2009 - AR : Architecture and Planning Exam

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Duration: Three Hours Maximum Marks:100

Q.1 - Q.20 carry one mark each.

1. The essential difference between CPM and PERT is **(GATE-AR 2009)**

   (A) Critical Path vs. Critical Activity
   (B) Arrow notation vs. Precedence notation
   (C) Deterministic approach vs. Probabilistic approach
   (D) Project Management vs. Network Analysis

2. The minimum thickness of a wall where single Flemish bond can be used is **(GATE-AR 2009)**

   (A) Half-brick thick
   (B) One-brick thick
   (C) One-and-half-brick thick
   (D) Two-brick thick

3. On the colour wheel, the combination of 'Violet-Yellow' or 'Orange-Blue' are best described as **(GATE-AR 2009)**

   (A) Complementary (B) Supplementary (C) Analogous (D) Monochromatic

4. The sudden stoppage in the flow of water in a closed conduit results in a phenomenon called **(GATE-AR 2009)**

   (A) Cavitation (B) Hydraulic gradient
   (C) Stack pressure (D) Water hammer

5. The number of intersecting arches that support Bijapur's Gol Gumbaz is **(GATE-AR 2009)**

   (A) 4 (B) 8 (C) 12 (D) 16

6. The 73^{rd} and 74^{th} Constitutional Amendments pertain to **(GATE-AR 2009)**

   (A) Abolishing the Urban Land Ceiling Act
   (B) Providing restricted role to local courts to settle rural disputes
   (C) Providing more responsibility to municipal and local bodies for planning and development
   (D) Providing right to information for the general public

7. A simply supported beam of length L carries a concentrated load of intensity P at its centre. The bending moment at the centre of the beam will be **(GATE-AR 2009)**

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

8. 'Desire lines' are associated with **(GATE-AR 2009)**

   (A) Origin – Destination analysis in transportation planning
   (B) Income – Expenditure analysis in personal finance management
   (C) Cut – Fill analysis in landscape planning
   (D) Demand – Supply analysis in economic planning

9. GRiHA is a rating for Green Buildings given by **(GATE-AR 2009)**

   (A) The Energy Research Institute (B) Development Alternatives
   (C) Bureau of Energy Efficiency (D) Ministry of Power

10. A 'cul-de-sac' is a street where **(GATE-AR 2009)**

    (A) Only two-wheelers are permitted
    (B) Through traffic is discouraged
    (C) Pedestrians are not permitted
    (D) Vehicles are permitted to move in one direction only

11. 'Usonian' houses were designed by **(GATE-AR 2009)**

(A) Mies van der Rohe
(B) Alvar Aalto
(C) Frank Lloyd Wright
(D) Le Corbusier

12. Increase in the volume of fine aggregate due to the presence of moisture is called **(GATE-AR 2009)**

(A) Bulking (B) Buckling (C) Bending (D) Twisting

13. The Pattern Language theory was propounded by **(GATE-AR 2009)**

(A) Christopher Alexander
(B) Patrick Geddes
(C) John Ruskin
(D) Amos Rapoport

14. As per IS:456-2000, the maximum area of tension reinforcement in a RCC beam shall not exceed x% of its cross-sectional area, where x is equal to **(GATE-AR 2009)**

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

15. 'No-cut no-fill' lines are mostly used in **(GATE-AR 2009)**

(A) Land use planning
(B) Interpretation of stereo-vision photographs
(C) Earthwork computation
(D) Interpretation of remotely sensed images

16. The property of concrete measured by the Slump Test is **(GATE-AR 2009)**

(A) Durability (B) Hardness (C) Strength (D) Workability

17. The Remote Sensing satellite that gives the highest spatial resolution is **(GATE-AR 2009)**

(A) IKONOS 2 (B) IRS 1C/1D (C) Quickbird 2 (D) SPOT 5

18. Development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs is termed by UNDP as **(GATE-AR 2009)**

(A) Comprehensive Development
(B) Equitable Development
(C) Human Development
(D) Sustainable Development

19. The parameter that does NOT apppear in a Psychrometric Chart is **(GATE-AR 2009)**

(A) Wind speed
(B) Dry bulb temperature
(C) Wet bulb temperature
(D) Relative humidity

20. Allowable stress in the design of a tension member in a steel truss is a function of **(GATE-AR 2009)**

(A) Cross-sectional area of the member
(B) Yield stress of the material
(C) Slenderness ratio of the member
(D) Moment of inertia of the member's cross-section

Q.21 to Q.60 carry two marks each.

