

Third Semester B.E. Degree Examination, July/August 2022

Data Structures and Applications

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define data structures. Explain the classification of data structures with examples. (06 Marks)
- b. Explain the dynamic memory allocation functions supported by 'C' with syntax and examples. (06 Marks)
- c. Consider the pattern P = ababab. Construct the table and the corresponding labeled directed graph used in the fast or second pattern matching algorithm. Trace it for the input text T = abaabababba. (08 Marks)

OR

- 2 a. Differentiate between structures and unions. Show examples for both. (06 Marks)
- b. Explain any four string handling functions supported by 'C' with syntax and examples. (06 Marks)
- c. Explain the representation of linear arrays in memory. Also, consider the linear arrays AAA (5:50) and BBB(-5:10).
 - i) Find the number of elements in each array.
 - ii) Suppose Base (AAA) = 300, Base (BBB) = 500 and 4 words per memory cell for AAA, 2 words per memory cell for BBB, find the address of AAA[15], AAA[55], BBB[8] and BBB[0]. (08 Marks)

Module-2

- 3 a. Define a stack. Explain the different operations that can be performed on stacks with suitable 'C' functions and examples. (07 Marks)
- b. Convert the following infix expression into postfix expression using stack.
 $A + (B * C - (D / E ^ F) * G) * H.$ (05 Marks)
- c. Develop a C recursive program for tower of Hanoi problem. Trace it for 3 disks with schematic call tree diagram. (08 Marks)

OR

- 4 a. Develop C functions to implement insertion, deletion and display operations of a circular queue. (07 Marks)
- b. Write an algorithm to evaluate a postfix expression. Trace the algorithm for the following expression showing the stack contents 6 5 1 - 4 * 23 ^ / +. (06 Marks)
- c. Define Ackermann function recursively and evaluate A(3, 0). Also, develop C code for the same. (07 Marks)

Module-3

- 5 a. Write the differences between arrays and linked lists. (04 Marks)
- b. Develop C functions to implement the following in a singly linked list:
 - i) Delete a node from the front
 - ii) Concatenate two linked lists. (08 Marks)
- c. Develop a C function to add two polynomials using singly linked list. (08 Marks)

OR

- 6 a. Show the diagrammatic linked representation for the following sparse matrix:

$$\begin{bmatrix} 0 & 1 & 2 \\ 3 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

(04 Marks)

- b. Develop C functions to implement the following in a doubly linked list:
 - i) Insert a node at the front
 - ii) Delete a node from the end.
 - c. Develop C functions to implement the various operations of queues using linked list.
- (08 Marks)
(08 Marks)

Module-4

- 7 a. With suitable examples, define the following:
 - i) Degree of a node
 - ii) Level of a binary tree
 - iii) Complete binary tree
 - iv) Full binary tree.
 - b. Construct binary search tree for the given set of values 14, 15, 4, 9, 7, 18, 3, 5, 16, 20. Also, perform inorder, preorder and postorder traversals of the obtained tree.
 - c. Explain threaded binary trees and their representation with a neat diagram. Also, develop a C function to do the inorder traversal of a threaded binary tree.
- (06 Marks)
(06 Marks)
(08 Marks)

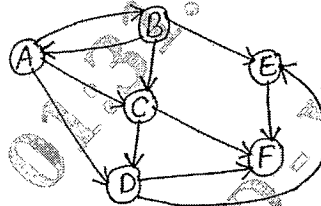
OR

- 8 a. Explain the array and linked representation of binary trees with suitable examples.
 - b. A binary tree has 9 nodes. The inorder and preorder traversals yield the following sequences of nodes:
Inorder: E A C K F H D B G
Preorder: F A E K C D H G B
Draw the binary tree. Also, perform the post order traversal of the obtained tree.
 - c. Develop C functions to implement the following:
 - i) Search a key value in a binary search tree
 - ii) Copying a binary tree.
- (06 Marks)
(08 Marks)

Module-5

- 9 a. Define a graph. For the graph shown in Fig.Q.9(a), show the adjacency matrix and adjacency list representations.
- (06 Marks)

Fig.Q.9(a)

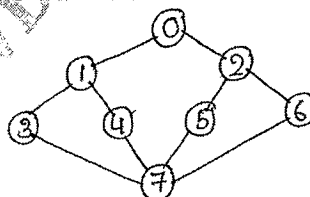


- b. Suppose an array contains 8 elements as follows: 77, 33, 44, 11, 88, 22, 66, 55. Sort the array using insertion sort algorithm.
 - c. What is hashing? Explain the following hash functions with proper examples:
 - i) Division
 - ii) Midsquare
 - iii) Folding
- (06 Marks)
(08 Marks)

OR

- 10 a. Briefly explain Breadth-First Search (BFS) and Depth-First Search (DFS) traversal of a graph. Also, show the BFS and DFS traversals for the following graph in Fig.Q.10(a).

Fig.Q.10(a)



- b. Suppose 9 cards are punched as follows: 348, 143, 361, 423, 538, 128, 321, 543, 366. Apply radix sort to sort them in 3 phases.
 - c. What is Collision? Explain the collision resolution techniques with proper examples.
- (06 Marks)
(08 Marks)

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18CS33

Third Semester B.E. Degree Examination, July/August 2022
Analog and Digital Electronics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the working principal of photodiode and discuss its applications. (08 Marks)
- b. Design a monostable multivibrator circuit using 555 Timer IC to generate an output pulse of 100 ms. Choose $C = 0.47 \mu F$. Draw the circuit. (06 Marks)
- c. Give the typical application of A/D and D/A converters with a block diagram. (06 Marks)

OR

- 2 a. Obtain the expression for collector to emitter voltage for voltage divider bias of BJT using accurate analysis. (08 Marks)
- b. Design and draw astable multivibrator circuit using 555 Timer IC to generate 1 kHz square wave (Duty cycle = 50 %). Assume $C = 0.1 \mu F$. (06 Marks)
- c. Explain R-2R ladder type DAC with a neat diagram. (06 Marks)

Module-2

- 3 a. Define prime implicant and essential prime implicant. Give an example. (04 Marks)
- b. Use a Karnaugh map to find the minimum sum-of-products form for
 $F(A,B,C,D) = \sum m(0, 2, 4, 10, 11, 14, 15) + \sum d(6, 7)$ (06 Marks)
- c. Find a minimum sum-of-products solution using the Quine-McClusky method for given function,
 $f(w,x,y,z) = \sum m(1, 3, 6, 7, 8, 9, 10, 12, 13, 14)$ (10 Marks)

OR

- 4 a. Obtain the minimum product of sums for $f(w,x,y,z) = \overline{\overline{x}}z + wyz + \overline{\overline{w}}\overline{\overline{y}}z + \overline{\overline{xy}}$ using Karnaugh map. (08 Marks)
- b. Find all prime implicants of the given function $F = \sum m(0, 1, 2, 5, 6, 7)$, and find all minimal solutions using Petrick's method. (08 Marks)
- c. Explain simplification of logic functions using map-entered variables. (04 Marks)

Module-3

- 5 a. Realize the given function $f = bc + ab + ab$ using only two-input NAND gates. (06 Marks)
- b. Discuss different types of hazards in combinational logic circuits. (06 Marks)
- c. What is Programmable Array Logic (PAL)? Show the implementation of a full adder using a PAL. (08 Marks)

OR

- 6 a. What is a multiplexer? Write the logic diagram for 8 : 1 multiplexer using 4 input AND and OR gates. (08 Marks)
- b. Discuss the four kinds of three state buffers. (08 Marks)
- c. Explain programmable logic array structure. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. What is VHDL? Show how to model the 4-to-1 multiplexer using a VHDL conditional assignment statement. (06 Marks)
- b. Derive the characteristic equation for S-R flip-flop and J-K flip-flop in product-of-sums form. (06 Marks)
- c. What is D flip-flop? Illustrate the operation of the clear and preset inputs in D-flip-flop with timing diagram. (08 Marks)

OR

- 8 a. Show how to construct a VHDL module using an entity architecture pair. (06 Marks)
- b. Explain switch debouncing with an S-R latch. (06 Marks)
- c. What is T flip-flop? Show how to convert D-flip-flop into T-flip-flop. (08 Marks)

Module-5

- 9 a. What is a register? Build a parallel adder with an accumulator using registers. (06 Marks)
- b. Design 3-bit synchronous counter using T-flip-flops. (08 Marks)
- c. Design a sequential parity checker for serial data. (06 Marks)

OR

- 10 a. Explain the working of a 3 bit shift register. (06 Marks)
- b. Distinguish ring counter and Johnson counter. Also give the general form of a shift register counter. (06 Marks)
- c. Design 3-bit binary synchronous down counter using J-K flip-flops. (08 Marks)

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18CS34

Third Semester B.E. Degree Examination, July/August 2022 Computer Organization

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With neat diagram, explain the basic operational concepts of computer. (10 Marks)
b. Explain:
(i) Processor clock
(ii) Clock rate
(iii) Basic performance equation
(iv) Performance measurement (10 Marks)

OR

- 2 a. Explain all addressing modes with assembler syntax. (10 Marks)
b. State and explain the possibilities of encoding of machine instruction of 32 bit word. (10 Marks)

Module-2

- 3 a. Explain interrupt and interrupt hardware. State steps in enabling and disabling interrupts. (10 Marks)
b. Explain interrupt nesting and handling simultaneous requests in interrupts. (10 Marks)

OR

- 4 a. Explain DMA transfer with bus arbitration. (10 Marks)
b. Explain USB tree structure and protocols. (10 Marks)

Module-3

- 5 a. Draw the internal organization of a $2M \times 8$ dynamic memory chip and explain working with fast page mode. (10 Marks)
b. State and explain the types of read only memory and memory hierarchy. (10 Marks)

OR

- 6 a. What is cache memory? Explain different mapping functions with diagrams. (10 Marks)
b. Explain memory interleaving with diagram. State hit rate and miss penalty. (10 Marks)

Module-4

- 7 a. Explain different types of number representations with example and draw the addition/subtraction logic unit. (10 Marks)
b. Design and explain the 4-bit carry look-ahead adder. (10 Marks)

OR

- 8 a. Explain Booth algorithm. Perform $(+13) \times (-6)$ using Booth algorithm. (10 Marks)
b. Draw the circuit arrangement for binary division. Perform $(1000) \div (11)$ using restoring division. (10 Marks)

Module-5

- 9 a. With neat diagram, explain single-bus organization of computer and fundamental concepts. (10 Marks)
b. State the steps required in execution of Add (R_3), R_1 , and explain the execution of branch instruction. (10 Marks)
- OR
- 10 a. Explain the information required to generate control signals and structure of micro programmed control unit. (10 Marks)
b. Explain basic idea of pipe lining and 4-stage pipeline structure. (10 Marks)

