VLYMBOOQ · FULL-LENGTH MOCK PAPER

GATE - Paper (Full Paper)

65 questions · 100 marks · 180 minutes

Paper pattern

Exam: GATE - Paper (Full Paper)
Questions: 65 Marks: 100 Time: 180 minutes
Negative marking: -1/3 for a 1-mark MCQ, -2/3 for a 2-mark MCQ; no negative for numerical-answer questions
Source: GATE: 65 questions, 100 marks, 180 minutes; General Aptitude 10 questions (15 marks), core 55 questions (85 marks).
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Sections

General Aptitude - 10 questions, 15 marks
Core Subject - 55 questions, 85 marks

Instructions

The timer is for practice; the real paper allows 180 minutes.
Each question has exactly one correct option.
Negative marking: -1/3 for a 1-mark MCQ, -2/3 for a 2-mark MCQ; no negative for numerical-answer questions.
The answer key and a full explanation for every question follow the paper.
Model-generated questions are marked as such in the HTML page; verify any factual detail against the official notification.

General Aptitude

Q1. If x + y = 10 and xy = 21, then x^2 + y^2 is:

A. 100
B. 79
C. 58
D. 42

Q2. A man buys a book for 500 and sells it for 600. Profit percentage is:

A. 10%
B. 20%
C. 15%
D. 25%

Q3. Find the next term: 3, 9, 27, 81, ?

A. 162
B. 189
C. 243
D. 324

Q4. Choose the correct spelling:

A. Mischeivous
B. Mischievious
C. Mischievous
D. Mischevous

Q5. If 3x + 2 = 11, then x = ?

A. 1
B. 3
C. 4
D. 2

Q6. A train 150 m long passes a pole in 15 seconds. Find the speed of the train in km/h.

A. 12 km/h
B. 24 km/h
C. 36 km/h
D. 48 km/h

Q7. A die is rolled once. Probability of getting an even number is:

A. 1/6
B. 1/2
C. 2/3
D. 1/3

Q8. Find the odd one out: 2, 4, 8, 16, 24, 32

A. 4
B. 8
C. 24
D. 32

Q9. If 5 men can build a wall in 12 days, how many days will 10 men take?

A. 24
B. 12
C. 6
D. 3

Q10. The simple interest on 1000 at 5% per annum for 2 years is:

A. 50
B. 100
C. 200
D. 25

Core Subject

Q11. Quick sand condition occurs when:

A. Permeability is zero
B. Upward seepage force equals submerged weight
C. Soil is fully dry
D. Water table is low

Q12. Which traversal gives sorted order in a BST?

A. Preorder
B. Postorder
C. Inorder
D. Level order

Q13. TIG welding uses which electrode?

A. Consumable
B. Non-consumable tungsten
C. Copper
D. Steel

Q14. A semaphore that is used as a binary lock is called:

A. Counting semaphore
B. Mutex
C. Spinlock
D. Monitor

Q15. The bending moment at a simply supported beam's center with point load P at center is:

A. PL/2
B. PL/4
C. PL/8
D. PL

Q16. The factor of safety is defined as:

A. Ultimate load/Working load
B. Ultimate strength/Working stress
C. Yield stress/Working stress
D. Both A and B

Q17. The main function of an operating system is:

A. Compiling programs
B. Providing internet access
C. Managing hardware resources
D. Running applications

Q18. The impedance of a capacitor of capacitance C at frequency is:

A. jC
B. 1/(jC)
C. C
D. 1/(C)

Q19. In am in-heap, the smallest element is at:

A. Root
B. Leftmost leaf
C. Rightmost leaf
D. Last node

Q20. The modulus of rigidity relates shear stress to:

A. Normal strain
B. Shear strain
C. Volumetric strain
D. Lateral strain

Q21. Which of the following is a linear data structure?

A. Tree
B. Queue
C. Graph
D. Binary Tree

Q22. The unit of moment of inertia is:

A. N/m
B. kg/m^2
C. m
D. N.m

Q23. An ideal op-amp has infinite:

A. Output impedance
B. Input impedance
C. Bandwidth
D. Both Band C

Q24. A stack is implemented using an array. If the top pointer is at index 5, what is the current size of the stack?

