

St. Philomena's College (Autonomous), Mysore
I Sem MCA-Final / Supplementary Examination: May/June - 2025
Subject :COMPUTER APPLICATION
Title : Computer Networks

Duration: 3 Hours

Max.Marks:70

Instruction: Answer all Sections

PART A

Answer all questions.

5×4=20

1. Explain the components of data communication with a block diagram.
2. Explain the two types of errors with an example bit pattern.
3. Explain the two ways used to Map address to a name.
4. List and define the four categories of active security attacks.
5. Explain principle of Public key cryptosystem with a neat diagram.

PART B

Answer ONE of the following :

1×10=10

6. Explain the TCP/IP model with a neat block diagram.
7. Explain with a diagram circuit switching and packet switching

PART C

Answer ONE of the following :

1×10=10

8. Check if transmission error exists or not?
sent data :100100 , Received Data : 100100001 with the generator polynomial – 1101
9. What is routing and forwarding? Explain the different parameters that effect network layer performance.

PART D

Answer ONE of the following :

1×10=10

10. a. Explain client-server paradigm of application layer with a neat diagram.
b. Explain Static ,Dynamic and Active documents with examples
11. Describe briefly the Go-Back N Protocol with a neat flow diagram.

PART E

Answer ONE of the following :

1×10=10

12. Explain the working of DES with a block diagram.
- 13 Explain any four security attacks and security mechanisms in Cryptography.

PTO

PART F

Answer ONE of the following :

1×10=10

14. Explain the working of RSA algorithm? Using RSA encrypt "SECURITY" for given prime nos 7 & 13. Find the Encryption & Decryption key. Also decrypt the cipher text. 2
15. Explain secure Hash Algorithm with an example.

St. Philomena's College (Autonomous), Mysore
I Sem MCA Final / Supplementary Examination: May/June - 2025
Subject : COMPUTER APPLICATION
Title : Operating System & Linux

Duration: 3 Hours

Max.Marks:70

*Instruction: Answer all Sections***PART A****Answer all questions.****5×4=20**

1. List the briefly define the four main elements of a computer. 3
2. Define process. What common events lead to the creation of a process? 2
3. What is segmentation? Explain with a neat diagram.
4. Explain tree structured directory structure.
5. Discuss about scheduling in Linux.

PART B**Answer ONE of the following :**

6. a) What do you mean by system call? Explain the types of system calls with examples. 6
- b) Explain multiprogramming and time sharing system with examples. 4

OR

7. a) What is cache memory? Explain single and three level cache memory. 5
- b) Explain various operating system services. 5

PART C**Answer ONE of the following :**

8. a) List the requirements for mutual exclusion. 2, 5
- b) Explain the three general categories of information in a process control block. 5

OR

9. Calculate the average waiting time by drawing Gantt chart using FCFS (First Come First serve), SJF (Shortest Job First) and RR (Round Robin) (q=2ms) algorithms for the following processes. 10

| Process | Arrival time | Burst time |
|---------|--------------|------------|
| P1 | 0 | 8 |
| P2 | 1 | 4 |
| P3 | 2 | 9 |
| P4 | 3 | 5 |

PTO

PART D

Answer ONE of the following :

10. a) What is the deadlock? What are the necessary conditions for the deadlock to occur? 5
b) Describe the resource allocation graph. 5
i) With deadlock
ii) With a cycle but no deadlock

OR

11. a) What is demand paging? Discuss with a neat diagram steps to handle page fault. 7
b) What do you mean by "role out, roll in" in swapping? 3

PART E

Answer ONE of the following :

12. a) Explain in detail various file operations in a file system. 7
b) Write the three classification of users in connection with each file with an example. 3

OR

13. a) Explain FCFS and SCAN disk scheduling techniques in detail. 7
b) Explain any three common file types. 3

PART F

Answer ONE of the following :

14. a) With a neat diagram explain the components of a Linux System. 7
b) Explain fork () and exec() process model. 3

OR

15. a) What do you mean by redirection? Explain its use in Linux with example. 6
b) What is ls command? Give the general syntax and any two options of ls command. 4

St. Philomena's College (Autonomous), Mysore
I Sem MCA Final / Supplementary Examination: May/June - 2025
Subject : COMPUTER APPLICATION
Title : Business Systems

Duration: 3 Hours

Max.Marks:70

Instruction: Answer all Sections

PART A

Answer all questions.

5×4=20

1. Discuss briefly information systems with an example.
2. Describe the process of developing IS Solutions, with a neat diagram.
3. Illustrate Organisational Planning with a neat diagram and explain the significance.
4. What constitutes a cross-functional enterprise application? Provide an example for the same.
5. Explain the integration of IT into business operations, supported by a diagram.