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18CS35

Third Semester B.E. Degree Examination, July/August 2022
Software Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is software engineering and why it is important? Explain software engineering ethics. (10 Marks)
- b. With a neat block diagram, explain the requirement elicitation and analysis process. (06 Marks)
- c. What is requirement validation? Explain the different types of checks carried out during the process. (04 Marks)

OR

- 2 a. What do you mean by software design and implementation? With neat block diagram, explain the general model of the design process. (10 Marks)
- b. Write note on the following:
 - (i) Non-functional requirements with example.
 - (ii) Notations used for writing system requirements. (10 Marks)

Module-2

- 3 a. What a Object Oriented Development? Explain the different stages of object oriented development. (10 Marks)
- b. Write note on the following:
 - (i) Association End Names.
 - (ii) Purposes of Model. (10 Marks)

OR

- 4 a. Write note on:
 - (i) OO Themes
 - (ii) The Three models. (10 Marks)
- b. Describe the various OCL (Object Constraint Language) constructs for traversing class models with example. (10 Marks)

Module-3

- 5 a. Describe Event-driven model with a state diagram of microwave oven application. (10 Marks)
- b. What do you mean by design pattern? Explain the essential elements of design pattern. (10 Marks)

OR

- 6 a. Describe the three main aspects of implementation important to software engineering. (10 Marks)
- b. Describe interaction models with example. (10 Marks)

Module-4

- 7 a. Describe the three different types of user testing. (10 Marks)
- b. Explain software reengineering process with a neat block diagram. (10 Marks)

OR

- 8 a. Describe the Lehman's laws of program evolution dynamics. (10 Marks)
b. Discuss the following with respect to Legacy system management :
(i) Strategic options
(ii) Clusters of system. (10 Marks)

Module-5

- 9 a. Describe the following with respect to project plan development :
(i) Sections of project plan. (10 Marks)
(ii) Project scheduling. (10 Marks)
b. Discuss the software review process and inspections of quality assurance. (10 Marks)

OR

- 10 a. Describe the key stages in the process of product measurement. Also briefly explain the factors affecting software pricing. (10 Marks)
b. Write note on the following:
(i) Static software product metrics,
(ii) Algorithmic cost modeling. (10 Marks)

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18CS36

Third Semester B.E. Degree Examination, July/August 2022
Discrete Mathematical Structures

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define Tautology. Prove that for any propositions p, q, r the compound proposition : $\{p \rightarrow (q \rightarrow r)\} \rightarrow \{(p \rightarrow q) \rightarrow (p \rightarrow r)\}$ is a tautology. (06 Marks)

b. Test the validity of the arguments using rules of inference.

$$(-p \vee q) \rightarrow r$$

$$r \rightarrow s \vee t$$

$$\neg s \wedge \neg u$$

$$\neg u \rightarrow \neg t$$

$$\therefore p$$

(06 Marks)

c. Give an indirect proof and proof by contradiction for, "If m is an even integer, then m + 7 is odd". (08 Marks)

OR

2 a. Prove the following logical equivalences using laws of logic:

$$[\neg p \wedge (\neg q \wedge r)] \vee [(q \wedge r) \vee (p \wedge r)] \Leftrightarrow r$$

(06 Marks)

b. Consider the following open statements with the set of all real numbers as the universe:

$$p(x) : x \geq 0, \quad q(x) : x^2 \geq 0, \quad r(x) : x^2 - 3x - 4 = 0$$

$s(x) : x^2 - 3 > 0$. Determine the truth values of the following statements.

(i) $\exists x, p(x) \wedge q(x)$

(ii) $\forall x, p(x) \rightarrow q(x)$

(iii) $\forall x, q(x) \rightarrow s(x)$

(iv) $\forall x, r(x) \vee s(x)$

(v) $\exists x, p(x) \wedge r(x)$

(vi) $\forall x, r(x) \rightarrow p(x)$

(06 Marks)

c. Establish the validity of the following :

$$\forall x, [p(x) \vee q(x)]$$

$$\exists x, \neg p(x)$$

$$\forall x, [\neg q(x) \vee r(x)]$$

$$\forall x, [s(x) \rightarrow \neg r(x)]$$

$$\therefore \exists x, \neg s(x)$$

(08 Marks)

Module-2

3 a. Prove by mathematical induction $4n < (n^2 - 7)$ for all positive integers $n \geq 6$. (06 Marks)

b. A certain question paper contains two parts A and B each containing 4 questions. How many different ways a student can answer 5 questions by selecting atleast 2 questions from each part? (06 Marks)

c. Determine the coefficient of,

(i) xyz^2 in $(2x - y - z)^4$

(ii) $x^9 y^3$ in the expansion of $(2x - 3y)^{12}$.

(08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 4 a. Prove by mathematical induction, $1.3 + 2.4 + 3.5 + \dots + n(n+2) = \frac{n(n+1)(2n+7)}{6}$. (06 Marks)
- b. Find the number of permutations of the letters of the word MASSASAUGA. In how many of these all four A's are together? How many of them begin with S? (06 Marks)
- c. In how many ways can we distribute eight identical white balls into four distinct containers so that,
- no container is left empty?
 - the fourth container has an odd number of balls in it?
- (08 Marks)

Module-3

- 5 a. State pigeonhole principle. ABC is an equilateral triangle whose sides are of length 1 cm each. If we select 5 points inside the triangle, prove that atleast two of these points are such that the distance between them is less than $\frac{1}{2}$ cm. (08 Marks)
- b. If $A = A_1 \cup A_2 \cup A_3$ where $A_1 = \{1,2\}$, $A_2 = \{2,3,4\}$ and $A_3 = \{5\}$, define a relation R on A by xRy if x and y are in the same subset A_i for $1 \leq i \leq 3$. Is R an equivalence relation. (06 Marks)
- c. Let $f, g: R \rightarrow R$ where $f(x) = ax+b$ and $g(x) = 1-x+x^2$. If $(gof)(x) = 9x^2 - 9x + 3$ determine a, b. (06 Marks)

OR

- 6 a. Prove that if $f: A \rightarrow B$, $g: B \rightarrow C$ are invertible functions, then $gof: A \rightarrow C$ is invertible and $(gof)^{-1} = f^{-1} \circ g^{-1}$. (06 Marks)
- b. For $A = \{a, b, c, d, e\}$ the Hasse diagram for the poset (A, R) is shown in Fig. Q6 (b).
- Determine the relation matrix for R.
 - Construct the directed graph G that is associated with R.
- (06 Marks)

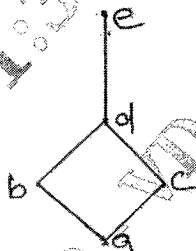


Fig. Q6 (b)

- c. If R is an equivalence relation on a set A and $x, y \in A$ then prove
- $x \in [x]$
 - xRy if and only if $[x] = [y]$ and
 - if $[x] \cap [y] \neq \emptyset$ then $[x] = [y]$.
- (08 Marks)

Module-4

- 7 a. Find the number of permutations of a, b, c, ..., x, y, z in which none of the patterns spin, game, path or net occurs. (08 Marks)
- b. For the positive integers 1, 2, 3, ..., n there are 11660 derangements where 1, 2, 3, 4 and 5 appear in the first five positions. What is the value of n? (06 Marks)
- c. Solve the recurrence relation $a_n + a_{n-1} - 6a_{n-2} = 0$ where $n \geq 2$ and $a_0 = -1$, $a_1 = 8$. (06 Marks)

OR

- 8 a. Determine the number of integers between 1 and 300 (inclusive) which are, (i) divisible by exactly two of 5, 6, 8 (ii) divisible by atleast two of 5, 6, 8. (06 Marks)
- b. Describe the expansion formula for Rook polynomials. Find the Rook polynomial for 3×3 board using expansion formula. (08 Marks)
- c. The number of bacteria in a culture is 1000 (approximately) and this number increases 250% every two hours. Use a recurrence relation to determine the number of bacteria present after one day. (06 Marks)

Module-5

- 9 a. Define with examples, (i) Subgraph, (ii) Spanning subgraph (iii) Complete graph (iv) Induced subgraph (v) Complement of a graph (vi) path. (06 Marks)
- b. Merge sort the list, $-1, 7, 4, 11, 5, -8, 15, -3, -2, 6, 10, 3$ (06 Marks)
- c. Define isomorphism of two graphs. Determine whether the following graphs G_1 and G_2 are isomorphic or not.

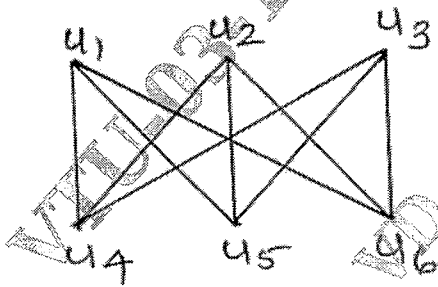


Fig. Q9 (c) - i

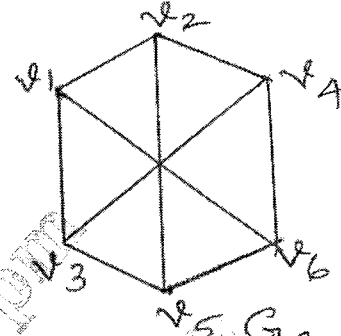


Fig. Q9 (c) - ii

(08 Marks)

OR

- 10 a. Let $G = (V, E)$ be the undirected graph in Fig. Q10 (a). How many paths are there in G from a to h ? How many of these paths have length 5? (06 Marks)

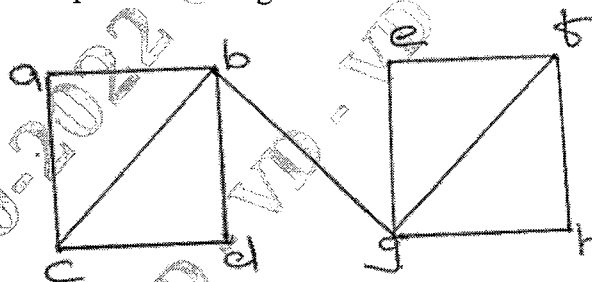


Fig. Q10 (a)

- b. Prove that in every tree $T = (V, E)$, $|V| = |E| + 1$ (06 Marks)
- c. Construct an optimal prefix code for the symbols a, o, q, u, y, z that occur with frequencies 20, 28, 4, 17, 12, 7 respectively. (08 Marks)

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18CS42

Fourth Semester B.E. Degree Examination, July/August 2022
Design and Analysis of Algorithms

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- Give the definition of an Algorithm and also discuss the characteristics of an Algorithm. (05 Marks)
 - Define Space Complexity and Time Complexity of an algorithm and compute the time complexity of Fibonacci Numbers algorithm. (05 Marks)
 - What are the various basic Asymptotic efficiency classes? Explain Big - O , Big - Ω , Big - θ notations with examples. (10 Marks)

