

VTU PREVIOUS QUESTION PAPER JUL/AUG 2022

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Computer Science Department

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18CS32

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.
 $A + (B * C - (D / E \wedge F) * G) * H$. (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 $6\ 5\ 1 - 4 * 23 \wedge / +$. (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)

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 e.g, 42+8 = 50, will be treated as malpractice.

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

Module-4

- 7 a. With suitable examples, define the following:
- Degree of a node
 - Level of a binary tree
 - Complete binary tree
 - Full binary tree.
- (06 Marks)
- 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. (06 Marks)
- 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. (08 Marks)

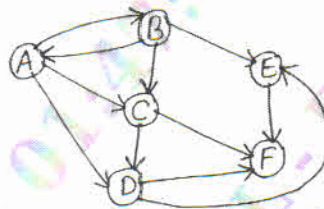
OR

- 8 a. Explain the array and linked representation of binary trees with suitable examples. (06 Marks)
- 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. (06 Marks)
- c. Develop C functions to implement the following:
- Search a key value in a binary search tree
 - Copying a binary tree.
- (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)

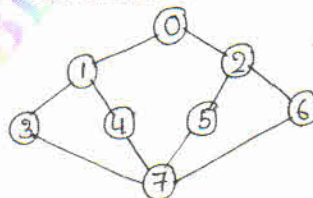


- b. Suppose an array contains 8 elements as follows: 77, 33, 44, 11, 88, 22, 66, 55. Sort the array using insertion sort algorithm. (06 Marks)
- c. What is hashing? Explain the following hash functions with proper examples: (08 Marks)
- Division
 - Midsquare
 - Folding.

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)



- (06 Marks)
- 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. (06 Marks)
- c. What is Collision? Explain the collision resolution techniques with proper examples. (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 $C = 0.47 \mu\text{F}$. 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 $C = 0.1 \mu\text{F}$. (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 $f = \overline{b}c + ab + ab$ 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)

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 (R₃), R₁, 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)

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OR

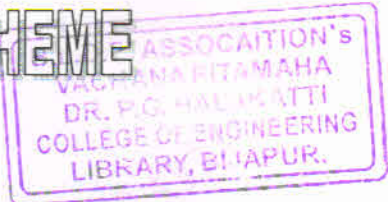
- 8 a. Describe the Lehman's laws of program evolution dynamics. (10 Marks)
b. Discuss the following with respect to Legacy system management :
(i) Strategic options
(ii) Clusters of system. (10 Marks)

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.
- $$\begin{array}{l} (\neg p \vee q) \rightarrow r \\ r \rightarrow s \vee t \\ \neg s \wedge \neg u \\ \neg u \rightarrow \neg t \\ \hline \therefore p \end{array}$$
- (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: (06 Marks)
- $$[\neg p \wedge (\neg q \wedge r)] \vee [(q \wedge r) \vee (p \wedge r)] \Leftrightarrow r$$
- b. Consider the following open statements with the set of all real numbers as the universe:
- $p(x) : x \geq 0, q(x) : x^2 \geq 0, r(x) : x^2 - 3x - 4 = 0$
- $s(x) : x^2 - 3 > 0$. 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 :
- $$\begin{array}{l} \forall x, [p(x) \vee q(x)] \\ \exists x, \neg p(x) \\ \forall x, [\neg q(x) \vee r(x)] \\ \forall x, [s(x) \rightarrow \neg r(x)] \\ \hline \therefore \exists x, \neg s(x) \end{array}$$
- (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?

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.

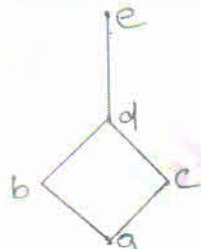


Fig. Q6 (b)

- 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 $[x] = [y]$.

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.