21. The parameters for determining Human Development Index are: **(GATE-AR 2009)**

P. Educational Attainment

Q. Per capita Gross Agricultural Produce

R. Life Expectancy

S. Per capita Gross Domestic Product

T. Per capita State Domestic Product

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

22. Match the individuals in Group I with the works in Group II: **(GATE-AR 2009)**

Group I	**Group II**
P. Hippodamus	1. Aqueducts
Q. Vitruvius	2. Campidoglio
R. Michelangelo	3. Hagia Sophia
S. Constantine	4. Agora
	5. Hanging Gardens

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

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

23. If the height of the facade = h, and the distance of the observer from the building = d, then match the enclosure types in Group I with their corresponding h/d ratio in Group II: **(GATE-AR 2009)**

Group I	**Group II**
P. Full enclosure	1. 1
Q. Threshold of enclosure	2. 1/2
R. Minimum of enclosure	3. 1/3
S. Loss of enclosure	4. 1/4
	5. 1/5

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

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

24. The correct sequence of activities in Solid Waste Management is **(GATE-AR 2009)**

(A) Collection → Transportation → Treatment → Segregation

(B) Segregation → Collection → Transportation → Treatment

(C) Collection → Segregation → Treatment → Transportation

(D) Treatment → Collection → Transportation → Segregation

25. The principles of Universal Design include: **(GATE-AR 2009)**

P. Flexibility in use

Q. Tolerance for error

R. Energy efficiency

S. Low physical effort

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

26. Match the urban design elements in Group I with their descriptions in Group II: **(GATE-AR 2009)**

Group I	**Group II**
P. District	1. Recognizable as having some common identifying character
Q. Landmark	2. Centre of activity
R. Node	3. Network of major and minor routes
S. Pathway	4. Prominent visual feature of the city

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

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

27. A commercial plot measures 100 m × 80 m. If the permissible Floor Space Index (FSI) is 3.0, and 50% of the ground is covered, then the maximum number of floors that can be built is **(GATE-AR 2009)**

(A) 3 (B) 4 (C) 6 (D) 12

28. Match elements of a Buddhist Stupa in Group I with their traditional names in Group II: **(GATE-AR 2009)**

Group I	**Group II**
P. Hemispherical Dome	1. Vedika
Q. Peripheral Railing	2. Anda
R. Entrance Gateway	3. Harmika
S. Portion above dome	4. Nagara
	5. Chaitya
	6. Torana

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

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

29. A microwave oven of 3 kW rating is operated for 30 minutes, a hot water geyser of 1 kW rating is operated for 15 minutes, and 5 fluorescent lamps of 60 W are operated for 6 hours. The total power consumed (in kWh) will be **(GATE-AR 2009)**

(A) 1.80 (B) 3.55 (C) 18.01 (D) 35.50

30. Match the building projects in Group I with their architects in Group II: **(GATE-AR 2009)**

Group I	**Group II**
P. National Olympic Stadium, Beijing	1. Rem Koolhaas
Q. Glass Pyramid, the Louvre, Paris	2. Richard Rogers
R. Millennium Dome, London	3. Renzo Piano
S. Kansai Airport, Osaka	4. Tadao Ando
	5. I. M. Pei
	6. Herzog & de Meuron

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

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

31. Identify the 'pre-historic' structures in the following: **(GATE-AR 2009)**

P. Mastaba

Q. Dolmen

R. Menhir

S. Pylon

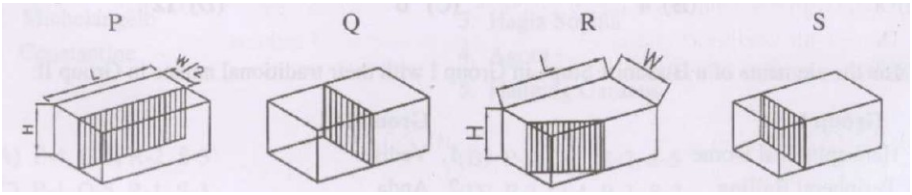
T. Stonehenge

U. Thermae

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

32. Match the figures of cut bricks in Group I with their terms in Group II: **(GATE-AR 2009)**

Group I



Group II

1. King Closer 2. Queen Closer 3. Half Bat 4. Three Quarter Bat

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

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

33. A site has 6 contour lines and the length of the line joining the midpoints of the highest contour and lowest contour is 300 m. If the slope of the line is 1 in 10, then the contour interval (in m) is **(GATE-AR 2009)**

