R4594

Sub. Code
25MCA2C1

M.C.A. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Computer Application

DESIGN AND ANALYSIS OF ALGORITHM

(CBCS – 2025 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. What does time complexity measure in an algorithm? (CO1, K2)

   (a) Number of operations executed

   (b) Amount of memory used

   (c) Number of lines of code

   (d) Input size

2. What is the space complexity of an algorithm that creates a new array of size n? (CO1, K2)

   (a) O(1) (b) O(n)

   (c) O(log n) (d) O(*n*^2)

3. What is the time complexity of merge sort in all cases? (CO2, K2)

(a) O(n) (b) O(n log n)

(c) O(*n*^2) (d) O(log n)

4. Strassen' s matrix multiplication is an algorithm that multiplies two matrices using which approach? (CO2, K2)

(a) Brute force

(b) Greedy approach

(c) Dynamic programming

(d) Divide and conquer

5. What is the primary goal when constructing an optimal binary search tree? (CO3, K2)

(a) To balance the tree perfectly

(b) To minimize the average search time

(c) To use all given keys

(d) To maximize the tree height

6. What is the main objective of the Fractional Knapsack problem? (CO3, K2)

(a) To maximize the total weight of the knapsack

(b) To minimize the total weight of the knapsack

(c) To maximize the total value of items in the knapsack

(d) To minimize the total value of items in the knapsack

7. The Breadth First Search traversal of a graph will result into? (CO4, K2)

(a) Linked List

(b) Tree

(c) Graph with back edges

(d) Arrays

8. On which algorithm is heap sort based on? (CO4, K2)

(a) Fibonacci heap

(b) Binary tree

(c) Priority queue

(d) FIFO

9. Which class includes decision problems that can be verified in polynomial time by a deterministic Turing machine, given a correct solution to the problem? (CO5, K2)

(a) P (b) NP

(c) NPC (d) NP hard

10. If a polynomial time algorithm is found for one NP-complete problem, what is the implication for other NP-complete problems? (CO5, K2)

(a) They all remain NP-complete.

(b) They all can also be solved in polynomial time.

(c) They all become unsolvable.

(d) No implications can be drawn

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Explain mathematical analysis of non-recursive algorithm. (CO1, K2)

Or

(b) Can empirical methods improve algorithmic efficiency? Explain. (CO1, K2)

12. (a) How does the selection sorting algorithm work? Explain. (CO2, K2)

Or

(b) What is a sequential search algorithm? Explain. (CO2, K2)

13. (a) What is knapsack problem? Explain. (CO3, K2)

Or

(b) How does greedy approach work? Explain. (CO3, K2)

14. (a) What is the space complexity of BFS algorithm? (CO4, K2)

Or

(b) Explain problem reduction in algorithm. (CO4, K2)

15. (a) Explain Subset Sum Problem using Backtracking. (CO5, K2)

Or

(b) What is Hamiltonian Path? Explain. (CO5, K2)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Explain Analysis of Algorithms and solving. (CO1, K2)

Or

(b) How to apply the general framework for analysis of algorithms to recursive algorithms? (CO1, K2)

17. (a) What is the average time complexity of quick sort? (CO2, K2)

Or

(b) How does Strassen recursive multiplication work? Explain. (CO2, K2)

18. (a) How do you execute a Prim's algorithm? Explain. (CO3, K2)

Or

(b) What is Dijkstra's shortest path algorithm? Explain. (CO3, K2)

19. (a) How does heapsort work? Explain. (CO4, K2)

Or

(b) Which algorithm is used to find an optimal solution? (CO4, K2)

20. (a) How to solve TSP problem using branch and bound method? (CO5, K2)

Or

(b) What is NP complete and NP hard? Explain. (CO5, K2)

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R4595

Sub. Code
25MCA2C2

M.C.A. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Computer Application

ADVANCED JAVA PROGRAMMING

(CBCS – 2025 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. Which component makes Java platform independent? (CO1, K1)

   (a) JDK (b) JRE

   (c) JVM (d) Compiler

2. Which loop is guaranteed to execute at least once? (CO1, K1)

   (a) do-while (b) while

   (c) for (d) if

3. The keyword used to inherit a class in Java (CO2, K2)

   (a) implement (b) extends

   (c) super (d) this

4. Which feature allows one interface to inherit another interface? (CO2, K1)

   (a) Multiple inheritance

   (b) Polymorphism

   (c) Interface extension

   (d) Encapsulation

5. The JDBC method used to execute SELECT queries (CO3, K2)

(a) executeUpdate( ) (b) executeQuery( )