PART B

Answer ONE of the following :

1×10=10

6. Elaborate on the fundamental roles in business, considering an example case study.
7. Examine & enumerate current trends in information systems and their implications.

PART C

Answer ONE of the following :

1×10=10

8. Discuss the challenges commonly faced in IT careers.
9. Explain the various resources involved in information systems management and their roles.

PART D

Answer ONE of the following :

1×10=10

10. Explain the Scenario approach used in business analysis.
11. Describe the process and significance of SWOT analysis in strategic planning.

PART E

Answer ONE of the following :

1×10=10

12. Explain briefly the functionality and importance of transaction processing systems in organizations.
13. Explain collaboration systems and their role in enhancing communication and productivity.

PTO

PART F

Answer ONE of the following :

1×10=10

14. Describe briefly manufacturing systems with an example.
15. Explain the functions and benefits of human resource systems in organizational management.

St Philomena's College (Autonomous), Mysuru**I Semester MCA – Final / Supplementary Examination : May / June – 2025****Subject: COMPUTER APPLICATIONS****Title: Data Structure and Problem Solving Using C****Time: 3 Hours****Maximum Marks: 70****PART – A****Answer any FOUR of the following :****4 × 5 = 20**

1. What is operator precedence in C? Explain with an example involving logical and arithmetic operators.
2. What is Dynamic memory allocation? Differentiate between Malloc and Calloc with examples.
3. What is recursion in C? Write a C function to find the factorial of a number? 18
4. What are the advantages of linked list over other data structures?
5. What is Binary search tree? How do you build a Binary search tree?

PART-B**Answer any ONE of the following :****1 × 10 = 10**

6. a) What are the different types of loop constructs used in C? Explain any two looping structures with examples. 06
- b) What are functions in C? Illustrate the use of functions with Parameters and return values. 04
7. a) Write a C program to solve a quadratic equation and find its roots. 06
- b) Differentiate structure and union with example. 04

PART-C**Answer any ONE of the following :****1 × 10 = 10**

8. a) Define a string ADT? Illustrate with a code snippet how character string is stored dynamically in Memory? 06
- b) Define Pointer in C? Illustrate with an example the declaration and intialisation of pointer? 04
9. a) What is an ADT for varying length character strings? Explain its implementation. 07
- b) What are the uses of free() and Realloc? 03

PART-D**Answer any ONE of the following :****1 × 10 = 10**

10. a) List the basic operations of Queue. Illustrate with code snippet any two queue operations. 05
- b) Write a C function to perform PUSH and POP operation on stack. 10 05
11. a) Write a C program to transform a given infix expression to postfix form. Trace your program for the below infix expression. (A+B)^(C*D) 08
- b) What are the advantages of circular queue? 02

PTO

PART-E

Answer any ONE of the following :

1 × 10 = 10

12. a) Explain the role of getnode() function in Linked list implementation. 02
- b) Explain the insertion and deletion operations of a node in a circular linked list with a code snippet. 08
13. a) With a neat diagram, explain how a new node can be inserted at front, end and in between on a doubly linked list. 3 08
- b) What are the disadvantages of singly linked list? How is it overcome? 1 02

PART-F

Answer any ONE of the following :

1 × 10 = 10

14. a) Define the following: 06
- i) Strictly Binary tree
- ii) Completely Binary tree
- b) Define depth, height, leaf and internal node in a binary tree with an example. 04
15. Explain with an Algorithm and diagram the different Tree Traversal mechanisms. 10

5

St. Philomena's College (Autonomous), Mysore
I Sem MCA Final / Supplementary Examination: May/June - 2025
Subject :COMPUTER APPLICATION

Title : Computer Organisation and Architecture

Duration: 3 Hours

Max.Marks:70

Instruction: Answer all Sections

PART A

Answer all questions.

5×4=20

1. What are the different forms of representing Boolean functions? Give example for each.
2. What is full Adder? Realise full Adder using two Half Adders.
3. What is Assembler Directive? Explain any 4 Assembler Directive with examples.
4. Explain the process of Instruction Execution.
5. What is a Bench Mark Program? Explain its use.