(A) 5 (B) 6 (C) 50 (D) 60

34. Match the plant types in Group I with their corresponding examples in Group II: **(GATE-AR 2009)**

Group I	**Group II**
P. Climber	1. Croton
Q. Shrub	2. Shirish
R. Tree	3. Duranta
S. Hedge	4. Bougainvillea

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

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

35. A neighbourhood with a total area of 200 hectares has a gross density of 300 persons per hectare (pph). If the residential area is 60% of the total area, then net density (in pph) of the neighbourhood is **(GATE-AR 2009)**

(A) 300 (B) 450 (C) 500 (D) 750

36. Identify the parameters used in the Hazen & William's nomogram to calculate pipe diameter for water supply: **(GATE-AR 2009)**

P. Flow rate in lit/sec

Q. Pipe diameter in mm

R. Population to be served

S. Head loss in m/m

T. Velocity in m/sec

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

37. Match the domes in Group I with their examples in Group II: **(GATE-AR 2009)**

Group I	**Group II**
P. Dome with a huge central cut-out at the top	1. Pisa Cathedral
Q. Dome with slit windows at the springing level	2. St. Peter's Cathedral
R. Dome with an elliptical base	3. Pantheon
S. Dome on a drum with a lantern on top	4. Hagia Sophia

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

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

38. Match the Institutions in Group I with their Architects in Group II: **(GATE-AR 2009)**

Group I	**Group II**
P. National Dairy Development Board, New Delhi	1. B. V. Doshi
Q. National Institute of Immunology, New Delhi	2. Charles Correa
R. Indian Institute of Management, Bangalore	3. A.P. Kanvinde
S. Jodhpur University, Jodhpur	4. J.A. Stein
	5. Raj Rewal
	6. U.C. Jain

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

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

39. Identify the urban functions that are included under Social Infrastructure: **(GATE-AR 2009)**

P. Schools and colleges

Q. Hospitals and clinics

R. Roads and footpaths

S. Parks and plazas

T. Malls and markets

U. Community centres

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

40. Match the tombs in Group I with their architectural characteristics in Group II: **(GATE-AR 2009)**

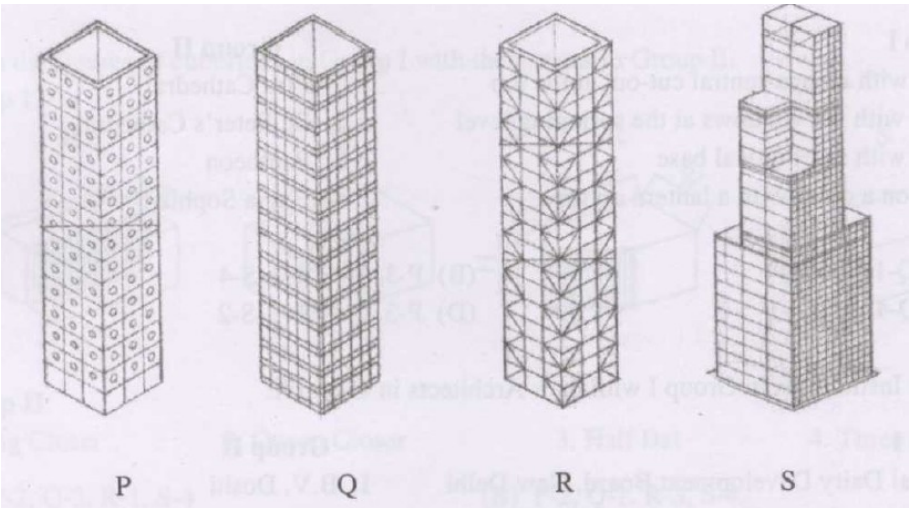
Group I	**Group II**
P. Tomb of Sher Shah	1. Irregular pentagonal site plan
Q. Tomb of Ghias-ud-din Tughlaq	2. Octagonal plan
R. Humayun's tomb	3. Gateway with four minarets
S. Akbar's tomb	4. Persian dome