(c) execute ( ) (d) runQuery( )

6. Which exception is used for database access errors? (CO3, K1)

(a) IOException

(b) ClassNotFoundException

(c) SQLException

(d) RuntimeException

7. Which protocol is used for reliable client-server communication? (CO4, K1)

(a) UDP (b) FTP

(c) HTTP (d) TCP

8. Which RMI component registers remote objects (CO4, K1)

(a) Remote interface (b) RMI compiler

(c) RMI registry (d) Stub

9. Which Swing component is used to display tabular data? (CO5, K1)

(a) JList (b) JTable

(c) JTree (d) JTextArea

10. Which AWT component is used to create a push button? (CO5, K1)

(a) Label (b) TextField

(c) Button (d) Checkbox

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Discuss briefly the concept of Object Orientation. (CO1, K4)

Or

(b) Describe a simple Java program to read an array of integers from user and to compute their average. (CO1, K4)

12. (a) Explain static members and final keyword in Java. (CO2, K4)

Or

(b) Explain string class and any four commonly used string methods. (CO2, K4)

13. (a) Explain the advantages of using Prepared Statement over Statement. (CO3, K5)

Or

(b) Discuss SQLException and SQLWarning in detail. (CO3, K4)

14. (a) Describe TCP/IP client socket programming in Java. (CO4, K4)

Or

(b) Describe the URL Connection class and its uses. (CO4, K4)

15. (a) Explain the use of Graphics class in Java. (CO5, K3)

Or

(b) Differentiate between AWT and swing. (CO5, K5)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Explain looping statements in Java and Write a Java program to display multiplication table of a given number. (CO1, K4)

Or

(b) Discuss the features of Java and explain how Java differs from C and C++. (CO1, K4)

17. (a) Explain interfaces in Java. How is multiple inheritance achieved using interfaces? (CO2, K4)

Or

(b) Explain packages in Java. Describe the steps involved in creating and accessing user defined packages. (CO2, K5)

18. (a) Explain JDBC architecture and describe all major JDBC components in detail. (CO3, K4)

Or

(b) Explain the process of inserting, updating and retrieving records from a database using JDBC. (CO3, K5)

19. (a) Explain datagram socket programming in Java. Write a Java program for UDP-based client-server communication. (CO4, K5)

Or

(b) Explain the steps involved in developing RMI-based application with suitable example. (CO4, K5)

20. (a) Describe any four AWT controls with suitable examples. (CO5, K4)

Or

(b) Explain FlowLayout and BorderLayout managers with suitable examples. (CO5, K4)

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R4596

Sub. Code
25MCA2C3

M.C.A. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Computer Application

ACCOUNTING AND FINANCIAL MANAGEMENT

(CBCS – 2025 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following by choosing the correct option.

1. Solvency Ratios indicate (CO1, K1)
   (a) Profitability (b) Activity
   (c) Credit worthiness (d) None of these

2. Funds from operation is (CO1, K2)
   (a) Gross profit (b) Net profit
   (c) Operating profit (d) None of these

3. Good will written off is a part of (CO2, K2)
   (a) Prime cost (b) Factory overhead
   (c) Office overhead (d) None of these

4. Marginal cost is (CO2, K2)
   (a) Prime cost
   (b) Variable cost
   (c) Works cost
   (d) Cost of production

5. A production budget is based on (CO3, K1)

(a) Cash budget (b) Overheads budget

(c) Sales budget (d) Purchase budget

6. JIT inventory system is (CO3, K1)

(a) Job in time (b) Just inventory time

(c) Just in time (d) None of the these

7. Capital budgeting deals with (CO4, K1)

(a) Working capital

(b) Long term investments

(c) Short term investment

(d) None of these

8. Net working capital refers to (CO4, K1)

(a) Current assets

(b) Current liabilities

(c) Current assets minus current liabilities

(d) None of these

9. The cost of equity shares or debt is known as (CO5, K1)

(a) The specific cost of capital

(b) The related cost of capital

(c) The burden on the share holders

(d) None of these

10. Capital structure is a part of (CO5, K2)

(a) Financial structure

(b) Working capital

(c) Dividend policies

(d) None of these

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Write short notes on : (CO1, K2)

(i) Convention of Full Disclosure

(ii) Convention of Materiality

Or

(b) Calculate : (CO1, K3)