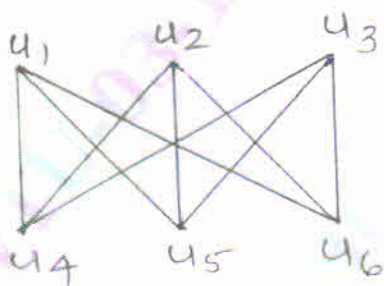
 G_1

Fig. Q9 (c) - i

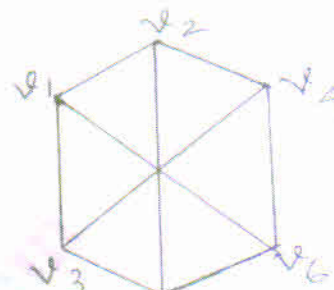
 G_2

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)

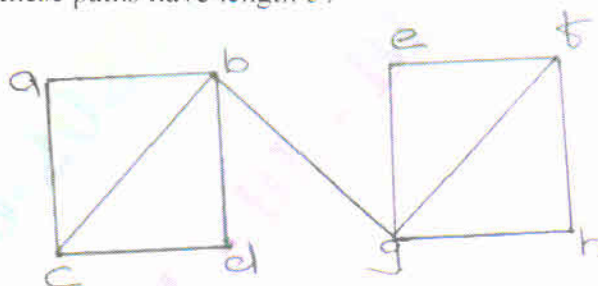


Fig. Q10 (a)

- 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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18MATDIP31

Third Semester B.E. Degree Examination, July/August 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. Express $\frac{(3+i)(1-3i)}{(2+i)}$ in the form $x + iy$. (06 Marks)
- b. If $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$, $\vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$ and $\vec{c} = 3\hat{i} + \hat{j}$. Find the value of ' ρ ' such that $\vec{a} - \rho\vec{b}$ is perpendicular to \vec{c} . (07 Marks)
- c. Find the angle between the vector $\vec{a} = 5\hat{i} - \hat{j} + \hat{k}$ and $\vec{b} = 2\hat{i} - 3\hat{j} + 6\hat{k}$. (07 Marks)

OR

- 2 a. Find the modulus and amplitude of the complex number $1 + \cos\alpha + i \sin\alpha$. (06 Marks)
- b. Prove that $\left(\frac{1 + \cos\theta + i \sin\theta}{1 + \cos\theta - i \sin\theta}\right)^n = \cos n\theta + i \sin n\theta$. (07 Marks)
- c. Find the sine of the angle between $\vec{a} = 2\hat{i} - 2\hat{j} + \hat{k}$ and $\vec{b} = \hat{i} - 2\hat{j} + 2\hat{k}$. (07 Marks)

Module-2

- 3 a. Find the n^{th} derivative of $\cos x \cos 2x$. (06 Marks)
- b. Obtain the Maclaurin's series expansion of the function $\sqrt{1 + \sin 2x}$ upto the term containing x^4 . (07 Marks)
- c. If $u = f(y - z, z - x, x - y)$ prove that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$. (07 Marks)

OR

- 4 a. If $u = \tan^{-1}\left(\frac{x^3 + y^3}{x - y}\right)$ prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$. (06 Marks)
- b. If $z = xy^2 + x^2y$ where $x = at^2$ and $y = 2at$. Find $\frac{dz}{dt}$. (07 Marks)
- c. If $x = e^u \sec v$, $y = e^u \tan v$. Find $J\left(\frac{x, y}{u, v}\right)$. (07 Marks)

Module-3

- 5 a. A particle moves along the curve $\vec{r} = \cos 2t\hat{i} + \sin 2t\hat{j} + t\hat{k}$ where t is the time variable. Determine the components of velocity and acceleration vectors at $t = \pi/8$ in the direction of $\sqrt{2}\hat{i} + \sqrt{2}\hat{j} + \hat{k}$. (06 Marks)
- b. Find $\text{div } \vec{f}$ for $\vec{f} = \nabla(x^3 + y^3 + z^3 - 3xyz)$. (07 Marks)
- c. Show that $\vec{f} = (2xy + z^2)\hat{i} + (x^2 + 2yz)\hat{j} + (y^2 + 2xz)\hat{k}$ is irrotational and find ϕ such that $\vec{f} = \nabla\phi$. (07 Marks)