OR

- Give the Mathematical Analysis of Non recursive Matrix Multiplication Algorithm. (05 Marks)
 - Give the general plan for analyzing Time efficiency of Recursive algorithms and also Analyze the Tower of Hanoi Recursive algorithm. (10 Marks)
 - Mention the important problem types considered for design and analysis. Explain any two problem types. (05 Marks)

Module-2

- Give the Recursive algorithm to find maximum and minimum element from the list and apply the algorithm to find maximum and minimum to the list [31 , 22 , 12 , -7 , 75 , -6 , 17 , 47 , 60]. (10 Marks)
 - Apply both mergesort and quicksort algorithm to sort the characters VTUBELAGAVI. (10 Marks)

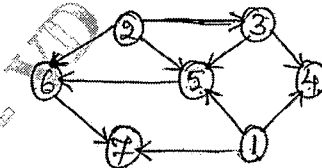
OR

- Apply Strassen's algorithm for matrix multiplication to multiply the following matrices and justify how the Strassen's algorithm is better. (10 Marks)

$$\begin{bmatrix} 4 & 3 \\ 1 & 2 \end{bmatrix} \times \begin{bmatrix} 1 & 2 \\ 6 & 5 \end{bmatrix}$$

- Obtain the topological sort for the graph, Fig. Q4(b) using i) Source Removal method ii) DFS method (10 Marks)

Fig. Q4(b)



Module-3

- Solve the Greedy Knapsack problem, Fig. Q5(a) of capacity 5kgs. (05 Marks)

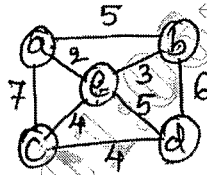
Fig. Q5(a)

| | | | | |
|--------|---|---|---|---|
| Items | 1 | 2 | 3 | 4 |
| Profit | 5 | 9 | 4 | 8 |
| Weight | 1 | 3 | 2 | 2 |

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- b. Find the Optimal solution for the Greedy Job sequencing problem given $n = 4$, profits $[10, 30, 60, 40]$, deadlines $[2, 3, 1, 3]$. (05 Marks)
- c. Apply Prims and Kruskal's algorithm to find the minimal cost spanning tree for the graph given in Fig. Q5(c). (10 Marks)

Fig. Q5(c)



OR

- 6 a. A document contains the letters "A" through "E" with frequencies is follows :
 A : 22 , B : 13 , C : 18 , D : 16 , E : 31.
 Construct a Huffman Tree and codes and
 Encode : CAB , ADD , BAD , ACE
 Decode : 110011 and 1000110001. (10 Marks)
- b. Apply Heapsort for the list $[9, 7, 1, 8, 3, 6, 2, 4, 10, 5]$ using Bottom up approach. (10 Marks)

Module-4

- 7 a. Apply Floyd's algorithm to find the all pairs shortest path for the given adjacency matrix. Fig. Q7(a)

Fig. Q7(a)

$$W = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 & 5 \end{matrix} \\ \begin{matrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{matrix} & \begin{bmatrix} 0 & 1 & \infty & 1 & 5 \\ 9 & 0 & 3 & 2 & \infty \\ \infty & \infty & 0 & 4 & \infty \\ \infty & \infty & 2 & 0 & 3 \\ 3 & \infty & \infty & \infty & 0 \end{bmatrix} \end{matrix}$$

(10 Marks)

- b. Solve the instance of 0/1 Knapsack problem Fig. Q7(b), using Dynamic Programming approach. (10 Marks)

| Item | Weight | Value |
|------|--------|-------|
| 1 | 2 | \$12 |
| 2 | 1 | \$10 |
| 3 | 3 | \$20 |
| 4 | 2 | \$15 |

Capacity $W = 5$

Fig. Q7(b)

OR

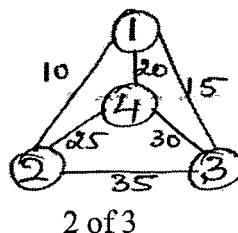
- 8 a. Construct an Optimal Binary search tree for the set of keys given in Fig. Q8(a). (10 Marks)

| Keys | A | B | C | D |
|-------------|-----|-----|-----|-----|
| Probability | 0.1 | 0.2 | 0.4 | 0.3 |

Fig. Q8(a)

- b. Apply Dynamic programming approach to solve the given Travelling Salesman problem. (10 Marks)

Fig. Q8(b)

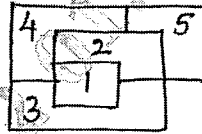


2 of 3

Module-5

- 9 a. With the help of State Space tree, solve the 4 – queens problem by using Backtracking approach. (10 Marks)
- b. Color the regions in the Map given in Fig. Q9(b), by applying backtracking graph color algorithm. Color = (R G B & Y). (10 Marks)

Fig. Q9(b)



OR

- 10 a. Apply LC – Branch and Bound approach to the assignment problem Fig. Q10(a). (10 Marks)

Fig. Q10(a)

$$C = \begin{matrix} & \begin{matrix} 1 & 2 & 3 & 4 \end{matrix} \\ \begin{matrix} \text{Person a} \\ \text{Person b} \\ \text{Person c} \\ \text{Person d} \end{matrix} & \begin{bmatrix} 9 & 2 & 7 & 8 \\ 6 & 4 & 3 & 7 \\ 5 & 8 & 1 & 8 \\ 7 & 6 & 9 & 4 \end{bmatrix} \end{matrix}$$

- b. Apply Branch and Bound approach to solve the instance of 0/1 Knapsack problem.

Knapsack Capacity $W \leq 10$

| Items | 1 | 2 | 3 | 4 |
|--------|-------|-------|-------|-------|
| Weight | 4 | 7 | 5 | 3 |
| Value | \$ 40 | \$ 42 | \$ 25 | \$ 12 |

Fig. Q10(b)

(10 Marks)

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18CS43

Fourth Semester B.E. Degree Examination, July/August 2022
Operating Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Distinguish between the following terms:
 - i) Multi programming and multitasking. (10 Marks)
 - ii) Multi processor systems and clustered systems. (10 Marks)
- b. Define Operating Systems. Explain dual mode of operating systems with a neat diagram. (05 Marks)
- c. Explain about system calls with an example of handling a user application invoking the open() system call. (05 Marks)

OR

- 2 a. What is a process? Illustrate with a neat diagram the different states of a process and control block. (05 Marks)
- b. Discuss the implementation of IPC using message passing systems in detail. (10 Marks)
- c. List and explain the services provided by OS for the user and efficient operation of system. (05 Marks)

Module-2

- 3 a. Give a brief description about multithreading and explain the different multi threading models. (05 Marks)
- b. Discuss the issues that come with multithreaded programming. (10 Marks)
- c. Explain CPU scheduling criteria. (05 Marks)

OR

- 4 a. Calculate the average waiting time and the average turnaround time by drawing the Gantt chart using FCFS, SRTE, RR (q = 2ms) and priority algorithms. Lower priority number represents higher priority.

| Process | Arrival Time | Burst Time | Priority |
|----------------|--------------|------------|----------|
| P ₁ | 0 | 9 | 3 |
| P ₂ | 1 | 4 | 2 |
| P ₃ | 2 | 9 | 1 |
| P ₄ | 3 | 5 | 4 |

(12 Marks)

- b. What is critical section problem? What are the requirements for the solution to critical section problem? Explain Peterson's solution. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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Module-3

- 5 a. What is a deadlock? What are the necessary conditions for the deadlock to occur? (05 Marks)
 b. How to prevent the occurrence of deadlock, explain in detail. (05 Marks)
 c. Consider the following snapshot of a system:

| Process | Allocation | | | | Max | | | | Available | | | |
|----------------|------------|---|---|---|-----|---|---|---|-----------|---|---|---|
| | A | B | C | D | A | B | C | D | A | B | C | D |
| P ₀ | 2 | 0 | 0 | 1 | 4 | 2 | 1 | 2 | 3 | 3 | 2 | 1 |
| P ₁ | 3 | 1 | 2 | 1 | 5 | 2 | 5 | 2 | | | | |
| P ₂ | 2 | 1 | 0 | 3 | 2 | 3 | 1 | 6 | | | | |
| P ₃ | 1 | 3 | 1 | 2 | 1 | 4 | 2 | 4 | | | | |
| P ₄ | 1 | 4 | 3 | 2 | 3 | 6 | 6 | 5 | | | | |

Answer the following using Banker's algorithm.

- i) Is the system in safe state? If so, give the safe sequence.
 ii) If process P₂ requests (0, 1, 1, 3) resources can it be granted immediately? (10 Marks)

OR

- 6 a. Explain paging hardware with TLB. (05 Marks)
 b. Explain segmentation in detail. (05 Marks)
 c. Discuss structure of page table with suitable diagrams. (10 Marks)

Module-4

- 7 a. Describe the steps in handling page faults. (06 Marks)
 b. Consider the page reference string: 1, 0, 7, 1, 0, 2, 1, 2, 3, 0, 3, 2, 4, 0, 3, 6, 2, 1 for a memory with 3 frames. Determine the number of page faults using FIFO, optimal and LRU replacement algorithms. Which algorithm is most efficient? (14 Marks)

OR

- 8 a. Explain the different allocation methods. (10 Marks)
 b. Discuss the various directory structures with required diagrams. (10 Marks)

Module-5

- 9 a. Explain access matrix method of system protection with domain as objects and its implementation. (10 Marks)
 b. A drive has 5000 cylinders numbered 0 to 4999. The drive is currently serving a request at 143 and previously serviced a request at 125. The queue of pending requests in FIFO order is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from current head position, what is the total distance travelled (in cylinders) by disk arm to satisfy the requests using FCFS, SSTF, SCAN, LOOK and C-LOOK algorithms. (10 Marks)

OR

- 10 a. With a neat diagram, explain the components of a Linux system. (08 Marks)
 b. Explain the different IPC mechanisms available in Linux. (06 Marks)
 c. Discuss about scheduling in Linux. (06 Marks)

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18CS44

Fourth Semester B.E. Degree Examination, July/August 2022
Microcontroller and Embedded Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Compare Microprocessors and Microcontrollers. (06 Marks)
 b. Discuss the ARM design Philosophy. (06 Marks)
 c. With a neat diagram, explain the four main hardware components of an ARM based embedded device. (08 Marks)

OR

- 2 a. Explain the ARM Core data flow model with a neat diagram. (08 Marks)
 b. Draw the basic layout of a generic program status register and briefly explain the various fields. (06 Marks)
 c. What is Pipelining? Illustrate it with a simple example. (06 Marks)

Module-2

- 3 a. Explain the different Data Processing Instructions in ARM. (10 Marks)
 b. Briefly explain the different Load – Store Instruction categories used with ARM. (10 Marks)

OR

- 4 a. Write a program for forward and backward branch by considering an example. (06 Marks)
 b. Explain Co – Processor Instructions of ARM processor. (06 Marks)
 c. Write a note on Profiling and Cycle Counting. (08 Marks)