A. 6
B. 5
C. 4
D. 7

Q25. The number of bits in a nibble is:

A. 2
B. 4
C. 8
D. 16

Q26. Thevenin's theorem is used to simplify:

A. Non-linear circuits
B. Linear circuits
C. Digital circuits
D. Magnetic circuits

Q27. What is the value of the integral of x^2 dx from 0 to 2?

A. 2/3
B. 8/3
C. 4/3
D. 16/3

Q28. Kirchhoff's current law is based on:

A. Conservation of energy
B. Conservation of charge
C. Ohm's law
D. Faraday's law

Q29. A 4-bit R-2R DAC uses resistors of values:

A. Only R
B. Only 2R
C. Rand 2R
D. R, 2R, 4R

Q30. What is the order of the differential equation d^2y/dx^2 + 3dy/dx + 2y = 0?

A. 1
B. 2
C. 3
D. 4

Q31. Class A amplifier has conduction angle of:

A. 90°
B. 180°
C. 360°
D. 270°

Q32. Which language is accepted by Pushdown Automata?

A. Regular
B. Context-Free
C. Context-Sensitive
D. Recursively Enumerable

Q33. The optimum depth of a canal is when:

A. Width is minimum
B. Hydraulic radius is maximum
C. Wetted perimeter is maximum
D. Velocity is minimum

Q34. The pH of pure water is:

A. 0
B. 14
C. 7
D. 10

Q35. The cutting speed in a lathe is measured in:

A. RPM
B. m/min
C. mm/rev
D. mm

Q36. In a CPU, what is the main function of the cache memory?

A. To increase the size of the main memory
B. To decrease the time taken to access the main memory
C. To increase the speed of the CPU
D. To decrease the power consumption of the CPU

Q37. The bandwidth of an ideal bandpass filter is:

A. Zero
B. Equal to center frequency
C. Difference of cut-off frequencies
D. Infinite

Q38. A language accepted by a Finite Automaton is called:

A. Regular language
B. Context-free language
C. Context-sensitive language
D. Recursively enumerable language

Q39. Beam deflection is maximum at:

A. Supports
B. Point of load
C. Depends on loading
D. Center always

Q40. The unit of entropy is:

A. J/K
B. kJ/K
C. kJ/kgK
D. All of these

Q41. The operation of enlarging a hole is called:

A. Drilling
B. Reaming
C. Boring
D. Counter-sinking

Q42. The grade of concrete M20 means:

A. 20 kN/m^3 density
B. 20 MPa compressive strength
C. 20 N/mm^2 tensile strength
D. 20% water content

Q43. In an isothermal process, which quantity remains constant?

A. Pressure
B. Volume
C. Temperature
D. Entropy

Q44. Which process is used to make threads on a bolt?

A. Milling
B. Drilling
C. Threading
D. Grinding

Q45. The bearing capacity of soil is improved by:

A. Water addition
B. Compaction
C. Excavation
D. Aeration

Q46. The Euler's buckling load for a column depends on:

A. Material only
B. Length only
C. Length, E, I, and end conditions
D. Cross-section only

Q47. Which memory has the fastest access time?

A. RAM
B. Cache
C. Hard Disk
D. SSD

Q48. The COP of a refrigerator is 4. If it extracts 200 J from cold reservoir, work input is:

A. 20 J
B. 40 J
C. 50 J
D. 200 J

Q49. The height of a complete binary tree with nno des is:

A. n
B. n/2
C. logn
D. sqrtn

Q50. In virtual memory, which technique is used for address translation?

A. Segmentation
B. Compaction
C. Paging
D. Swapping

Q51. In a computer network, what is the purpose of the router?

A. To connect multiple devices within a network
B. To connect multiple networks together
C. To provide network security
D. To provide network storage

Q52. The worst-case time complexity of quicksort is:

A. O(log n)
B. O(n log n)
C. O(n^2)
D. O(n)

Q53. The effective span of a simply supported beam is:

A. Clear span
B. Center to center of supports
C. Clear span + effective depth
D. Overall length

Q54. The material used for cutting tools is:

A. Mild steel
B. HSS (High Speed Steel)
C. Cast iron
D. Brass

Q55. The power dissipated in a resistor R with current I is:

A. IR
B. I^2R
C. V^2R
D. IR^2

Q56. Which flip-flop has no race condition?

