a diameter of 2.5 m for the disposal of 1020 L/day of septic tank effluent is _____

(GATE AR 2014)

37) Match the AutoCAD command in Group I with their functions in Group II

OOPS	Creates solid lines
RAY	Restores an erased drawing
TRACE	Manages customized user interface elements
CUI	Creates semi-infinite lines
	Creates a five sided 3D solid with a sloped face tapering along the X axis

(GATE AR 2014)

- a) P-1, Q-3, R-2, S-5
- b) P-2, Q-4, R-1, S-3
- c) P-2, Q-1, R-3, S-4
- d) P-1, Q-2, R-3, S-4

38) Match the bridges in Group I with their structure type in Group II

Group I	Group II
Harbour Bridge, Sydney	1. Simply Supported
Golden Gate Bridge, San Francisco	2. Cable Stayed
Howrah Bridge, Kolkata	3. Arch
Millau Viaduct, Millau	4. Suspension
	5. Cantilever

(GATE AR 2014)

- a) P-3, Q-4, R-5, S-2

- b) P-2, Q-3, R-4, S-5
- c) P-5, Q-1, R-4, S-3
- d) P-1, Q-2, R-3, S-4

39) The arithmetic average value of the sound absorption coefficient for a specific material and particular mounting condition for four frequencies is

(GATE AR 2014)

- a) Transmission coefficient
- b) Noise reduction coefficient
- c) Absorption coefficient
- d) Reflection coefficient

40) A single span simply supported reinforced concrete beam (250 mm wide and 480 mm effective depth) is subjected to a concentrated load of $120kN$ at its mid-span. Neglecting self-weight of the beam, the nominal shear stress (MPa) at the support section is _____

(GATE AR 2014)

41) The optimistic time, the pessimistic time and the most likely time of a job are 6, 13 and 8 days respectively. The variance for this job is _____

(GATE AR 2014)

42) A refuse collection system consisting of two chutes is to be provided in a 20 storied residential building with 2 flats/floor (average family size = 5) and with each chute serving one flat on each floor. Average quantity of refuse and its density are 880 g/person/day and 240 kg/m^3 respectively. If the cleaning interval is two days, then the minimum size of the refuse container (litre) at the bottom of each chute is _____

(GATE AR 2014)

43) Match the features in Group I with their architectural periods in Group II

Group I	Group II
Caryatids	Roman
Hypocaust	Gothic
Pylons	Greek
Lofty Pinnacles	Egyptian
	Romanesque

(GATE AR 2014)

- a) P-1, Q-5, R-4, S-2
- b) P-5, Q-1, R-3, S-2
- c) P-3, Q-2, R-5, S-4
- d) P-3, Q-1, R-4, S-2

44) Match the following terminologies in Group I with their descriptions in Group II

Group I	Group II
Pruning	Useful in reproducing plants that would not breed true if propagated by seed
Topiary	A live bud from a desired plant inserted into a host plant
Grafting	Cutting of evergreen shrubs into abstract or geometric shapes
Budding	Trimming and cutting of lawns
	Selective cutting of plant branches for better growth

(GATE AR 2014)

- a) P-5, Q-3, R-4, S-2
- b) P-2, Q-3, R-1, S-5
- c) P-3, Q-4, R-1, S-2
- d) P-5, Q-3, R-1, S-2

45) In a dance hall the indoor and outdoor temperatures are 28°C and 18°C respectively. There is an internal heat gain of 5 kW and the specific heat of air (on volume basis) is $1300\text{J}/\text{m}^3\text{ }^{\circ}\text{C}$, then the necessary cross sectional area (m^2) of a duct with an air velocity of 2 m/s required for cooling by ventilation is _____

(GATE AR 2014)

46) Assuming full compaction, strength of concrete is inversely proportional to

(GATE AR 2014)

- a) Water - cement ratio
- b) Water - sand ratio
- c) Water - coarse aggregate ratio
- d) Water - plasticiser ratio

47) Match the terms in Group I with their examples in Group II

Group I	Group II
Incentive zoning	Boardwalk, Atlantic City
Universal design	Minneapolis, USA
Promenading	Broadway Theatre District, New York
Skyway system	Pruitt Igoe Housing, St. Louis, Missouri
	Curitiba, Brazil

(GATE AR 2014)

- a) P-5, Q-3, R-2, S-1
- b) P-4, Q-5, R-1, S-3
- c) P-3, Q-5, R-4, S-2
- d) P-3, Q-5, R-1, S-2

48) If yield stress of steel is 415MPa , then strain in tensile reinforcement at the limit state of collapse shall be at least _____. For steel, the Young's Modulus, $E = 2 \times 10^5\text{MPa}$.

(GATE AR 2014)

49) Match the books in Group I with their authors in Group II

Group I	Group II
Architecture now!	Ian Mc Harg
Intentions in architecture	Robert Venturi
Design with Nature	Christopher Alaxander
Complexity	Contradictions in Architecture & Philip Jodidio
	Christian Norberg Schulz

(GATE AR 2014)

- a) P-2, Q-3, R-4, S-1
- b) P-4, Q-5, R-1, S-2
- c) P-3, Q-1, R-5, S-2
- d) P-3, Q-1, R-4, S-2

50) Match the common names of the trees in Group I with their botanical names in Group II

Group I	Group II
Gulmohar	Dalbergia Sissoo
Palas	Ficus Benghalensis
Indian Mahogany	Delonix Regia
Banyan	Toona Ciliata
	Butea Monosperma

(GATE AR 2014)

- a) P-5, Q-3, R-4, S-2
- b) P-4, Q-5, R-2, S-1
- c) P-3, Q-1, R-5, S-2
- d) P-3, Q-1, R-4, S-2

51) A room of internal dimension $4m \times 9m \times 3.5m$ ($L \times B \times H$) has $20cm$ thick walls and two doors of size $1m \times 2m$. The required area for Damp Proof Course ($sq.m$) is _____.

(GATE AR 2014)

52) A load of $30kN$ is applied vertically downward at the free end of a cantilever of span $5m$. If the elastic modulus of the cantilever is $30GPa$ and the section has a width of 0.3 m and a depth of 0.6 m, then, the elastic deflection (in mm) is _____.

(GATE AR 2014)

53) Associate the plans in Group I with the options in Group II

Group I	Group II
City Development Plan	PMGSY
Slum Free City Plan	JNNURM
Transport Network Plan	RAY
Disaster Management Plan	NDMA
	RSVY

(GATE AR 2014)

- a) P-2, Q-3, R-1, S-4
- b) P-2, Q-1, R-5, S-4
- c) P-1, Q-3, R-2, S-5
- d) P-3, Q-2, R-1, S-4

54) The capacity of a hall is 600 persons and its volume is 3000cu.m . If an optimum reverberation time of 1.0 second is to be achieved then the required total absorption ($m^2\text{ sabine}$) is _____.

(GATE AR 2014)

55) A solid straight steel rod of diameter 100mm is bent in single curvature into a circular arc by a moment of 50kNm applied at its ends. If elastic modulus, E , for steel is $2 \times 10^5\text{MPa}$, the radius of curvature (mm) of the arc assuming $\pi = 3.14$ is _____.

(GATE AR 2014)

END OF THE QUESTION PAPER