Module-3

- 5 a. What is an Embedded System? Differentiate between general purpose computing system and embedded system. (06 Marks)
 b. List any four purposes of Embedded system with examples. (08 Marks)
 c. Write short notes on : (i) Real Time Clock (ii) Watch Dog Timer. (06 Marks)

OR

- 6 a. Briefly describe the classification of Embedded system. (08 Marks)
 b. Explain the following :
 i) I²C Bus ii) S P I Bus iii) Reset Circuit iv) 1 – Wire Interface. (12 Marks)

Module-4

- 7 a. What are the Operational and Non – Operational Quality Attributes of an Embedded system? (10 Marks)
 b. Explain the different communication buses used in Automotive applications. (06 Marks)
 c. Design an FSM model for Tea / Coffee vending machine. (04 Marks)

OR

- 8 a. Explain the Fundamental issues in Hardware Software Co - design. (06 Marks)
b. Explain the Assembly language based Embedded firmware development with a diagram. (06 Marks)
c. With a neat block diagram, how source file to object file translation takes place in High level language based firmware development. (08 Marks)

Module-5

- 9 a. With a neat diagram, explain Operating System Architecture. (08 Marks)
b. Explain Multithreading. (06 Marks)
c. Explain the concept of Binary Semaphore. (06 Marks)

OR

- 10 a. Explain the role of Integrated Development Environment (IDE) for Embedded Software development. (08 Marks)
b. Write a note on Message passing. (08 Marks)
c. Explain the concept of deadlock with a neat diagram. (04 Marks)

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18CS45

Fourth Semester B.E. Degree Examination, July/August 2022
Object Oriented Concepts

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the concept of object oriented programming language :
 - (i) Encapsulation
 - (ii) Polymorphism
 - (iii) Inheritance

(06 Marks)
- b. What is an inline function? What are the advantages of inline functions? Write a C++ program to find minimum of two numbers using inline function. (08 Marks)
- c. Define a friend function. Illustrate with an example. (06 Marks)

OR

- 2 a. Why friend functions are required? Write a C++ program to illustrate the use of friend function. (06 Marks)
- b. What is function overloading? Write a C++ program to swap two integers by function overloading. (08 Marks)
- c. Explain instance variable hiding. Explain with example how to overcome instance variable hiding. (06 Marks)

Module-2

- 3 a. What are constructors and destructors? Explain default constructors with example. (08 Marks)
- b. Illustrate with an example the order of calling constructor and destructor. (08 Marks)
- c. Explain namespaces with example. (04 Marks)

OR

- 4 a. Explain the following : Java buzzwords, Object oriented, Robust, Multi-threaded, Architecture neutral. (08 Marks)
- b. Write a Java program to find the sum of even numbers using for each version of for loop and print the result. (06 Marks)
- c. Explain labelled break and labelled continue with examples. (06 Marks)

Module-3

- 5 a. Explain general form of a class with example. (06 Marks)
- b. Write a Java program to implement stack of integers. Provide constructors and methods to push an element, POP an element and display the contents of the stack. (14 Marks)

OR

- 6 a. Explain multilevel inheritance with an example. (06 Marks)
- b. Explain exception handling mechanism provided in Java. Give syntax. Write a Java program to demonstrate exception handling construct. (08 Marks)
- c. Write a Java program to create user defined exception and demonstrate its use. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Explain the steps to create a package in Java with an example. (08 Marks)
b. Explain interfaces in Java with example. (06 Marks)
c. Can interfaces be inherited? Justify with an example. (06 Marks)

OR

- 8 a. Explain the following methods of Thread class, getName (), getPriority (), isAlive (), join (). (08 Marks)
b. Write a Java program to illustrate thread creation using Runnable interface. (06 Marks)
c. Write a Java program to illustrate synchronization using synchronized methods. (06 Marks)

Module-5

- 9 a. What are events, event listener and event source. Explain delegation event model used to handle events in Java. (07 Marks)
b. Write a Java program to handle mouse dragged and mouse moved events. (07 Marks)
c. Explain Adapter class with example. (06 Marks)

OR

- 10 a. Explain the following with examples : (04 Marks)
(i) JLabel (ii) JTextField
b. Write a Java program to create a button, on clicking which displays "Welcome to VTU". (06 Marks)
c. Write a Java program to create a table with column heading as FirstName, LastName, Age. Insert at least 3 records in the table and display. (10 Marks)

GBCS SCHEME

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18CS46

Fourth Semester B.E. Degree Examination, July/August 2022 Data Communication

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is Data Communication? With neat diagram, explain the components of data communication. (08 Marks)
- b. With neat diagram, explain four basic topologies. Assume that 10 devices are connected in mesh topology. How many duplex links are needed? How many ports are needed for each device? (08 Marks)
- c. Explain Half Duplex and Full Duplex with respect to data communication. (04 Marks)

OR

- 2 a. With neat diagram, explain TCP/IP protocol suite of computer networks. (08 Marks)
- b. Define transmission impairments. Explain different causes of transmission impairment during signal transmission. (08 Marks)
- c. Explain briefly about Shannon capacity and Nyquist-bit rate for communication channel. (04 Marks)

Module-2

- 3 a. With neat diagram, explain the most common technique to change analog signal to digital signal. (12 Marks)
- b. With a neat diagram, explain ASK, FSK and PSK. (06 Marks)
- c. In a digital transmission the receiver clock is 0.3 percent faster than the sender clock. How many extra bits per second does the receiver receive if the data rate is 1 Mbps? (02 Marks)

OR

- 4 a. Define line coding. List out its characteristics. Represent the sequence "01001110" using NRZ-L, NRZ-I and Manchester scheme. (10 Marks)
- b. Explain parallel and serial transmission modes. (06 Marks)
- c. An analog signal has a bit rate of 8000 bps and baud rate of 1000 baud. How many data elements are carried by each signal element? How many signal elements do we need? (04 Marks)

Module-3

- 5 a. What is circuit switching? Enumerate the characteristics of circuit switching. Analyze the three stages of circuit switching. (10 Marks)
- b. What is multiplexing? Explain wavelength division multiplexing. (05 Marks)
- c. Given data word 101001111 and divisor 10111. Show the generation of CRC codeword at the sender site. (05 Marks)

OR

- 6 a. What is spread spectrum? Explain FHSS and DHSS. (10 Marks)
- b. Analyze how message can be transferred from one system to another using datagram network and calculate the delay in the network. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

- c. Assume a packet is made any of four 16 bits words $(466F)_{16}$, $(726F)_{16}$, $(757A)_{16}$ and $(616E)_{16}$. Find the sender site checksum using traditional checksum algorithm. (05 Marks)

Module-4

- 7 a. With neat diagram, explain point-to-point protocol frame format. (06 Marks)
b. Explain pure ALOHA and slotted ALOHA protocols. (08 Marks)
c. Explain the working of stop-and-wait protocol for Noiseless channels. (06 Marks)

OR

- 8 a. Analyze channelization. Explain Code Division Multiple Access (CDMA). (08 Marks)
b. Mention different controlled access methods. Explain token passing method. (06 Marks)
c. Explain class full addressing of IPV4. (06 Marks)

Module-5

- 9 a. Explain the operation of Cellular Telephony. (08 Marks)
b. Explain Bluetooth Architecture. (05 Marks)
c. Explain the different types of addressing mechanisms in IEEE-802.11. (07 Marks)

OR

- 10 a. With neat diagram, explain Ethernet frame format. (10 Marks)
b. Explain access control of wireless LAN. (05 Marks)
c. Explain Fourth Generation (4G) of Cellular Telephone. (05 Marks)

CBCS SCHEME

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18MAT31

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Transform Calculus, Fourier Series and Numerical
Techniques

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Evaluate (i) $L\left\{\frac{\cos 2t - \cos 3t}{t}\right\}$ (ii) $L(t^2 e^{-3t} \sin 2t)$ (06 Marks)
- b. If $f(t) = \begin{cases} t, & 0 \leq t \leq a \\ 2a - t, & a \leq t \leq 2a \end{cases}$, $f(t + 2a) = f(t)$ then show that $L(f(t)) = \frac{1}{s^2} \tanh\left(\frac{as}{2}\right)$ (07 Marks)
- c. Solve by using Laplace Transforms
 $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 4y = e^{-t}$, $y(0) = 0$, $y'(0) = 0$ (07 Marks)

OR

- 2 a. Evaluate $L^{-1}\left(\frac{4s+5}{(s+1)^2(s+2)}\right)$ (06 Marks)
- b. Find $L^{-1}\left(\frac{s}{(s^2+a^2)^2}\right)$ by using convolution theorem. (07 Marks)
- c. Express $f(t) = \begin{cases} \sin t, & 0 \leq t < \pi \\ \sin 2t, & \pi \leq t < 2\pi \\ \sin 3t, & t \geq 2\pi \end{cases}$
 in terms of unit step function and hence find its Laplace Transform. (07 Marks)

Module-2

- 3 a. Obtain fourier series for the function $f(x) = |x|$ in $(-\pi, \pi)$ (06 Marks)
- b. Expand $f(x) = \frac{(\pi-x)^2}{4}$ as a Fourier series in the interval $(0, 2\pi)$ and hence deduce that
 $\frac{\pi^2}{12} = \frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$ (07 Marks)
- c. Express y as a Fourier series upto the second harmonic given :

| | | | | | | |
|----|---|----|-----|-----|-----|-----|
| x: | 0 | 60 | 120 | 180 | 240 | 300 |
| y: | 4 | 3 | 2 | 4 | 5 | 6 |

(07 Marks)

OR

- 4 a. Find the Half-Range sine series of $\pi x - x^2$ in the interval $(0, \pi)$ (06 Marks)
- b. Obtain fourier expansion of the function $f(x) = 2x - x^2$ in the interval $(0, 3)$. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

- c. Obtain the Fourier expansion of y upto the first harmonic given :

| | | | | | | |
|---|---|----|----|----|----|----|
| x | 0 | 1 | 2 | 3 | 4 | 5 |
| y | 9 | 18 | 24 | 28 | 26 | 20 |

(07 Marks)

Module-3

- 5 a. If $f(x) = \begin{cases} 1, & |x| < a \\ 0, & |x| > a \end{cases}$, find the Fourier transform of $f(x)$ and hence find the value of $\int_0^{\infty} \frac{\sin x}{x} dx$ (06 Marks)

- b. Find the infinite Fourier cosine transform of $e^{-\alpha x}$. (07 Marks)

- c. Solve using z-transform $y_{n+2} - 4y_n = 0$ given that $y_0 = 0, y_1 = 2$ (07 Marks)

OR

- 6 a. Find the fourier sine transform of $f(x) = e^{-|x|}$ and hence evaluate $\int_0^{\infty} \frac{x \sin mx}{1+x^2} dx$; $m > 0$. (06 Marks)

- b. Obtain the z-transform of $\cos n\theta$ and $\sin n\theta$. (07 Marks)

