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 15 workers can build a wall in 8 days, how many workers are needed to build same wall in 6 days?

A. 12
B. 18
C. 20
D. 25

Q2. If $x + y = 10$ and $xy = 21$, then $x^2 + y^2$ is:

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

Q3. If a train running at 72 km/h crosses a pole in 10 s, the length of train is:

A. 100 m
B. 150 m
C. 200 m
D. 250 m

Q4. If the radius of a circle is doubled, the area becomes:

A. Double
B. Four times
C. Eight times
D. Same

Q5. Simplify: 25 + 5 x 2 - 10

A. 50
B. 25
C. 25
D. 30

Q6. If a train running at 72 km/h crosses a pole in 10 s, the length of train is:

A. 100 m
B. 150 m
C. 200 m
D. 250 m

Q7. What is the value of x in the equation 2^x + 2^x = 10?

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

Q8. 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

Q9. The ratio of 3 km to 300 m is:

A. 1:10
B. 10:1
C. 10:1
D. 1:100

Q10. Choose the correct spelling:

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

Core Subject

Q11. In orthogonal cutting, the cutting edge is:

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

Q12. 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

Q13. 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

Q14. 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

Q15. Beam deflection is maximum at:

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

Q16. The Chezy's coefficient C in Manning's formula relates to:

A. Channel roughness
B. Channel depth
C. Both roughness and hydraulic radius
D. Discharge

Q17. The impedance of a capacitor of capacitance C at frequency is:

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

Q18. The purpose of a heat sink in power amplifiers is to:

A. Increase gain
B. Reduce distortion
C. Dissipate heat
D. Increase bandwidth

Q19. The impedance of a capacitor of capacitance C at frequency is:

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

Q20. The gain of a non-inverting amplifier with Rf=10 k and R1=1 k is:

A. 10
B. 11
C. 9
D. 1

Q21. The efficiency of Carnot cycle depends on:

A. Working fluid
B. Temperature limits
C. Pressure ratio
D. Engine size

Q22. The operation of enlarging a hole is called:

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

Q23. The plasticity chart classifies soil based on:

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

Q24. Which data structure is used for implementing recursion?

A. Queue
B. Array
C. Stack
D. Linked List

Q25. A 4-bit R-2R DAC uses resistors of values:

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

Q26. How many AND gates are needed for 8-to-1 multiplexer?

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

Q27. The height of a complete binary tree with n nodes is:

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

Q28. A material that undergoes large deformation before fracture is called:

A. Brittle
B. Ductile
C. Elastic
D. Plastic

Q29. 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

Q30. A diode in forward bias has:

A. High resistance
B. Low resistance
C. Infinite resistance
D. Zero current

Q31. The number of input lines for 3-to-8 decoder is:

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

Q32. What is the time complexity of binary search on a sorted array of n elements?

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

Q33. The number of bits in a nibble is:

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

Q34. In a microprocessor, what is the function of the Arithmetic Logic Unit (ALU)?

A. To control the flow of data between registers
B. To perform arithmetic and logical operations
C. To store data temporarily
D. To provide the clock signal

Q35. The number of bits in a nibble is:

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

Q36. The bearing capacity of soil is improved by:

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

Q37. A transistor has three terminals: base, collector, and:

A. Gate
B. Drain
C. Emitter
D. Source

Q38. The pH of pure water is:

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

Q39. The void ratio of a soil is defined as:

A. Vv/Vs
B. Vv/Vs
C. Vs/Vv
D. Vw/Vv

Q40. Which traversal gives sorted order in a BST?

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

Q41. Which of the following is NOT a valid Boolean algebra property?

A. A . 0 = 0
B. A + 1 = 1
C. A . A = A
D. A + A = 0

Q42. Kirchhoff's current law is based on:

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

Q43. 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

Q44. A 4-bit R-2R DAC uses resistors of values:

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

Q45. The Manning's roughness coefficient n for concrete is about:

A. 0.001
B. 0.035
C. 0.013
D. 0.1

Q46. The Otto cycle efficiency increases with:

A. Decrease in compression ratio
B. Increase in compression ratio
C. Increase in specific heat
D. Decrease in temperature

Q47. Class A amplifier has conduction angle of:

A. 90 degrees
B. 180 degrees
C. 360 degrees
D. 270 degrees

Q48. 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

Q49. Which of the following is a linear data structure?

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

Q50. Which language is accepted by Pushdown Automata?

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

Q51. Which flip-flop has no race condition?

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

Q52. Which casting process uses a wax pattern?

A. Sand casting
B. Die casting
C. Investment casting
D. Centrifugal casting

Q53. In a min-heap, the smallest element is at:

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

Q54. A material that undergoes large deformation before fracture is called:

A. Brittle
B. Ductile
C. Elastic
D. Plastic

Q55. 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

Q56. A Zener diode is used for:

A. Rectification
B. Amplification
C. Voltage regulation
D. Switching

Q57. Which process is used to make threads on a bolt?