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

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

41. Match the high-rise tube structural systems in Group I with their corresponding terms in Group II: **(GATE-AR 2009)**

Group I



Group II

1. Framed tube 2. Bundled tubes 3. Braced tube 4. Perforated shell tube

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

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

42. A town with a population of 50000 has an average household size of 5.0. The number of occupied dwelling units is 8400 of which 10% are in dilapidated condition. The housing demand of the town is **(GATE-AR 2009)**

(A) 760 (B) 1600 (C) 2440 (D) 10840

43. Match the items in Group I with those in Group II: **(GATE-AR 2009)**

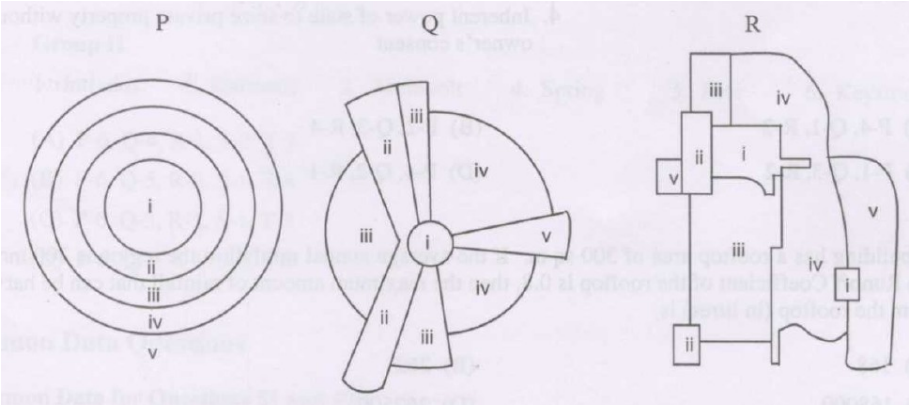
Group I	**Group II**
P. Hypostyle hall	1. Roman architecture
Q. Ziggurat	2. Egyptian architecture
R. Acropolis	3. Assyrian architecture
S. Triumphal arch	4. Greek architecture

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

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

44. Match the Planning Models in Group I with their proponents in Group II: **(GATE-AR 2009)**

Group I



Group II

1. Homer Hoyt 2. Ernest Burgess 3. Von Thunen
4. Harris & Ullman 5. William Reilley

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

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

45. The correct sequence in the four-stage model used for transportation planning is **(GATE-AR 2009)**

(A) Trip generation → Trip distribution → Modal split → Trip assignment

(B) Trip generation → Trip assignment → Modal split → Trip distribution

(C) Trip distribution → Modal split → Trip assignment → Trip generation

(D) Trip generation → Trip distribution → Trip assignment → Modal split

46. Identify the objects with which the EXPLODE command in AutoCAD can be used: **(GATE-AR 2009)**

P. Polyline

Q. Block

R. Multi-line text

S. Arc

T. 3D Solid

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

47. Match the planning terms in Group I with their descriptions in Group II: **(GATE-AR 2009)**

Group I	**Group II**
P. Eminent Domain	1. Protecting land by reassigning the rights to develop from one area to another
Q. Police Power	2. Regulating behaviour and enforcing order within the state territory
R. Transfer of Development Rights	3. Protecting the individual development rights of a citizen by seeking state protection
	4. Inherent power of state to seize private property without the owner's consent

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

48. A building has a rooftop area of 300 sq.m. If the average annual rainfall in the region is 700 mm and the Runoff Coefficient of the rooftop is 0.8, then the maximum amount of rainfall that can be harvested from the rooftop (in litres) is **(GATE-AR 2009)**