- c. Find the inverse z-transform of $\frac{4z^2 - 2z}{z^3 - 5z^2 + 8z - 4}$ (07 Marks)

Module-4

- 7 a. Solve $\frac{dy}{dx} = x^3 + y$, $y(1) = 1$ using Taylor's series method considering up to fourth degree terms and find $y(1.1)$. (06 Marks)

- b. Given $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$ compute $y(0.2)$ by taking $h = 0.2$ using Runge - Kutta method of fourth order. (07 Marks)

- c. If $\frac{dy}{dx} = 2e^x - y$, $y(0) = 2, y(0.1) = 2.010, y(0.2) = 2.040$ and $y(0.3) = 2.090$, find $y(0.4)$ correct to 4 decimal places using Adams-Bashforth method. (07 Marks)

OR

- 8 a. Use fourth order Runge-Kutta method, to find $y(0.8)$ with $h = 0.4$, given $\frac{dy}{dx} = \sqrt{x+y}$, $y(0.4) = 0.41$ (06 Marks)

- b. Use modified Euler's method to compute $y(20.2)$ and $y(20.4)$ given that $\frac{dy}{dx} = \log_{10}\left(\frac{x}{y}\right)$ with $y(20) = 5$ Taking $h = 0.2$. (07 Marks)

- c. Apply Milne's predictor-corrector formulae to compute $y(2.0)$ given $\frac{dy}{dx} = \frac{x+y}{2}$ with

| | | | | |
|---|-------|--------|--------|--------|
| x | 0.0 | 0.5 | 1.0 | 1.5 |
| y | 2.000 | 2.6360 | 3.5950 | 4.9680 |

(07 Marks)

Module-5

9 a. Using Runge-Kutta method, solve

$$\frac{d^2y}{dx^2} = x \left(\frac{dy}{dx} \right)^2 - y^2, \text{ for } x = 0.2, \text{ correct to four decimal places, using initial conditions } y(0) = 1, y'(0) = 0$$

(07 Marks)

b. Derive Euler's equation in the standard form viz, $\frac{\partial f}{\partial y} - \frac{d}{dx} \left(\frac{\partial f}{\partial y'} \right) = 0$

(07 Marks)

c. Find the extremal of the functional $\int_{x_1}^{x_2} (y^2 + y'^2 + 2ye^x) dx$

(06 Marks)

OR

10 a. Given the differential equation $2 \frac{d^2y}{dx^2} = 4x + \frac{dy}{dx}$ and the following table of initial values:

| | | | | |
|----|---|--------|--------|--------|
| x | 1 | 1.1 | 1.2 | 1.3 |
| y | 2 | 2.2156 | 2.4649 | 2.7514 |
| y' | 2 | 2.3178 | 2.6725 | 2.0657 |

Compute y(1.4) by applying Milne's Predictor-corrector formula.

(07 Marks)

b. Prove that geodesics of a plane surface are straight lines.

(07 Marks)

c. On what curves can the functional $\int_0^1 (y'^2 + 12xy) dx$ with $y(0) = 0, y(1) = 1$ can be extremized?

(06 Marks)

CBCS SCHEME

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18MATDIP31

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Additional Mathematics – I

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Find the modulus and amplitude of the complex number : $\frac{(2-3i)(2+i)^2}{1-i}$. (07 Marks)
- b. Prove that $\left(\frac{1+\cos\theta+i\sin\theta}{1+\cos\theta-i\sin\theta}\right)^n = \cos n\theta + i\sin n\theta$. (06 Marks)
- c. Show that the vectors $\vec{a}-2\vec{b}+3\vec{c}$, $-2\vec{a}+3\vec{b}-4\vec{c}$, $-\vec{b}+2\vec{c}$ are coplanar. (07 Marks)

OR

- 2 a. Given $\vec{a} = 2\hat{i} + 2\hat{j} - \hat{k}$, $\vec{b} = 6\hat{i} - 3\hat{j} + 2\hat{k}$. Find : i) $\vec{a} \cdot \vec{b}$ ii) $\vec{a} \times \vec{b}$ iii) $|\vec{a} \times \vec{b}|$. (07 Marks)
- b. Determine the value of λ , so that $\vec{a} = 2\hat{i} + \lambda\hat{j} - \hat{k}$, and $\vec{b} = 4\hat{i} - 2\hat{j} - 2\hat{k}$ are perpendicular. (06 Marks)
- c. Express $1 - i\sqrt{3}$ in the polar form and hence find its modulus and amplitude. (07 Marks)

Module-2

- 3 a. Using Euler's theorem, prove that $xu_x + yu_y = -3\cot u$ where $u = \sin^{-1}\left(\frac{x^2y^2}{x+y}\right)$. (07 Marks)
- b. Using Maclaurin's series, prove that $\sqrt{1+\sin 2x} = 1 + x - \frac{x^2}{2} - \frac{x^3}{3} + \frac{x^4}{24} + \dots$. (06 Marks)
- c. If $u = x + 3y^2$, $v = 4x^2yz$, $w = 2z^2 - xy$, evaluate $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ at the point $(1, -1, 0)$. (07 Marks)

OR

- 4 a. Obtain Maclaurin's series expansion for the function e^x upto x^4 . (07 Marks)
- b. If $u = \sin^{-1}\left[\frac{x^3+y^3}{x+y}\right]$ prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 2 \tan u$. (06 Marks)
- c. If $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 0$. (07 Marks)

Module-3

- 5 a. A particle moves along the curve $x = (1-t^3)$, $y = (1+t^2)$, $z = (2t-5)$ determine its velocity and acceleration at $t = 1$ sec. (07 Marks)
- b. If $\vec{F} = 2x^2\hat{i} - 3yz\hat{j} + xz^2\hat{k}$, and $\phi = 2z - x^3y$, find $\vec{F} \cdot (\nabla\phi)$ and $\vec{F} \times (\nabla\phi)$ at $(1, -1, 1)$. (06 Marks)
- c. Find the constants a, b, c so that $\vec{f} = (x + 2y + az)\hat{i} + (bx - 3y - z)\hat{j} + (4x + cy + 2z)\hat{k}$ is irrotational. (07 Marks)

OR

- 6 a. Find the directional derivative of $\phi = x^2yz + 4xz^2$ at $(1, -2, -1)$ along $\hat{a} = 2\hat{i} - \hat{j} - 2\hat{k}$ (07 Marks)
- b. Find curl \vec{f} given that $\vec{f} = xyz^2\hat{i} + xy^2z\hat{j} + x^2yz\hat{k}$. (06 Marks)
- c. If $\vec{f} = x^2\hat{i} + y^3\hat{j} + z^3\hat{k}$ and $\vec{g} = yzi + zxj + xyk$. Show that $\vec{f} \times \vec{g}$ is a solenoidal vector. (07 Marks)

Module-4

- 7 a. Obtain the reduction formula, $I_n = \int \cos^n x dx$, where n is a positive integer. (07 Marks)
- b. Evaluate $\int_0^1 \int_0^{1-x} xy dy dx$. (06 Marks)
- c. Evaluate $\int_0^1 \int_0^1 \int_0^1 (x + y + z) dx dy dz$. (07 Marks)

OR

- 8 a. Evaluate $\int_0^{\pi/2} \sin^{-1}(3x) dx$. (07 Marks)
- b. Evaluate $\int_0^{\pi/2} x \sin^{-1} x \cos^6 x dx$. (06 Marks)
- c. Evaluate $\int_0^1 \int_0^1 \int_0^1 xyz dx dy dz$. (07 Marks)

Module-5

- 9 a. Solve $(2x + y + 1) dx + (x + 2y + 1) dy = 0$. (07 Marks)
- b. Solve $(4xy + 3y^2 - x) dx + (x^2 + 2xy) dy = 0$. (06 Marks)
- c. Solve $y(2xy + e^y) dx + e^y dy = 0$. (07 Marks)

OR

- 10 a. Solve $(5x^4 + 3x^2y^3 - 2xy^3) dx + (2x^3y - 3x^2y^2 - 5y^4) dy = 0$. (07 Marks)
- b. Solve $y(2xy + 1) dx + x dy = 0$. (06 Marks)
- c. Solve $\frac{dy}{dx} + y \cot x = \cos x$. (07 Marks)

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18CS32

Third Semester B.E. Degree Examination, Feb./Mar. 2022

Data Structures and Applications

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.**Module-1**

- 1 a. Define Data Structures. Explain the various operations on Data structures. (06 Marks)
- b. Define Structures. Explain the types of structures with examples for each. (07 Marks)
- c. List and explain the functions supported in C for Dynamic Memory Allocation. (07 Marks)

OR

- 2 a. Define Pattern Matching. Write the Knuth Morris Pratt Pattern matching algorithm and apply the same to search the pattern 'abcdabcy' in the text 'abcxabcdabxabcdbabcy'. (10 Marks)
- b. Write the Fast Transpose algorithm to transpose the given Sparse Matrix. Express the given Sparse Matrix as triplets and find its transpose. (10 Marks)

$$A = \begin{bmatrix} 10 & 0 & 0 & 25 & 0 \\ 0 & 23 & 0 & 0 & 45 \\ 0 & 0 & 0 & 0 & 32 \\ 42 & 0 & 0 & 31 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 30 & 0 & 0 \end{bmatrix}$$

(10 Marks)

Module-2

- 3 a. Define Stacks. List and explain the various operations on stacks using arrays with stack overflow and stack underflow conditions. (10 Marks)
- b. Write an algorithm to convert an infix expression to postfix expression and also trace the same for the expression $(a + b) * d + e/f + c$. (10 Marks)

OR

- 4 a. Define Recursion. Explain the types of recursion. Write the recursive function for
 - i) Factorial of a number
 - ii) Tower of Hanoi. (10 Marks)
- b. Give the Ackermann function and apply the same to evaluate $A(1, 2)$. (04 Marks)
- c. Explain the various operations on Circular queues using arrays. (06 Marks)

Module-3

- 5 a. Give the node structure to create a single linked list of integers and write the functions to perform the following operations :
 - i) Create a list containing three nodes with data 10, 20, 30 using front insertion.
 - ii) Insert a node with data 40 at the end of list.
 - iii) Delete a node whose data is 30.
 - iv) Display the list contents. (10 Marks)
- b. Write the functions for :
 - i) Finding the length of the list
 - ii) Concatenate two lists
 - iii) Reverse a list. (10 Marks)

OR

- 6 a. Write the node representation for the linked representation of a polynomial. Explain the algorithm to add two polynomials represented as linked list. (08 Marks)
- b. For the given Sparse matrix, write the diagrammatic linked list representation.

$$A \begin{bmatrix} 3 & 0 & 0 & 0 \\ 5 & 0 & 0 & 6 \\ 0 & 0 & 0 & 0 \\ 4 & 0 & 0 & 8 \\ 0 & 0 & 9 & 0 \end{bmatrix}$$

(04 Marks)