A. SR
B. JK
C. Master-slave JK
D. D

Q57. The dry density of soil is maximum at:

A. Liquid limit
B. Plastic limit
C. Optimum moisture content
D. Shrinkage limit

Q58. The plasticity chart classifies soil based on:

A. Grain size
B. Liquid limit and plasticity index
C. Permeability
D. Compaction

Q59. In orthogonal cutting, the cutting edge is:

A. Parallel to work surface
B. Perpendicular to cutting velocity
C. At 45°
D. Inclined

Q60. A steel rod of 10 mm diameter carries 31.4 kN load. Stress is:

A. 100 MPa
B. 200 MPa
C. 400 MPa
D. 314 MPa

Q61. The first law of thermodynamics is essentially:

A. Conservation of mass
B. Conservation of energy
C. Conservation of momentum
D. Law of entropy

Q62. How many AND gates are needed for 8-to-1 multiplexer?

A. 4
B. 6
C. 8
D. 16

Q63. The output of XOR gate with inputs (1,1) is:

A. 1
B. 0
C. High impedance
D. Don't care

Q64. In an RC circuit, the time constant is:

A. R + C
B. RC
C. R/C
D. C/R

Q65. Which of the following is a universal gate?

A. AND
B. OR
C. NOT
D. NAND

Answer key

Q1 C	**Q2 B**	**Q3 C**	**Q4 C**
Q5 B	**Q6 C**	**Q7 B**	**Q8 C**
Q9 C	**Q10 B**	**Q11 B**	**Q12 C**
Q13 B	**Q14 B**	**Q15 B**	**Q16 B**
Q17 C	**Q18 B**	**Q19 A**	**Q20 B**
Q21 B	**Q22 C**	**Q23 B**	**Q24 A**
Q25 B	**Q26 B**	**Q27 B**	**Q28 B**
Q29 C	**Q30 B**	**Q31 C**	**Q32 B**
Q33 B	**Q34 C**	**Q35 B**	**Q36 B**
Q37 C	**Q38 A**	**Q39 C**	**Q40 B**
Q41 C	**Q42 B**	**Q43 C**	**Q44 C**
Q45 B	**Q46 C**	**Q47 B**	**Q48 C**
Q49 C	**Q50 C**	**Q51 B**	**Q52 C**
Q53 C	**Q54 B**	**Q55 B**	**Q56 C**
Q57 C	**Q58 B**	**Q59 B**	**Q60 C**
Q61 B	**Q62 C**	**Q63 B**	**Q64 B**
Q65 D			

Solutions and explanations

Q1. If x + y = 10 and xy = 21, then x^2 + y^2 is:
Answer: C
x^2+y^2 = (x+y)^2 - 2xy = 100 - 42 = 58.

Q2. A man buys a book for 500 and sells it for 600. Profit percentage is:
Answer: B
Profit = 100, CP = 500. Profit% = 100/500 x 100 = 20%.

Q3. Find the next term: 3, 9, 27, 81, ?
Answer: C
Geometric progression with ratio 3: 35 = 243.

Q4. Choose the correct spelling:
Answer: C
Correct spelling: Mischievous.

Q5. If 3x + 2 = 11, then x = ?
Answer: B
3x = 9 x = 3.

Q6. A train 150 m long passes a pole in 15 seconds. Find the speed of the train in km/h.
Answer: C
Speed = distance/time = 150/15 = 10 m/s. In km/h: 10 x (18/5) = 36 km/h.

Q7. A die is rolled once. Probability of getting an even number is:
Answer: B
Even: 2,4,6 (3 outcomes). P = 3/6 = 1/2.

Q8. Find the odd one out: 2, 4, 8, 16, 24, 32
Answer: C
All others are powers of 2 (2, 2^2, 2, 2, 2). 24 is not a power of 2.