(i) Current ratio

(ii) Liquidity ratio from the following information :

	Rs.		Rs.
Cash	18,000	Debtors	1,42,000
Closing stock	1,80,000	Bills payable	27,000
Creditors	50,000	Outstanding expenses	15,000
Tax payable	75,000		

12. (a) Prepare a cost sheet from the following information: (CO2, K4)

Materials consumed Rs. 30,000

Wages Rs. 60,000

Works overhead is charged at 40% of prime cost and office overhead is taken at 20% of works cost. Units produced and sold are 180 units at Rs. 1,200 each

Or

(b) From the following data, calculate (i) P/V ratio (ii) Profit Sales Rs. 20,000 Fixed expenses Rs. 4,000 Break even point Rs. 10,000. (CO2, K4)

13. (a) From the following particulars, calculate : (CO3, K3)

Normal usage	100 units per day
Minimum usage	60 units day
Maximum usage	130 units per day
Reorder quantity	5000 units
Reorder period	25 to 30 days

Calculate :

(i) Maximum level

(ii) Minimum level

(iii) Reorder level.

Or

(b) You are required to prepare a production budget for the half year ending June 2020 from the following information : (CO3, K4)

Product	Budgeted sales	Actual stock on 31.12.2019	Desired stock on 30.06.2020
S	20,000 units	4,000 units	5,000 units
T	50,000 units	6,000 units	10,000 units

14. (a) A project costs Rs. 15,60,000 and yield annually a profit of Rs. 2,70,000 after depreciation of 12% p.a but before tax at 25%. Calculate pay-back period. (CO4, K4)

Or

(b) From the following, calculate the average amount of working capital required : (CO4, K4)

Rs.

(i) Average amount locked-up in stocks :

Stock of finished goods 10,000

Stocks of stores, materials etc 8,000

		Rs.
(ii)	Average credit given :	
	Local sales 2 weeks credit	1,04,000
	Sales outside the state 6 weeks credit	3,12,000
(iii)	Time available for payment :	
	For purchases 4 weeks	78,000
	For wages 2 weeks	2,60,000
	ADD : 10% to allow for contingencies	

15. (a) A company issues 10,000 10% preference shares of Rs.100 each at a discount of 5%. The cost of issue is Rs.2 per share. Calculate the cost of preference capital. (CO5, K5)

Or

(b) Equity share capital Rs. 1,00,000 (CO5, K4)
10% reference share capital Rs. 1,00,000
8% Debentures of Rs. 1,25,000
The present EBIT id Rs. 50,000. Calculate the financial leverage assuming that the company is in 50% tax bracket.

Part C

$(5 \times 8 = 40)$

Answer **all** questions not more than 1000 words each.

16. (a) How do you classify the accounting concepts? Explain. (CO1, K2)

Or

(b) From the following information make out a statement of proprietor's funds with as many details as possible : (CO1, K5)

Current ratio	2.5	Liquidity ratio	1.5
Proprietary ratio (fixed assets/ proprietary fund)	0.75	Working capital	Rs. 60,000
Reserves and surplus	Rs. 40,000	Bank overdraft	Rs. 10,000

There is no long-term loan or fictitious asset.

17. (a) From the following information calculate : (CO2, K5)

(i) P/V ratio

(ii) Break-even point

(iii) Margin of safety

(iv) If the selling price is reduced to Rs. 90, how much is the margin of safety reduced?

Or

(b) From the following information prepare a cost sheet for the month of December 2021 : (CO2, K5)

	Rs.
Opening stock of raw materials	25,000
Opening stock of finished goods	17,300
Closing stock of raw materials	26,200
Closing stock of finished goods	15,700
Purchase of raw materials	21,900
Work in progress as on 1.1.21	1,100
Work in progress as on 31.12.21	8,200
Sales of finished goods	72,300
Direct wages	17,200
Non - productive wages	800
Direct expenses	1,200
Factory overheads	8,300
Administrative overheads	3,200
Selling and distribution overheads	4,200

18. (a) Calculate Material cost variance, Material price variance and Material usage variance from the following data : (CO3, K5)

	Standard	Actual
Quantity	400 Kgs	460 kgs
Price	Rs. 2 per kg	Rs. 1.5 per kg
Value	Rs. 800	Rs. 600

Or

(b) Prepare a flexible budget for overheads on the basis of the following data. Ascertain overhead rates at 50%, 60% and 70% capacity. (CO3, K4)