- c. List out the differences between single linked list and double linked list. Write the functions to perform following operations on double linked list :
- i) Insert a node at rear end of the list ii) Delete a node at rear end of the list
- iii) Search a node with a given key value. (08 Marks)

Module-4

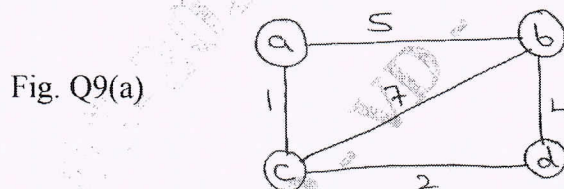
- 7 a. Define a Tree. With suitable example explain i) Binary tree ii) Complete binary tree
- iii) Strict binary tree iv) Skewed binary tree. (10 Marks)
- b. Write the routines to traverse the given tree using
- i) Pre – Order traversal ii) Post – Order traversal. (06 Marks)
- c. Write the recursive search algorithm for a Binary Search tree. (04 Marks)

OR

- 8 a. Draw a Binary tree for the following expression : $((6 + (3-2) * 5) ^ 2 + 3)$.
Traverse the above generated tree using Pre – order and Post – order and also write their respective functions. (10 Marks)
- b. Write the routines for :
- i) Copying of binary trees ii) Testing equality of binary trees. (10 Marks)

Module-5

- 9 a. Define Graphs. Give the Adjacency matrix and Adjacency list representation for the following graph in Fig. Q9(a). (08 Marks)



- b. Write the algorithm for following Graph Traversal methods :
- i) Breadth first search ii) Depth first search. (08 Marks)
- c. Write an algorithm for insertion sort. (04 Marks)

OR

- 10 a. Define Hashing. Explain any three Hash functions. (08 Marks)
- b. Explain Static and Dynamic hashing in detail. (08 Marks)
- c. Define the term File Organization. Explain indexed sequential File Organization. (04 Marks)

CBCS SCHEME

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18CS33

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Analog and Digital Electronics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is biasing? Mention different BJT biasing techniques. Explain voltage divider bias. (08 Marks)
 b. Explain relaxation oscillator. (06 Marks)
 c. Write a note on opto coupler. (06 Marks)

OR

- 2 a. Explain active filters. List advantages of active filters over passive filters. (06 Marks)
 b. Explain with diagram, R-2R ladder type D to A converter. (08 Marks)
 c. Define op-amp. Explain the performance parameters of op-amp. (06 Marks)

Module-2

- 3 a. Explain Don't Care condition with an example. (04 Marks)
 b. Reduce the following functions using K-map technique:
 $F(P, Q, R, S) = \sum m(0, 1, 4, 8, 9, 10) + d(2, 11)$ (08 Marks)
 c. Using Quine McClusky method, simplify the expression:
 $F(P, Q, R, S) = \sum m(0, 3, 5, 6, 7, 11, 14)$
 Write the gate diagram for the same. (08 Marks)

OR

- 4 a. Explain entered variable map method. (05 Marks)
 b. Apply Quine McClusky method to find the essential prime implicants for the Boolean expression $f(a, b, c, d) = \sum m(1, 3, 6, 7, 9, 10, 12, 13, 14, 15)$ (07 Marks)
 c. For the below expression, draw the logic diagram using AOI logic for minimal sum. Obtain minimal sum using K-map.
 $F(a, b, c, d) = \sum m(1, 2, 3, 5, 6, 7, 11, 12, 13, 14, 15)$ (08 Marks)

Module-3

- 5 a. What is hazard? List the types of hazards. Explain static 0 and static 1 hazard. (06 Marks)
 b. Differentiate between combinational and sequential circuit. (06 Marks)
 c. Implement the following using PLA:
 $A(x, y, z) = \sum m(1, 2, 4, 6)$
 $B(x, y, z) = \sum m(0, 1, 6, 7)$
 $C(x, y, z) = \sum m(2, 6)$ (08 Marks)

OR

- 6 a. Implement the following function using 8:1 multiplexer:
 $f(a, b, c, d) = \sum m(0, 1, 5, 6, 8, 10, 12, 15)$ (07 Marks)
 b. What is programmable logic array? How does PLA differ from PAL? (06 Marks)
 c. Realize the following using 3:8 decoder:
 (i) $f(a, b, c) = \sum m(1, 2, 3, 4)$ (ii) $f(a, b, c) = \sum m(3, 5, 7)$ (07 Marks)

Module-4

- 7 a. What are the three different models for writing a module body in VHDL? Give example for any one model. (06 Marks)
b. Derive characteristic equation for JK, T, D and SR flip flop. (08 Marks)
c. Give VHDL code for 4:1 multiplexer using conditional assign statement. (06 Marks)

OR

- 8 a. Using structural model, write VHDL code for Half Adder. (06 Marks)
b. Derive the excitation table for JK and SR flip flop. How SR flip flop is converted to T flip flop? (08 Marks)
c. With logic diagram, explain JK flip flop. (06 Marks)

Module-5

- 9 a. Define counter. Design synchronous counter for the sequence 0, 4, 1, 2, 6, 0, 4 using JK flip-flop. (08 Marks)
b. What is shift register? With a neat diagram, explain 4 bit parallel in serial out shift register. (08 Marks)
c. Write a note on sequential parity checker. (04 Marks)

OR

- 10 a. With a neat diagram, explain ring counter. (06 Marks)
b. Design and implement MOD 5 synchronous counter using JK flip-flop. Explain with timing diagram. (08 Marks)
c. Write a note on parallel adder with accumulator. (06 Marks)

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18CS34

**Third Semester B.E. Degree Examination, Feb./Mar. 2022
Computer Organization**

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With a neat diagram, explain the different processor registers. (08 Marks)
- b. Explain the overall SPEC rating for the computer in a program suite. (04 Marks)
- c. Explain one address, two address and three address instruction with examples. Also, use any of these instructions to carry out $C \leftarrow [A] + [B]$. (08 Marks)

OR

- 2 a. What is an addressing mode? Explain the different addressing modes. With an example for each. (10 Marks)
- b. Explain shift and rotate operations, with example. (10 Marks)

Module-2

- 3 a. What is direct memory access, when it is used? Explain it with block diagram. (08 Marks)
- b. Define the terms 'cycle stealing' and 'burst mode with respect to DMA. (04 Marks)
- c. Define bus arbitration. Explain in detail centralized bus arbitration. (08 Marks)

OR

- 4 a. With a block diagram, explain how the keyboard is connected to processor. (08 Marks)
- b. Explain the use of a PCI bus in a computer system with a neat sketch. (08 Marks)
- c. What are the design objectives of USB? (04 Marks)

Module-3

- 5 a. Draw a neat block diagram of memory hierarchy in a computer system. Discuss the variation of size, speed and cost per bit in the hierarchy. (08 Marks)
- b. Explain the working of a single transistor dynamic memory cell and internal organization of a 16 megabit DRAM chip configured as $2M \times 8$ cells. (12 Marks)

OR

- 6 a. Explain the different mapping functions used in cache memory. (12 Marks)
- b. What is replacement policy? Explain LRU replacement algorithm. (04 Marks)
- c. Explain memory interleaving with necessary diagram. (04 Marks)

Module-4

- 7 a. Perform the following operations on the 5-bit signed numbers using 2's complement representation system:
 - i) $(-10) + (-13)$
 - ii) $(-10) - (+4)$
 - iii) $(-3) + (-8)$
 - iv) $(-10) - (+7)$
- b. In a carry look ahead addition, explain the generate G_i and propagate P_i functions for stage i . Using this design explain 4 bit carry look ahead adder. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, $42+8=50$, will be treated as malpractice.

OR

- 8 a. Perform the signed multiplication of numbers +13 and -6 using booth multiplication and bit pair recording method. List the tables used. (10 Marks)
- b. Perform division of number 9 by 3($9 \div 3$) using the restoring division algorithm. Write the steps of algorithm used. (10 Marks)

Module-5

- 9 a. Draw and explain multiple bus organization. Explain its advantages. (10 Marks)
- b. Write and explain the control sequence for execution of an unconditional branch instruction. (10 Marks)

OR

- 10 a. Draw the block diagram of the control unit organization and describe. (10 Marks)
- b. Explain basic idea of instruction pipelining. (10 Marks)

CBGS SCHEME

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18CS35

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Software Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define software engineering. What are the different types of software products? (06 Marks)
- b. Explain briefly the Software Engineering Ethics. (06 Marks)
- c. List and explain the different types of Application Softwares. (08 Marks)

OR

- 2 a. What are the fundamental software process activities? With neat diagram, explain requirement engineering process. (08 Marks)
- b. With neat diagram, explain Bohem's Spiral model. (08 Marks)
- c. Explain Re-use oriented Software Engineering. (04 Marks)

Module-2

- 3 a. What is object orientation? Explain the characteristics of object oriented approach. (10 Marks)
- b. Define model. Explain the three different models of object orientation. (10 Marks)

OR

- 4 a. Explain the following with suitable diagrams:
 - (i) Links and Associations
 - (ii) Generalization
- b. With neat diagram, explain the class model of a Windowing System. (10 Marks)

Module-3

- 5 a. With neat diagram, explain the context model for MHC-PMS system. (10 Marks)
- b. Explain the state diagram of microwave oven. (10 Marks)

OR

- 6 a. Explain the Rational Unified Process. (06 Marks)
- b. Explain Design Pattern with UML model of the observer model. (08 Marks)
- c. What are the different implementation issues of Software Engineering? (06 Marks)

Module-4

- 7 a. What are the two distinct goals of Software Testing? (05 Marks)
- b. Explain the three different types of testing carried out during software development. (05 Marks)
- c. What are the different types of user testing? With neat diagram, explain the six stages of acceptance testing process. (10 Marks)

OR

- 8 a. Write the Lemman's law of program dynamic evolution. (06 Marks)
- b. With neat diagram, explain the software reengineering process activities. (08 Marks)
- c. What are the four strategic options for Legacy Systems? (06 Marks)

Module-5

- 9 a. What are the factors affecting the pricing of software product? (04 Marks)
b. With neat diagram, explain the project planning process. (06 Marks)
c. With neat diagram, explain the COCOMO – II estimation model. (10 Marks)

OR

- 10 a. Explain the product standards and process standards in software quality management. (06 Marks)
b. Explain three phases of software review process. (08 Marks)
c. Explain the various inspection checks in the program inspection. (06 Marks)

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18CS36

Third Semester B.E. Degree Examination, Feb./Mar. 2022
Discrete Mathematical Structures

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Prove that for any propositions p, q, r the compound proposition $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$ is a Tautology. (08 Marks)
- b. Prove the logical equivalence without using truth table:
 $p \rightarrow (q \rightarrow r) \Leftrightarrow (p \wedge q) \rightarrow r$ (05 Marks)
- c. Find whether the following argument is valid. No engineering student of first or second semester studies logic.
Anil is an Engineering student who studies logic
 \therefore Anil is not in second semester (07 Marks)