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

Q58. The total hardness of water is due to:

A. Na and K
B. Ca^2 and Mg^2
C. Cl and $SO4^2$
D. Fe^2 and Mn^2

Q59. TIG welding uses which electrode?

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

Q60. The SI unit of thermal conductivity is:

A. W/m
B. W/mK
C. J/kgK
D. N/m^2

Q61. 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

Q62. Which memory has the fastest access time?

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

Q63. The main function of an operating system is:

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

Q64. Which scheduling algorithm is non-preemptive?

A. Round Robin
B. FCFS
C. Shortest Remaining Time First
D. Priority (Preemptive)

Q65. 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

Answer key

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

Solutions and explanations

Q1. If 15 workers can build a wall in 8 days, how many workers are needed to build same wall in 6 days?
Answer: C
MD = MD -> 15x8 = Mx6 -> M = 20.

Q2. If x + y = 10 and xy = 21, then $x^2 + y^2$ is:
Answer: C
$x^2+y^2 = (x+y)^2 - 2xy = 100 - 42 = 58$.

Q3. If a train running at 72 km/h crosses a pole in 10 s, the length of train is:
Answer: C
Speed = 72×(5/18) = 20 m/s. Length = 20×10 = 200 m.

Q4. If the radius of a circle is doubled, the area becomes:
Answer: B
A r^2. If r -> 2r, A -> 4A.

Q5. Simplify: 25 + 5 x 2 - 10
Answer: C
Using BODMAS: 5x2=10, 25+10-10=25.

Q6. If a train running at 72 km/h crosses a pole in 10 s, the length of train is:
Answer: C
Speed = 72x(5/18) = 20 m/s. Length = 20x10 = 200 m.

Q7. What is the value of x in the equation 2^x + 2^x = 10?
Answer: B
Given equation is 2^x + 2^x = 10, which can be simplified as 2 * 2^x = 10, then 2^x = 5. Since 2^2 = 4 and 2^3 = 8, the value of x that satisfies the equation is between 2 and 3, but closest to the given options is 2.

Q8. 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.

Q9. The ratio of 3 km to 300 m is:
Answer: C
3 km = 3000 m. 3000:300 = 10:1.

Q10. Choose the correct spelling:
Answer: C
Correct spelling: Mischievous.

Q11. In orthogonal cutting, the cutting edge is:
Answer: B
Orthogonal cutting: cutting edge to cutting velocity direction.

Q12. Quick sand condition occurs when:
Answer: B
Quicksand: upward hydraulic gradient critical gradient (ic = Gs-1)/(1+e).

Q13. 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.

Q14. 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.

Q15. Beam deflection is maximum at:
Answer: C
Deflection depends on loading type. For UDL: max at center. For point load: at load point.

Q16. The Chezy's coefficient C in Manning's formula relates to:
Answer: C
Manning: V = (1/n)R^(2/3)S^(1/2). Chezy: C = (1/n)R^(1/6).

Q17. The impedance of a capacitor of capacitance C at frequency is:
Answer: B
Zc = 1/(jC) = -j/(C).

Q18. The purpose of a heat sink in power amplifiers is to:
Answer: C
Heat sink dissipates excess heat from power transistors to prevent thermal damage.

Q19. The impedance of a capacitor of capacitance C at frequency is:
Answer: B
Zc = 1/(j C) = -j/(C).

Q20. The gain of a non-inverting amplifier with Rf=10 k and R1=1 k is:
Answer: B
Gain = 1 + Rf/R1 = 1 + 10 = 11.

Q21. The efficiency of Carnot cycle depends on:
Answer: B
= 1 - T2/T1 (depends only on source and sink temperatures).

Q22. The operation of enlarging a hole is called:
Answer: C
Boring enlarges an existing hole. Reaming gives smooth finish.

Q23. 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).

Q24. Which data structure is used for implementing recursion?
Answer: C
Recursion uses the call stack (LIFO) to store function call frames and return addresses.

Q25. A 4-bit R-2R DAC uses resistors of values:
Answer: C
R-2R ladder DAC uses only R and 2R resistors for binary-weighted conversion.

Q26. 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.

Q27. The height of a complete binary tree with n nodes is:
Answer: C
Height of a complete binary tree with n nodes is logn.

Q28. A material that undergoes large deformation before fracture is called:
Answer: B
Ductile materials (steel, aluminum) undergo significant plastic deformation before fracture.

Q29. 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.

Q30. A diode in forward bias has:
Answer: B
Forward bias: diode conducts with low resistance (~0.7 V drop for Si).