Variable overheads	At 60% capacity
Indirect material	6,000
Indirect labour	18,000
Semi-variable overheads	
Electricity (40% fixed 60% variable)	30,000
Repairs (80% fixed 20% variable)	3,000
Fixed overheads :	
Depreciation	16,500
Insurance	4,500
Salaries	15,000
Total overheads	93,000
Estimated direct labour hours	1,86,000

19. (a) Explain the sources of working capital. (CO4, K3)

Or

(b) Each of the following projects requires a cash outlay of Rs. 10,000. You are required to suggest which project should be accepted if the standard pay-back period is 5 years : (CO4, K4)

	Project X	Project Y
	Cash inflows	Cash inflows
1	2,500	4,000
2	2,500	3,000
3	2,500	2,000
4	2,500	1,000
5	2,500	–

20. (a) Blue sky ltd has an EBIT Rs. 2,00,000. The cost of debt is 10% and the outstanding debt is Rs. 9,00,000. The overall capitalisation rate (Ke) is 12.5%. Calculate the total value of the firm (V) and equity capitalisation rate (Ke). (CO5, K5)

Or

(b) Alpha Ltd issue 10% redeemable preference shares of Rs. 100 each, redeemable after 10 years. The floatation costs were 5% of the normal value. Compute the effective cost to the company if the issue is made at:

(i) Par

(ii) a premium of 5%

(iii) a discount of 5%. (CO5, K5)

R4597

Sub. Code
25MCA2C4

M.C.A. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Computer Application

OPERATING SYSTEM

(CBCS – 2025 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. What is an operating system? (CO1, K2)

   (a) interface between the hardware and application programs

   (b) collection of programs that manages hardware resources

   (c) system service provider to the application programs

   (d) all of the mentioned

2. What is the ready state of a process? (CO1, K2)

   (a) When process is scheduled to run after some execution

   (b) When process is unable to run until some task has been completed

   (c) When process is using the CPU

   (d) None of the mentioned

3. What is interprocess communication? (CO2, K2)

(a) communication within the process

(b) communication between two processes

(c) communication between two threads of same process

(d) none of the mentioned

4. The processes that are residing in main memory and are ready and waiting to execute are kept on a list called _____ (CO2, K2)

(a) job queue (b) ready queue

(c) execution queue (d) process queue

5. A deadlock avoidance algorithm dynamically examines the ———— to ensure that a circular wait condition can never exist (CO3, K2)

(a) operating system

(b) resources

(c) system storage state

(d) resource allocation state

6. Which module gives control of the CPU to the process selected by the short-term scheduler? (CO3, K2)

(a) dispatcher

(b) interrupt

(c) scheduler

(d) None of the mentioned

7. Logical memory is broken into blocks of the same size called ———————— (CO4, K2)

(a) frames

(b) pages

(c) backing store

(d) none of the mentioned

8. In priority scheduling algorithm ———————— (CO4, K2)

(a) CPU is allocated to the process with highest priority

(b) CPU is allocated to the process with lowest priority

(c) Equal priority processes can not be scheduled

(d) None of the mentioned

9. Memory management techniques in which system stores and retrieves data from secondary storage for use in main memory is called? (CO5, K2)

(a) Fragmentation

(b) Paging

(c) Mapping

(d) None of the mentioned

10. When will file system fragmentation occur? (CO5, K2)

(a) unused space or single file are not contiguous

(b) used space is not contiguous

(c) unused space is non-contiguous

(d) multiple files are non-contiguous

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Discuss the operating system structure in OS. (CO4, K2)

Or

(b) Discuss the operating system design and implementation. (CO1, K2)

12. (a) What are the concepts of operating system? Explain. (CO2, K2)

Or

(b) Explain the process scheduling in operating system. (CO2, K2)

13. (a) Briefly explain CPU scheduling in operating system. (CO3, K2)

Or

(b) Explain deadlock detection algorithm. (CO3, K4)

14. (a) Explain swapping in operating system. (CO4, K4)

Or

(b) What is paging in memory management? Explain. (CO4, K2)

15. (a) Explain the methods of file allocation and file access. (CO5, K4)

Or

(b) Explain structures of directory in operating system. (CO5, K4)

Part C

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Explain computer system architecture in an OS. (CO1, K2)

Or

(b) What are operating system services in OS? (CO1, K2)