OR

- 2 a. Give a direct proof and an indirect proof for the given statement. "If 'n' is an odd integer, then $n + 9$ is an even integer". (06 Marks)
- b. Prove the given logical equivalence problem using laws of logic.
 $(p \rightarrow q) \wedge [\neg q \wedge (r \vee \neg q)] \Leftrightarrow \neg (q \vee p)$. (07 Marks)
- c. Verify the given argument is valid or not?
 $p \rightarrow (q \rightarrow r)$
 $p \vee \neg s$
 q

 $\therefore s \rightarrow r$ (07 Marks)

Module-2

- 3 a. Prove that for each $n \in \mathbb{Z}^+$
 $1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{1}{6} n(n+1)(2n+1)$ (07 Marks)
- b. Find the number of permutation of the letter of the word "MASSASAUGA". In how many of there all four 'A's are together? How many of them begin with 'S'? (06 Marks)
- c. Find how many distinct four digit integers one can make from the digit 1, 3, 3, 7, 7, 8. (07 Marks)

OR

- 4 a. Determine the co-efficient of xyz^2 in the expansion of $(2x - y - z)^4$. (06 Marks)
- b. In how many ways can 10 identical pencils be distributed among 5 children in following cases:
 i) There are no restrictions.
 ii) Each child gets atleast one pencil.
 iii) The youngest child gets at least two pencils. (07 Marks)
- c. Find the number of arrangements of all the letters in "TALLAHASSEE"? How many of these arrangement have no adjacent 'A's'? (07 Marks)

Module-3

- 5 a. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined by
- $$f(x) = \begin{cases} 3x - 5 & \text{for } x > 0 \\ -3x + 1 & \text{for } x \leq 0 \end{cases}$$
- find $f^{-1}(0), f^{-1}(1), f^{-1}(3), f^{-1}(-3), f^{-1}(-6), f^{-1}([-5, 5])$. (07 Marks)
- b. On the set \mathbb{Z}^+ a relation 'R' is defined by aRb if and only if "a divides b (exactly)" verify that 'R' is equivalence relation. (06 Marks)
- c. Draw the Hasse diagram representing the positive divisor of 36. (07 Marks)

OR

- 6 a. Let $A = \{1, 2, 3, 4, 5\}$ define relation 'R' on $A \times A$ by $(X_1, Y_1) R (X_2, Y_2)$ if and only if $X_1 + Y_1 = X_2 + Y_2$.
- i) Verify 'R' is a equivalence relation on $A \times A$
- ii) Determine the partition of $A \times A$ induced by R. (07 Marks)
- b. Let $A = \{1, 2, 3, 4, 6\}$ and 'R' be a relation on 'A' defined by aRb if and only if "a is multiple of b" represent the relation 'R' as a matrix, draw its diagraph and relation R. (06 Marks)
- c. Let f, g, h be a function from \mathbb{R} to \mathbb{R} defined by $f(x) = x + 2, g(x) = x - 2, h(x) = 3x$ for $\forall x \in \mathbb{R}$ find $g \circ f, f \circ g, f \circ f, g \circ g, f \circ h, h \circ f$. (07 Marks)

Module-4

- 7 a. How many integers between 1 and 300 (inclusive) are
- i) Divisible by atleast one of 5, 6, 8
- ii) Divisible by none of 5, 6, 8. (07 Marks)
- b. Find the rook polynomial for the 3×3 board by using the expansion formula. (07 Marks)
- c. Solve the recurrence relation $a_n - 3a_{n-1} = 5 \times 3^n$ for $n \geq 1$ given that $a_0 = 2$. (06 Marks)

OR

- 8 a. The number of virus affected files in a system is 1000 (to start with) and this increases 250% every two hours. Use a recurrence relation to determine the number of virus affected files in the system after one day. (06 Marks)
- b. Solve the recurrence relation $a_n = 2(a_{n-1} - a_{n-2})$ for $n \geq 2$ given that $a_0 = 1$ and $a_1 = 2$. (07 Marks)
- c. Compute derangement of d_4, d_5, d_6, d_7 . (07 Marks)

Module-5

- 9 a. Define Isomorphism. Verify the given two graphs are Isomorphic (Fig.Q.9(a)). (07 Marks)



Fig.Q.9(a)

- b. "A tree with 'n' vertices has n - 1 edges". Prove this. Define a tree. (06 Marks)
- c. Construct an optimal prefix code for the given set of frequencies, 20, 28, 4, 17, 12, 7. (07 Marks)

OR

- 10 a. Explain complete graph, Bipartite graph, subgraph, regular graph, spanning subgraph, minimally connected graph, with example for each. (07 Marks)
- b. Apply merge sort to the given list -1, 7, 4, 11, 5, -8, 15, -3, -2, 6, 10, 3. (06 Marks)
- c. Obtain an optimal prefix code for the message "LETTER RECEIVED" indicate the code. (07 Marks)

18CPC39/49

18. Which one of the following Rights conferred by the Constitution is also available to Noncitizens,
 a) Freedom of speech assembly and association
 b) Freedom to move, reside and settle in any part of the territory of India
 c) Freedom to acquire property or to carry on any occupation, trade or business
 d) Right to Constitutional remedies.
19. Which one of the following has been wrongly listed as a special feature of Fundamental Rights in India
 a) Fundamental Rights are more sacrosanct than rights granted by ordinary laws
 b) Fundamental Rights are subject to reasonable restrictions
 c) Fundamental Rights are Justifiable and can be enforced through the Supreme Court
 d) None of these.
20. The main objective of the Cultural and Educational Rights granted to the Citizen is
 a) To preserve the rich culture heritage of India.
 b) To evolve a single-integrated India culture.
 c) To help the minorities to conserve their culture.
 d) All the above.
21. The Fundamental Rights of a Citizen can be suspended
 a) By the Parliament through a Law enacted by two – third majority
 b) By the President during a National emergency
 c) By the Supreme Court
 d) None of these
22. Which authority can a Citizen approach for securing right of Personal freedom
 a) The Parliament
 b) The President
 c) Supreme Court alone
 d) Both Supreme Court and High Court
23. The main objective of the Fundamental Rights is to
 a) Ensure Independence of Judiciary
 b) Promote a Socialist Pattern of Society
 c) Ensure Individual liberty
 d) Ensure all the above
24. Under which section of IT Act, stealing any digital asset or information is written a cyber crime
 a) 65
 b) 65 - D
 c) 67
 d) 70
25. Fundamental duties of the Indian Citizen, were
 a) Enshrined in the original Constitution
 b) Added to the Constitution by the 42nd Amendment.
 c) Added to the Constitution by the 44th Amendment.
 d) Added to the Constitution in the wake the Supreme Court Judgment Keshavananda Bharati case with consent of all the Political parties.
26. Which one of the following Fundamental Right has been subject of maximum litigation since the inauguration of the Constitution?
 a) Right to Freedom of speech
 b) Right to Constitutional remedies
 c) Right to property
 d) Right against exploitation
27. The Fundamental Rights of Citizens were
 a) Incorporated in the original Constitution
 b) Outlined in an Act of Parliament in 1952
 c) Incorporated by the 42nd Amendment
 d) Incorporated by the 44th Amendment

VER - A - 3 of 10

18CPC39/49

28. The Fundamental Rights of Indian Citizen have been criticized on the ground that
 a) They are hemmed in by too many restrictions.
 b) They are couched in language beyond the comprehension of ordinary citizen
 c) They are absolute
 d) Both (a) and (b).
29. Respite means
 a) Death due to drowning
 b) Awarding lesser punishment
 c) Death due to strangulation
 d) Painless death
30. The Governor recommends the imposition of Presidents rule in the State
 a) On the recommendation of the State Legislature
 b) On the recommendation of the C. M.
 c) On the recommendation of Council of Minister
 d) If he is satisfied that the State Government cannot be carried on his accordance with the provision of the Constitution.
31. The Chief Election Commissioner can be removed from his office before the expiry of term by the
 a) Chief Justice of India
 b) Prime Minister on the recommendation of Cabinet
 c) President on the recommendation of Parliament after the impeachment
 d) President on the advice of Chief Justice of India.
32. The quorum of minimum number of members required to hold the meetings of either Houses of Parliament is
 a) One - tenth
 b) One - fifth
 c) One - third
 d) 72 hours
33. The advice of the Supreme Court is
 a) Binding of the President
 b) Binding on the President if it is tendered unanimously
 c) Not binding on the President
 d) Binding in certain cases and not binding in other cases
34. The Governor reserves the Right to issue ordinances
 a) When the State Legislature is not in session and he feels that there is an immediate need of action
 b) Whenever the State is under President's Rule
 c) Whenever he likes
 d) None of these
35. The Writ of Certiorari is issued by a Superior Court
 a) To an Inferior Court to stop further proceedings in a particular case
 b) To an Inferior Court to transfer the record of proceedings in a case for its review
 c) To an Office to show his right to hold a particular Office
 d) To a Public authority to produce a person detained by it before the Court within 24 hours.
36. Which one of the following was wrongly listed as a duty of Indian Citizens
 a) To uphold and protect the Sovereign unity and Integrity of the Country
 b) To promote harmony and the spirit of common brotherhood among the people of India
 c) To protect and pressure the Natural Environment
 d) To practice Family planning and control population.