(A) 168
(B) 262
(C) 168000
(D) 262500

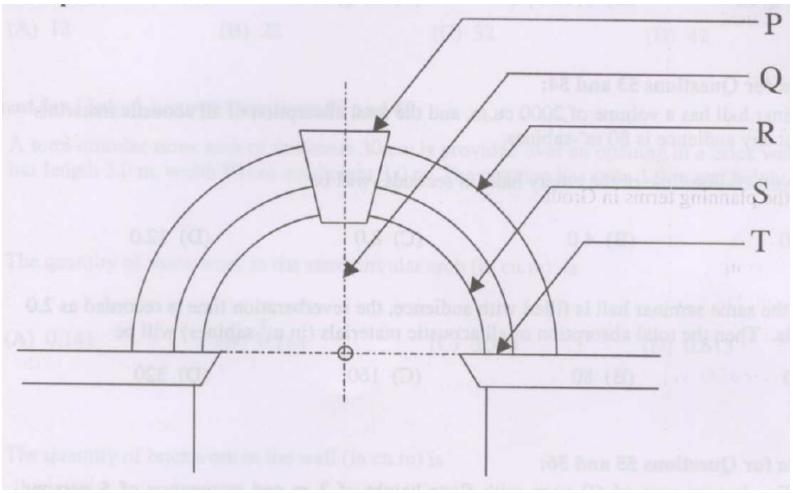
49. Identify Pozzolana from the following materials: **(GATE-AR 2009)**

P. Cement
Q. Fly-ash
R. Sand
S. Surkhi

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

50. Match the notations in the given figure in Group I with corresponding names in Group II: **(GATE-AR 2009)**

Group I



Group II

1. Intrados 2. Extrados 3. Archivolt 4. Spring 5. Rise 6. Keystone

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

Common Data Questions

Common Data for Questions 51 and 52:

A construction project has the following data:

Activity	Duration (days)	Predecessors
P	4	-
Q	3	P
R	7	P
S	2	P
T	4	Q
U	6	S
V	4	R, T, U

51. The normal project duration (in days) is **(GATE-AR 2009)**

(A) 14 (B) 15 (C) 16 (D) 17

52. The critical activities of the project are **(GATE-AR 2009)**

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

Common Data for Questions 53 and 54:

A seminar hall has a volume of 2000 cu.m, and the total absorption of all acoustic materials without any audience is 80 m^2-sabines.

53. The reverberation time of the empty hall (in seconds) will be **(GATE-AR 2009)**

(A) 1.0 (B) 4.0 (C) 8.0 (D) 12.0

54. When the same seminar hall is filled with audience, the reverberation time is recorded as 2.0 seconds. Then the total absorption of all acoustic materials (in m^2-sabines) will be **(GATE-AR 2009)**

(A) 40 (B) 80 (C) 160 (D) 320

Common Data for Questions 55 and 56:

An office has an area of 60 sq.m with floor height of 3 m and occupancy of 5 persons. The external wall area is 40 sq.m which includes 4 sq.m if double glazed windows. The thermal transmittance rate (U) of external wall is 0.35 and window is 2.00. External and internal design temperatures are 34°C and 22°C respectively.

55. The heat gain through the external walls and windows (in watts) will be **(GATE-AR 2009)**

(A) 151.2 (B) 168.0 (C) 247.2 (D) 264.0

56. If 20 lit/sec/person of air is extracted from the office, calculate the ventilation rate in terms of air changes/hour. **(GATE-AR 2009)**

(A) 0.4 (B) 2.0 (C) 4.0 (D) 20.0

Linked Answer Questions

Statement for Linked Answer Questions 57 and 58:

A cantilever beam XY of 2.5 m span is supported at P and is subjected to 40 kN point load at free end Y.

57. If self-weight of the beam is neglected, bending moment developed at the fixed end (in kN-m) is **(GATE-AR 2009)**

(A) 50 (B) 100 (C) 150 (D) 200

58. A uniformly distributed load (in kN/m) that will result in the same value of bending moment at the fixed end is **(GATE-AR 2009)**

(A) 12 (B) 22 (C) 32 (D) 42

Statement for Linked Answer Questions 59 and 60:

A semi-circular stone arch of thickness 30 cm is provided over an opening in a brick wall. The wall has length 3.0 m, width 30 cm and height 3.0 m. The opening has span 1.0 m and height 2.0 m.

59. The quantity of stone work in the semi-circular arch (in cu.m) is **(GATE-AR 2009)**

(A) 0.141 (B) 0.184 (C) 0.325 (D) 0.613

60. The quantity of brickwork in the wall (in cu.m) is **(GATE-AR 2009)**

(A) 1.369 (B) 1.445 (C) 1.629 (D) 1.798

END OF THE QUESTION PAPER