Q9. If 5 men can build a wall in 12 days, how many days will 10 men take?
Answer: C
MD = MD -> 5x12 = 10xD -> D = 6 days.

Q10. The simple interest on 1000 at 5% per annum for 2 years is:
Answer: B
SI = PxRxT/100 = 1000x5x2/100 = 100.

Q11. Quick sand condition occurs when:
Answer: B
Quicksand: upward hydraulic gradient critical gradient (ic = Gs-1)/(1+e).

Q12. Which traversal gives sorted order in a BST?
Answer: C
Inorder traversal of BST visits nodes in ascending order (left -> root -> right).

Q13. TIG welding uses which electrode?
Answer: B
TIG (Tungsten Inert Gas) uses non-consumable tungsten electrode.

Q14. A semaphore that is used as a binary lock is called:
Answer: B
Mutex (mutual exclusion) is a binary semaphore used for locking in concurrent programming.

Q15. The bending moment at a simply supported beam's center with point load P at center is:
Answer: B
Mmax = PL/4 for simply supported beam with central point load.

Q16. The factor of safety is defined as:
Answer: B
FoS = ultimate load / allowable load = ultimate stress / working stress.

Q17. The main function of an operating system is:
Answer: C
The Osman ages CPU, memory, I/Ode vices, and provides resource allocation and protection.

Q18. The impedance of a capacitor of capacitance C at frequency is:
Answer: B
Zc = 1/(jC) = -j/(C).

Q19. In am in-heap, the smallest element is at:
Answer: A
Min-heap property: parent children, so root is always the minimum element.

Q20. The modulus of rigidity relates shear stress to:
Answer: B
G = / (shear stress / shear strain).

Q21. Which of the following is a linear data structure?
Answer: B
Queue is linear (elements in sequence). Tree and Graph aren on-linear data structures.

Q22. The unit of moment of inertia is:
Answer: C
Moment of inertia (area) has units of m.

Q23. An ideal op-amp has infinite:
Answer: B
Ideal op-amp: infinite input impedance, zero output impedance, infinite gain.

Q24. A stack is implemented using an array. If the top pointer is at index 5, what is the current size of the stack?
Answer: A
If top = 5 (0-indexed), there are 6 elements at indices 0 through 5.

Q25. The number of bits in a nibble is:
Answer: B
1 nibble = 4 bits. 1 byte = 2 nibbles = 8 bits.

Q26. Thevenin's theorem is used to simplify:
Answer: B
Thevenin's theorem applies to linear circuits (voltage source + series resistance).

Q27. What is the value of the integral of x^2 dx from 0 to 2?
Answer: B
The integral of x^2 dx from 0 to 2 is (1/3)x^3 from 0 to 2, which is (1/3)(2^3) - (1/3)(0^3) = (1/3)(8) = 8/3.

Q28. Kirchhoff's current law is based on:
Answer: B
KCL: sum of currents entering = sum leaving (charge conservation).

Q29. A 4-bit R-2R DAC uses resistors of values:
Answer: C
R-2R ladder DAC uses only Rand 2R resistors for binary-weighted conversion.

Q30. What is the order of the differential equation d^2y/dx^2 + 3dy/dx + 2y = 0?
Answer: B
The order of a differential equation is determined by the highest order derivative. In this case, the highest order derivative is d^2y/dx^2, which is of order 2.

Q31. Class A amplifier has conduction angle of:
Answer: C
Class A: conducts for full 360° of input cycle -> low efficiency (~25%).

Q32. Which language is accepted by Pushdown Automata?
Answer: B
PDA accepts exactly the class of Context-Free Languages (CFL).

Q33. The optimum depth of a canal is when:
Answer: B
Most economical section: max hydraulic radius -> min wetted perimeter.

Q34. The pH of pure water is:
Answer: C
Pure water has pH 7 at 25°C (neutral).

Q35. The cutting speed in a lathe is measured in:
Answer: B
Cutting speed = pDN/1000 m/min (D in mm, N in RPM).

Q36. In a CPU, what is the main function of the cache memory?
Answer: B
The main function of the cache memory in a CPU is to store frequently used data and instructions, which reduces the time taken to access the main memory.