PART B

Answer ONE of the following :

6. a) Obtain the minimal expression for the Boolean functions using K-MAP in both SOP and POS. 6

$$f = \sum m (2,3,4,8,9,10,12,14) + dc (5,11,15)$$

- b) Convert $(225.225)_{10}$ to binary, Octal and Hexadecimal. 4

OR

7. a) Simplify the following Boolean function to the specified numbers of literals. 6
 $(A+C+D) (A+C+D^1) (A+C+D) (A+B^1)$ to 4 literals.
- b) Perform Subtraction using 1's complement and 2's complement method for the following. 4

$$1100 - 110001$$

8. What is the need of look ahead carry adder? Explain the design and implementation of 4 bit full adder with look ahead carry. 10

OR

9. a) Implement the following Boolean functions using appropriate MUX. 5
 $f = \sum m (0,1,3,4,8,9,15)$
- b) Explain the operation of clocked RSFF with a neat circuit diagram. Obtain the characteristic table and characteristic equation. 5

PTO

10. What is I/O interfacing? Explain I/O mapped I/O and memory mapped I/O clearly bringing out the differences between the two. 10

OR

11. a) What is addressing mode? Identify the addressing mode of the following instruction : 3
MOVE A, # 20
MOVE 20(R₁), R₂

- b) What is an Interrupt and Maskable Interrupt? Explain multiple Bus structure arrangement to connect I/O devices to the computer with a neat diagram. 7

12. a) Explain the operation of 16×8 memory organization with a neat diagram. 7
b) Differentiate between Serial Access memories and random access memories. 3

OR

13. a) Explain conditional Branching and unconditional Branching with suitable examples. 4
b) What do you mean by multilevel interrupts? Explain how multilevel interrupts are realized with a neat diagram. 6

14. a) Explain how to determine the SPEC rating for computer under test. 6
b) State & explain the basic performance equation. 4

OR

15. a) Identify the addressing mode and type of instruction of the following : 4
JNZ BACK
ADD A, [R₀]
b) Write an assembly language program to find the SUM and Average of ten 8 bit numbers. 6

St. Philomena's College (Autonomous) Mysore

PG I Semester C3 Examination May/June 2025

Subject : Computer Applications

Title : Mathematical Foundations for Computer Science

Time: 3 Hours

Maximum Marks: 70

PART - A

Answer any four of the following

(4 × 5 = 20)

1. Define mean and mode with an suitable example.

2. If $A = \begin{bmatrix} 0 & 6 & 7 \\ -6 & 0 & 8 \\ 7 & -8 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 1 & 1 \\ -1 & 0 & 2 \\ 1 & 2 & 0 \end{bmatrix}$ and $C = \begin{bmatrix} 2 \\ -2 \\ 3 \end{bmatrix}$.

Verify $(A + B)C = AC + BC$.

3. Explain the steps involved in Gauss - Jordan method. Further, give the computational count in the Gauss - Jordan method.

4. Validate the following statement

"The composition of functions is commutative".

5. Define Eulerian trail with an example. Draw two different cubic graphs with six vertices and nine edges.

Part - B

Answer ONE of the following :

(1 × 10 = 10)

6. (a) Find the arithmetic mean from the following distribution

| | | | | | | | |
|------------------|-----------------|-----------------|------------------|------------------|------------------|------------------|-----------------|
| <i>x:</i> | <i>1</i> | <i>2</i> | <i>3</i> | <i>4</i> | <i>5</i> | <i>6</i> | <i>7</i> |
| <i>f:</i> | <i>5</i> | <i>9</i> | <i>12</i> | <i>17</i> | <i>14</i> | <i>10</i> | <i>6</i> |

(b) Evaluate the appropriate measure of dispersion from the following data

| | | | | | | | | |
|-------------------------------|-----------------|----------------------------|---------------------|---------------------|----------------------|-----------------------|-----------------------|-------------------------|
| <i>Income (in Rs.)</i> | <i>:</i> | <i>Less than 50</i> | <i>50—70</i> | <i>70—90</i> | <i>90—110</i> | <i>110—130</i> | <i>130—150</i> | <i>Above 150</i> |
| <i>No. of persons</i> | <i>:</i> | <i>54</i> | <i>100</i> | <i>140</i> | <i>300</i> | <i>230</i> | <i>125</i> | <i>51</i> |

(4+6)

7. (a) Prove that for any discrete distribution standard deviation is not less than mean deviation from mean.
 (b) Calculate the mean deviation from mean for the following data

| | | | | | |
|----------------|---|-----|-----|-----|------|
| Class Interval | : | 2-4 | 4-6 | 6-8 | 8-10 |
| Frequency | : | 3 | 4 | 2 | 1 |

(4+6)

Part - C

Answer ONE of the following :

(1 × 10 = 10)

8. (a) Define the following with suitable examples.
 (i) Vector space, (ii) Basis of a vector space and (iii) Orthogonal vectors.
 (b) Verify whether the set $\{(1, 1, 2), (1, 2, 0), (0, 2, 1)\}$ is linearly dependent or not in the vector space $V = \mathbb{R}^3(\mathbb{R})$. (6+4)
9. (a) Find the inverse of the following matrix by employing elementary

$$\text{transformations } A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}.$$