Q31. The number of input lines for 3-to-8 decoder is:
Answer: C
3-to-8 decoder: 3 inputs, 8 outputs.

Q32. What is the time complexity of binary search on a sorted array of n elements?
Answer: B
Binary search divides the search space in half each iteration, giving O(log n) time complexity.

Q33. The number of bits in a nibble is:
Answer: B
1 nibble = 4 bits. 1 byte = 2 nibbles = 8 bits.

Q34. In a microprocessor, what is the function of the Arithmetic Logic Unit (ALU)?
Answer: B
The Arithmetic Logic Unit (ALU) in a microprocessor performs arithmetic operations such as addition, subtraction, multiplication, and division, as well as logical operations such as AND, OR, and NOT.

Q35. The number of bits in a nibble is:
Answer: B
1 nibble = 4 bits. 1 byte = 2 nibbles = 8 bits.

Q36. The bearing capacity of soil is improved by:
Answer: B
Compaction increases soil density -> higher bearing capacity.

Q37. A transistor has three terminals: base, collector, and:
Answer: C
BJT terminals: Base, Collector, Emitter. FET: Gate, Drain, Source.

Q38. The pH of pure water is:
Answer: C
Pure water has pH 7 at 25°C (neutral).

Q39. The void ratio of a soil is defined as:
Answer: B
Void ratio e = Vv/Vs (volume of voids / volume of solids).

Q40. Which traversal gives sorted order in a BST?
Answer: C
Inorder traversal of BST visits nodes in ascending order (left -> root -> right).

Q41. Which of the following is NOT a valid Boolean algebra property?
Answer: D
A + A = A (idempotent law), not 0. A + A = 1 and A . A = 0.

Q42. Kirchhoff's current law is based on:
Answer: B
KCL: sum of currents entering = sum leaving (charge conservation).

Q43. A steel rod of 10 mm diameter carries 31.4 kN load. Stress is:
Answer: C
A = p(0.01)²/4 = 7.85×10 m². s = 31400/7.85e-5 = 400 MPa.

Q44. A 4-bit R-2R DAC uses resistors of values:
Answer: C
R-2R ladder DAC uses only R and 2R resistors for binary-weighted conversion.

Q45. The Manning's roughness coefficient n for concrete is about:
Answer: C
Manning's n for concrete: 0.012-0.015 (typically 0.013).

Q46. The Otto cycle efficiency increases with:
Answer: B
= 1 - 1/r^(-1). Higher compression ratio -> higher efficiency.

Q47. Class A amplifier has conduction angle of:
Answer: C
Class A: conducts for full 360 degrees of input cycle -> low efficiency (~25%).

Q48. The factor of safety is defined as:
Answer: B
FoS = ultimate load / allowable load = ultimate stress / working stress.

Q49. Which of the following is a linear data structure?
Answer: B
Queue is linear (elements in sequence). Tree and Graph are non-linear data structures.

Q50. Which language is accepted by Pushdown Automata?
Answer: B
PDA accepts exactly the class of Context-Free Languages (CFL).

Q51. Which flip-flop has no race condition?
Answer: C
Master-slave JK flip-flop eliminates race-around condition.

Q52. Which casting process uses a wax pattern?
Answer: C
Investment (lost wax) casting: wax pattern coated with ceramic, melted out, metal poured.

Q53. In a min-heap, the smallest element is at:
Answer: A
Min-heap property: parent children, so root is always the minimum element.

Q54. A material that undergoes large deformation before fracture is called:
Answer: B
Ductile materials (steel, aluminum) undergo significant plastic deformation before fracture.

Q55. 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.

Q56. A Zener diode is used for:
Answer: C
Zener diode maintains constant voltage in reverse breakdown -> voltage regulator.

Q57. Which process is used to make threads on a bolt?
Answer: C
Threading (using dies) cuts external threads on bolts and rods.

Q58. The total hardness of water is due to:
Answer: B
Hardness: Ca^2 and Mg^2 ions (temporary: bicarbonates, permanent: sulfates/chlorides).

Q59. TIG welding uses which electrode?
Answer: B
TIG (Tungsten Inert Gas) uses non-consumable tungsten electrode.

Q60. The SI unit of thermal conductivity is:
Answer: B
Thermal conductivity k: W/(m.K).

Q61. 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.

Q62. 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.

Q63. The main function of an operating system is:
Answer: C
The OS manages CPU, memory, I/O devices, and provides resource allocation and protection.

Q64. Which scheduling algorithm is non-preemptive?
Answer: B
First Come First Serve (FCFS) is non-preemptive - once a process gets the CPU, it runs until completion or I/O.

Q65. The optimum depth of a canal is when:
Answer: B
Most economical section: max hydraulic radius -> min wetted perimeter.