Q37. The bandwidth of an ideal bandpass filter is:
Answer: C
BW = fH - fL where fH and flare upper and lower cut-off frequencies.

Q38. A language accepted by a Finite Automaton is called:
Answer: A
Finite automata accept exactly the class of regular languages (Type 3 in Chomsky hierarchy).

Q39. Beam deflection is maximum at:
Answer: C
Deflection depends on loading type. For UDL: max at center. For point load: at load point.

Q40. The unit of entropy is:
Answer: B
Entropy units: J/K (total) or kJ/kg·K (specific).

Q41. The operation of enlarging a hole is called:
Answer: C
Boring enlarges an existing hole. Reaming gives smooth finish.

Q42. The grade of concrete M20 means:
Answer: B
M20 = 20 MPa (20 N/mm²) characteristic compressive strength at 28 days.

Q43. In an isothermal process, which quantity remains constant?
Answer: C
Isothermal: T = constant, PV = constant (for ideal gas).

Q44. Which process is used to make threads on a bolt?
Answer: C
Threading (using dies) cuts external threads on bolts and rods.

Q45. The bearing capacity of soil is improved by:
Answer: B
Compaction increases soil density -> higher bearing capacity.

Q46. The Euler's buckling load for a column depends on:
Answer: C
Pcr = p²EI/(Le)². Depends on E, I, effective length (end conditions).

Q47. Which memory has the fastest access time?
Answer: B
Cache memory is closest to the CPU and has the fastest access time (nanoseconds), followed by RAM, then SSD, then HDD.

Q48. The COP of a refrigerator is 4. If it extracts 200 J from cold reservoir, work input is:
Answer: C
COP = Q/W -> 4 = 200/W -> W = 50 J.

Q49. The height of a complete binary tree with nno des is:
Answer: C
Height of a complete binary tree with nno des is logn.

Q50. In virtual memory, which technique is used for address translation?
Answer: C
Paging maps virtual addresses to physical addresses using page tables, enabling virtual memory.

Q51. In a computer network, what is the purpose of the router?
Answer: B
The purpose of the router in a computer network is to connect multiple networks together and route traffic between them.

Q52. The worst-case time complexity of quicksort is:
Answer: C
Quicksort worst-case O(n^2) when pivot is smallest/largest element (e.g., sorted array with naive pivot).

Q53. The effective span of a simply supported beam is:
Answer: C
For simply supported: Le = min(Lc + d, c/c distance of supports).

Q54. The material used for cutting tools is:
Answer: B
HSS retains hardness at high cutting temperatures (used for drills, end mills).

Q55. The power dissipated in a resistor R with current I is:
Answer: B
P = I²R = V²/R = VI.

Q56. Which flip-flop has no race condition?
Answer: C
Master-slave JK flip-flop eliminates race-around condition.

Q57. The dry density of soil is maximum at:
Answer: C
Proctor test: maximum dry density at OMC (optimum moisture content).

Q58. The plasticity chart classifies soil based on:
Answer: B
Casagrande's plasticity chart: LL vs PI to classify fine-grained soils (CL, CH, ML, MH).

Q59. In orthogonal cutting, the cutting edge is:
Answer: B
Orthogonal cutting: cutting edge to cutting velocity direction.

Q60. A steel rod of 10 mm diameter carries 31.4 kN load. Stress is:
Answer: C
A = pi(0.01)^2/4 = 7.85x10 m^2. = 31400/7.85e-5 = 400 MPa.

Q61. The first law of thermodynamics is essentially:
Answer: B
U = Q - W (energy conservation for thermodynamic systems).

Q62. How many AND gates are needed for 8-to-1 multiplexer?
Answer: C
8-to-1 MUX needs 8 AND gates (one per input) + 1 OR gate.

Q63. The output of XOR gate with inputs (1,1) is:
Answer: B
XOR: output 1 when inputs differ, 0 when same. 11 = 0.

Q64. In an RC circuit, the time constant is:
Answer: B
= RC (time for voltage to reach 63.2% of final value).

Q65. Which of the following is a universal gate?
Answer: D
NAND and NOR are universal gates - any Boolean function can be implemented using only NAND (or only NOR) gates.