17. (a) Discuss the critical section problem in process synchronization. (CO2, K2)

Or

(b) Explain the operations on process in OS. (CO2, K4)

18. (a) Explain the characteristics of deadlock prevention. (CO3, K4)

Or

(b) Which method is used to avoid deadlock? Explain. (CO3, K2)

19. (a) Explain contiguous memory allocation in OS. (CO4, K4)

Or

(b) Discuss the importance of segmentation in operating system. (CO4, K2)

20. (a) Explain file system implementation in operating system. (CO5, K4)

Or

(b) What is free space management in OS? Explain. (CO5, K2)

R4598

Sub. Code
25MCA2E1

M.C.A. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Computer Application

Elective – ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

(CBCS – 2025 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. Which approach represents a problem in terms of states and operators? (CO1, K1)

   (a) Heuristic search

   (b) State space search

   (c) Constraint satisfaction

   (d) Rule-based reasoning

2. Which search strategy uses both cost and heuristic information? (CO1, K1)

   (a) Depth-first search

   (b) Breadth-first search

   (c) Best-first search

   (d) Generate-and-test

3. Which logic is used to represent objects, properties, and relations? (CO2, K1)

(a) Propositional logic (b) Predicate logic

(c) Modal logic (d) Fuzzy logic

4. Forward chaining is mainly associated with (CO2, K2)

(a) Goal-driven reasoning

(b) Data driven reasoning

(c) Backward reasoning

(d) Heuristic pruning

5. Which type of learning uses labelled training data? (CO3, K1)

(a) Unsupervised learning

(b) Reinforcement learning

(c) Supervised learning

(d) Evolutionary learning

6. Which of the following is not suitable to be solved using machine learning? (CO3, K1)

(a) Sorting numbers

(b) Image recognition

(c) Spam filtering

(d) Recommendation systems

7. Which method divides data into k subsets for validation? (CO4, K1)

(a) Holdout method

(b) Bootstrap sampling

(c) K-fold cross-validation

(d) Monte Carlo method

8. Overfitting occurs when a model (CO4, K2)

(a) Performs well on unseen data

(b) Has high bias

(c) Ignores noise in data

(d) Fits training data too closely

9. A random variable whose values are countable is called (CO5, K2)

(a) Continuous random variable

(b) Conditional variable

(c) Discrete random variable

(d) Independent variable

10. In Bayes' theorem, the probability after observing evidence is called (CO5, K2)

(a) Posterior (b) Likelihood

(c) Prior (d) Hypothesis

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Define Artificial Intelligence and explain any two AI techniques. (CO1, K3)

Or

(b) Define heuristic search and explain its importance. (CO1, K4)

12. (a) Explain forward reasoning and backward reasoning. (CO2, K4)

Or

(b) Explain representing 'IS-A' and INSTANCE-OF' relationships using predicate logic. (CO2, K4)

13. (a) Differentiate between human learning and machine learning. (CO3, K5)

Or

(b) List and explain any four applications of Machine Learning. (CO3, K4)

14. (a) Explain the major machine learning activities involved in preparing a model. (CO4, K3)

Or

(b) Explain any two methods used to evaluate the performance of a model. (CO4, K5)

15. (a) Explain Bayesian Belief Networks and their use in probabilistic reasoning. (CO5, K4)

Or

(b) Explain the common discrete probability distributions used in Machine Learning. (CO5, K4)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Explain constraint satisfaction problems and describe their applications in AI. (CO1, K4)

Or

(b) Describe state space representation of a problem and explain it with an example. (CO1, K4)

17. (a) Explain various approaches to knowledge representation. Discuss their advantages and limitations. (CO2, K4)

Or

(b) Explain predicate logic in Artificial Intelligence. Discuss syntax, semantics and inference. (CO2, K5)

18. (a) Explain the state-of-the-art programming languages and tools used in Machine Learning. (CO3, K4)

Or

(b) Explain types of human learning in detail and discuss how they influence machine learning models. (CO3, K5)

19. (a) Explain the basic types of Machine Learning in detail. (CO4, K4)

Or

(b) Explain how the structure of data is explored in Machine Learning. Discuss its role in data preprocessing and model selection. (CO4, K5)

20. (a) Explain hypothesis testing. Discuss null hypothesis, alternative hypothesis and types of errors. (CO5, K4)

Or

(b) Explain Monte Carlo approximation technique. Discuss its importance in probabilistic modelling. (CO5, K5)

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