VER - A - 4 of 10

- 37. The Directive Principles Aim at
 - a) Ensuring Individual liberty
 - b) Ensuring strengthening of the Country's Independence
 - c) Providing a social and economic base for a genuine Democracy in the Country.
 - d) Achieving all the above objectives.
- 38. The Directive Principles are the
 - a) Positive instructions to the Government to work for the attainment of the set objectives
 - b) Negative injunctions to the Government to refrain from encroaching on the freedom of the people.
 - c) Directive to the State to enhance the International prestige of the Country
 - d) Directives to the Government to pursue a policy of non alignment.
- 39. Which one of the following has been wrongly listed as Directive Principle based on 'Liberal Principles'?
 - a) Separation of Judiciary and Executive
 - b) Provision of a Uniform Civil code for the Country
 - c) Protection of monuments and places of artistic or Historical importance
 - d) None of the above has been wrongly listed.
- 40. The Constitution has vested the Executive power of the Union Government in
 - a) The President of India
 - b) The Prime Minister
 - c) The Council of Minister
 - d) All the above
- 41. Which one of the following does not take part in the Election of the President?
 - a) Elected members of Lok - Sabha
 - b) Elected members of Rajya - Sabha
 - c) Members of the Legislative Council
 - d) None of these
- 42. The President can be removed by impeachment procedure on the ground of violating the Constitution by
 - a) The Supreme Court
 - b) The Lok - Sabha only
 - c) Both Houses of Parliament
 - d) The High Court
- 43. The Vice - President of India is Elected by the
 - a) People
 - b) Members of State - Legislative Assembly
 - c) Members of the Rajya - Sabha
 - d) Members of both the Houses of Parliament at Joint sitting.
- 44. Who discharges the duties of the President in the event of President and Vice - President being not available?
 - a) The Prime Minister
 - b) The Chief Justice of India
 - c) The Speaker of Lok - Sabha
 - d) The Attorney General of India
- 45. Which one of the following can the President of India declare?
 - a) Emergency due to threat of War, external aggression or armed rebellion
 - b) Emergency due to breakdown of constitutional machinery in the State
 - c) Financial emergency on account of threat to the financial credit of India
 - d) All the above.
- 46. Which budget is placed first in the Parliament House
 - a) Railway
 - b) General budget
 - c) Financial
 - d) Vote of credit

- 47. The President can make Laws through ordinances
 - a) During the recess of the Parliament
 - b) On certain subjects even when Parliament is in session
 - c) Only on subjects contained in the concurrent list
 - d) Under no circumstances.
- 48. The President can grant pardon in
 - a) All cases of punishment by Court martial
 - b) All offences against laws in the Union and Concurrent list
 - c) All cases involving death sentence
 - d) All the above cases
- 49. If State fails to comply with the directives of the Central Government, the President can
 - a) Declare break - down of Constitutional machinery in the State and assume responsibility for its governance
 - b) Send reserve police force to secure compliance with directions
 - c) Dissolve the State legislature and order fresh elections
 - d) Can do either (a) or (b)
- 50. Which one of the following has been wrongly listed as Judicial power of the President of India?
 - a) He appoints the Chief Justice and other Judges of the Supreme Court
 - b) He can grant pardon, reprieve and respite to a person awarded punishment
 - c) He can consult the Supreme Court on any question of law or fact.
 - d) He can remove the Judges of Supreme - Court on ground of misconduct.
- 51. Impeachment proceedings can be initiated against the President in either House of Parliament only if a resolution signed by members of the house is moved.
 - a) 10 percent of total
 - b) 25 percent of total
 - c) 20 percent of total
 - d) 15 percent of total
- 52. Which one of the following functions of Prime - Minister has been wrongly listed?
 - a) He presides over the meeting of the Cabinet
 - b) He prepares the agenda for the meeting of the Cabinet.
 - c) He coordinates the working of various department
 - d) He chairs the meeting of the various standing and ad-hoc committees of Parliament.
- 53. A motion of no - confidence against the Council Ministers can be moved in the Lok - Sabha, if it is supported by atleast
 - a) 50 members
 - b) 55 members
 - c) 100 members.
 - d) One - third of the total members of Lok - Sabha
- 54. The President can call a Joint Session of the two Houses of Parliament
 - a) If a bill passed by one house is rejected by the other
 - b) If the amendment proposed to the bill by one house is not acceptable to the other house.
 - c) If the house does not take any action for six months on a bill remitted by the other house.
 - d) Under all the above conditions.

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55. The Members of the Rajya – Sabha except the nominated ones are
 a) Directly elected by the people
 b) Elected by local Self – Governing bodies
 c) Elected by the Legislative Assemblies of the States.
 d) Elected partially by Legislative Assemblies and partially by the Local Self Governing bodies.
56. The President who is the head of the State under the Parliamentary system prevailing in India.
 a) Enjoys absolute powers
 b) Enjoys limited but real powers
 c) Enjoys only nominal powers
 d) Enjoys no powers
57. The Vice – President is the Ex – Office Chairman of
 a) The Rajya Sabha
 b) The National Development Council
 c) The Planning Commission
 d) None of the above
58. The Speaker of the Lok – Sabha is
 a) Appointed by the President.
 b) Appointed by the President on the recommendations of the P.M.
 c) Elected by the members of the two houses at a joint sitting.
 d) Elected by the members of the Lok – Sabha.
59. The Rajya – Sabha is a permanent House but
 a) One – third of its members retire every two years
 b) One – half of its members retire every three years
 c) One – fifth of its members retire every year
 d) One – half of its member retire every two years.
60. The power to control the Expenditure of the Government of India rests exclusively with
 a) The Parliament
 b) The President
 c) The Comptroller and Auditor General
 d) The Union Finance Minister
61. Who decides disputes regarding disqualification of members of Parliament?
 a) The President
 b) The Concerned house
 c) The Election Commission.
 d) The President in consultation with the Election Commission.
62. Who presides over the Lok – Sabha if neither the Speaker nor the Deputy Speaker is not available?
 a) A member nominated by the President.
 b) A member chosen by the Council of Minister.
 c) A member of the panel of Chairman announced by the Speaker.
 d) The Senior most member of the Lok – Sabha.
63. Lok – Sabha is superior to the Rajya – Sabha because
 a) It is directly elected
 b) It alone controls the Finances
 c) It can oust the Council of Minister through a Vote of no – Confidence
 d) of all the above reasons.
64. The Supreme Court of India was setup
 a) By the Constitution
 b) Under the Indian Independence Act 1947
 c) Through an Act of Parliament in 1950
 d) Under the Government of India Act 1935

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65. The Judges of the Supreme Court are
 a) Elected by the Parliament.
 b) Appointed by the President on the advice of the Parliament.
 c) Appointed by the President on the advice of the P.M.
 d) Appointed by the President on the advice of the Chief Justice of India.
66. The Judges of the Supreme Court after retirement are not permitted to carry on practice before
 a) The Supreme Court
 b) The High Courts
 c) The District and Session Courts
 d) Any of the above
67. Which of the following Jurisdiction of the Supreme Court of India has been wrongly listed
 a) Original Jurisdiction
 b) Appellate Jurisdiction
 c) Advisory Jurisdiction
 d) None of the above
68. Generally, the Governor belongs to
 a) The State where he is posted
 b) Some other State
 c) The Indian Administrative Service
 d) None of the above
69. Which of the following Legislative Powers is enjoyed by the Governor of a State?
 a) He can summon or prorogue the State Legislature
 b) He can appoint one sixth of the members of the Legislative Council.
 c) He can nominate certain member of the Anglo Indian Community to the Legislative Assembly.
 d) All of above powers.
70. Engineering Ethics is a
 a) Preventive Ethics
 b) Developing
 c) Natural Ethics
 d) Scientifically developed Ethics.
71. Cooking Means
 a) Boiling under pressure
 b) Retaining results which fit theory
 c) Making deceptive statements
 d) Misleading the Public about quality of the product.
72. Which one is not a Trade Secret?
 a) Theorem
 b) Equipment
 c) Formulae
 d) Pattern
73. The codes of Ethics can be taken as guidelines by the Engineers to
 a) Resolve the conflicts
 b) Formulate problems
 c) Overcome the work pressure
 d) Escape from the responsibility
74. A Fault tree is used to
 a) Assess the risk involved
 b) Claim compensation
 c) Take free consent
 d) Improve safety
75. Risk of harm equal to probability of producing benefit is
 a) Inevitable Risk
 b) Acceptable Risk
 c) Risk which cannot be avoided
 d) None of these

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76. One of the Aims of studying Engineering Ethics is to
 a) Inspire Engineers to acquire in depth knowledge in their field
 b) Acquire new skills in Engineering testing
 c) Stimulate moral imaginations
 d) Make Engineers self – confident in discharging their duties.
77. Which one is not an impediment to responsibility?
 a) Group think
 b) Microscopic vision
 c) Trademark
 d) Egocentric tendencies
78. Being safe or blaming others is type of attitude of responsibility of Engineers
 a) Minimalist
 b) Reasonable care
 c) Good works
 d) None of these
79. To overcome an impediment 'Uncritical Acceptance,' what step an Engineer has to take?
 a) Accept and Analyse
 b) Analyse and Accept
 c) Always say Yes Boss
 d) None of these
80. Engineering Ethics,
 a) Stimulates the moral imagination
 b) Provides up – to – date knowledge in the field of Engineering.
 c) Stimulates to Conduct Research
 d) Stresses on Time Management.
81. Professional Ethics is
 a) Set of Rules relating to personal character of Professionals
 b) Traditional Rules observed since a long time.
 c) Set of Rules passed by Professional bodies.
 d) Set of standards adopted by Professionals.
82. Tight couple means
 a) Binding two beams tightly
 b) Erecting two pillars side by side
 c) Process tightly coupled
 d) Strong adhesive material
83. An Engineer may not be held legally liable or causing harm. When the harm is caused
 a) Intentionally
 b) Ignorantly
 c) Negligently
 d) Recklessly
84. A compound measure of the probability and magnitude of the adverse effect is known as.
 a) Risk
 b) Benefit
 c) Compensation
 d) Both (b) and (c)
85. Engineers shall issue Public statements only
 a) In subjective manner
 b) In objective manner
 c) On their personal responsibility
 d) Based on the reports sent by higher Officers.
86. Attackers commonly target _____ for fetching IP address of a target or victim user.
 a) Website
 b) Web pages
 c) IP tracker
 d) Emails
87. _____ is the first phase of Ethical hacking
 a) DNS Poisoning
 b) Foot printing
 c) ARP – Poisoning
 d) Enumeration
88. Which of the following do not comes under the intangible skills of hackers?
 a) Creative thinking
 b) Problem solving capability
 c) Persistence
 d) Smart attacking potential
89. Why programming language is important for ethical hackers and Security Professionals?
 a) Only to write malware.
 b) For solving problems and building tool and programs
 c) To teach programming
 d) To develop program to harm others.
90. Understanding of _____ is also important for gaining access to a system through networks.
 a) OS
 b) Email servers
 c) Networking
 d) Hardware
91. For hacking a database or accessing and manipulating data which of the following language the hacker must know?
 a) SQL
 b) HTML
 c) TCL
 d) F #
92. _____ are piece of programs or scripts that allow hackers to take control over any system.
 a) Exploits
 b) Antivirus
 c) Firewall by passers
 d) Worms
93. The process of finding vulnerabilities and exploiting them using exploitable scripts or programs are known as
 a) Infiltrating
 b) Exploitation
 c) Cracking
 d) Hacking
94. How many types of exploits are there based on their nature from hackings perspective?
 a) 04
 b) 03
 c) 02
 d) 05
95. A _____ is a set of changes done to any program or its associated data designed for updating fixing or improving it.
 a) Scratch
 b) Patch
 c) Fixer
 d) Resolver
96. Fixing of security vulnerabilities in a system by additional programs is known as
 a) Hacking
 b) Database
 c) Server
 d) Security
97. _____ are some very frequent updates that come for every antiviruses.
 a) Patch update
 b) Data update
 c) Code update
 d) Definition update
98. Cyber – Crime can be categorized into _____ types.
 a) 04
 b) 03
 c) 02
 d) 06
99. Which of the following is not a type of peer to peer cyber – crime.
 a) Phishing
 b) Injecting Trojans to a target victim
 c) MITM
 d) Credit card details leak in deep web
100. In which year India's IT Act came into existence?
 a) 2000
 b) 2001
 c) 2002
 d) 2003