- (b) List the properties of determinants. Without expanding the determinant, prove that
- $$\begin{vmatrix} x+4 & x & x \\ x & x+4 & x \\ x & x & x+4 \end{vmatrix} = 16(3x+4). \quad (5+5)$$

Part - D

Answer ONE of the following :

(1 × 10 = 10)

10. (a) If $x + y + z = 9$, $2x - 3y + 4z = 13$ and $3x + 4y + 5z = 40$. Find x, y and z by the Gauss elimination method.
 (b) Solve the following equation using LU decomposition method
 $x_1 + x_2 = 2, 2x_1 + 3x_2 = 5$. (5+5)

11. Solve the system of equation by Gauss-Seidel iterative method
 $45x_1 + 2x_2 + 3x_3 = 58, -3x_1 + 22x_2 + 2x_3 = 47, 5x_1 + x_2 + 20x_3 = 67$. (10)

Part - E

Answer ONE of the following :

(1 × 10 = 10)

12. (a) Consider these relations on the set of integers
 $R_1 = \{(a, b)/a \leq b\},$
 $R_2 = \{(a, b)/a > b\},$

$$R_3 = \{(a, b)/a = b \text{ or } a = -b\},$$

$$R_4 = \{(a, b)/a = b\},$$

$$R_5 = \{(a, b)/a = b + 1\},$$

$$R_6 = \{(a, b)/a + b \leq 3\}.$$

Which of these relations are reflexive, symmetric and transitive ? Justify.

(b) Determine whether the function f from the set $\{a, b, c, d\}$ to $\{1, 2, 3, 4, 5\}$ with $f(a) = 4, f(b) = 5, f(c) = 1, f(d) = 4$ is one one and onto. (6+4)

13. (a) State the Pigeon hole principle. What is the minimum number of students required in a discrete mathematics class to be sure at least six will receive the same grade, if there are five possible grades A, B, C, D, E and F ?

(b) Define the inverse of a function . Further, justify whether the function $f : \mathbb{Z} \rightarrow \mathbb{Z}$ defined by $f(x) = x + 1$ is invertible or not. (6+4)

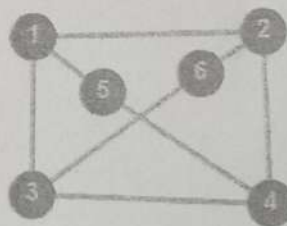
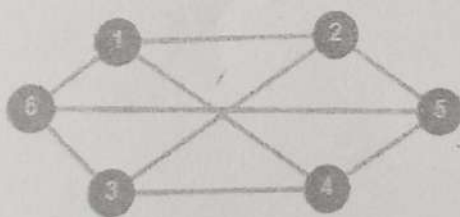
Part - F

Answer any *three* from the following :

(3 × 10 = 30)

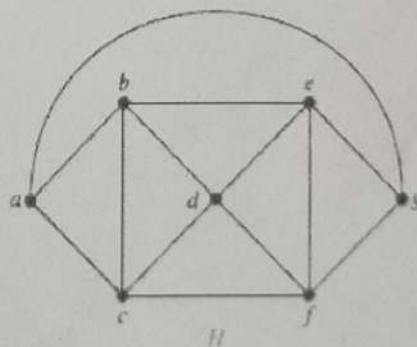
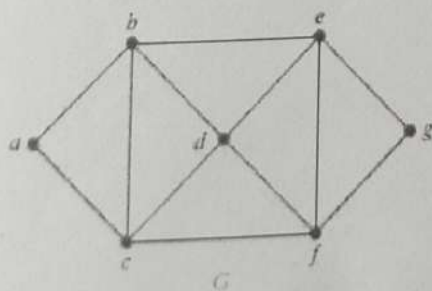
14. (a) State and prove the Hand Shaking lemma.

(b) Show that the following graphs are isomorphic.



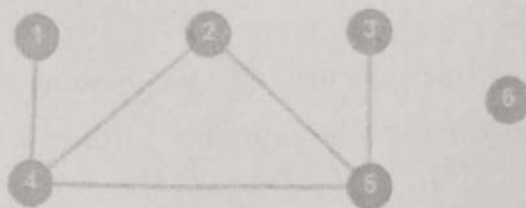
(5+5)

15. (a) State the four color theorem. Further, compute the chromatic number of the following graphs G and H .



PTO

(b) Identify pendant, isolated even and odd vertices of the following graph.



(5+5)