OR

- 6 a. Find the unit normal to the surface $x^3y^3z^2 = 4$ at the point $P(-1, -1, 2)$. (06 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 $(1, -1, 1)$. (07 Marks)
- c. Show that $\vec{f} = \frac{x\hat{i} + y\hat{j}}{x^2 + y^2}$ is both solenoidal and irrotational. (07 Marks)

Module-4

- 7 a. Obtain a reduction formula for $\int_0^{\pi/2} \sin^n x \, dx$ ($n > 0$). (06 Marks)
- b. Evaluate $\int_0^{2a} x^2 \sqrt{2ax - x^2} \, dx$. (07 Marks)
- c. Evaluate $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} xyz \, dz \, dy \, dx$. (07 Marks)

OR

- 8 a. Obtain a reduction formula for $\int_0^{\pi/2} \cos^n x \, dx$ ($n > 0$). (06 Marks)
- b. Evaluate $\iint_R xy \, dx \, dy$ where R is the first quadrant of the circle $x^2 + y^2 = a^2$, $x \geq 0$, $y \geq 0$. (07 Marks)
- c. Evaluate $\int_{-1}^1 \int_0^{x+z} \int_{x-z}^{x+z} (x+y+z) \, dy \, dx \, dz$. (07 Marks)

Module-5

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

OR

- 10 a. Solve $\left[y \left(1 + \frac{1}{x} \right) + \cos y \right] dx + [x + \log x - x \sin y] dy = 0$. (06 Marks)
- b. Solve $\frac{dy}{dx} + y \cot x = \sin x$. (07 Marks)
- c. Solve $\frac{dy}{dx} + \frac{y}{x} = y^2x$. (07 Marks)

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18MAT31

Third Semester B.E. Degree Examination, July/August 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. Find the Laplace transform,
 - (i) $e^{-2t}(2\cos 5t - \sin 5t)$ (ii) $\cosh^2 3t$ (06 Marks)
- b. Find the Laplace transform of the full wave rectifier $f(t) = E \sin \omega t$ $0 < t < \frac{\pi}{\omega}$ having a period $\frac{\pi}{\omega}$. (07 Marks)
- c. Find the inverse Laplace transform $\left[\frac{s^2 + 4}{s(s+4)(s-4)} \right]$. (07 Marks)

OR

2. a. Find the Laplace transform, $\frac{\cos at - \cos bt}{t}$. (06 Marks)
- b. Solve by using Laplace transform method $y'''(t) + 2y''(t) - y'(t) - 2y(t) = 0$, given $y(0) = y'(0) = 0$ and $y''(0) = 6$ (07 Marks)
- c. Express the function $f(t)$ in terms of unit step function and hence find its inverse LT. (07 Marks)

$$f(t) = \begin{cases} \cos t & 0 < t \leq \pi \\ 1 & \pi < t \leq 2\pi \\ \sin t & t > 2\pi \end{cases}$$

Module-2

3. a. Obtain the Fourier series of $f(x) = \frac{\pi - x}{2}$, in $0 < x < 2\pi$. Hence deduce that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots = \frac{\pi}{4}$. (06 Marks)
- b. Show that the sine half range series for the function, $f(x) = Lx - x^2$, in $0 < x < L$ is $\frac{8L^2}{\pi^3} \sum_0^{\infty} \frac{1}{(2n+1)^3} \sin\left(\frac{2n+1}{L}\pi x\right)$. (07 Marks)
- c. Obtain the Fourier series of y up to the first harmonics for the following values :

x°	45	90	135	180	225	270	315	360
y	4.0	3.8	2.4	2.0	-1.5	0	2.6	3.4

(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.

OR

- 4 a. Expand the function $f(x) = x \sin x$, as a Fourier series in the interval $-\pi \leq x \leq \pi$. Deduce that $\frac{1}{1,3} - \frac{1}{3,5} + \frac{1}{5,7} \dots = \frac{\pi-2}{4}$ (06 Marks)

b. Obtain the half range cosine series of $f(x) = x \sin x$ $0 \leq x \leq \pi$. (07 Marks)

c. Obtain the constant term and the first three coefficients in the Fourier cosine series for y using the following data :

x	0	1	2	3	4	5
y	4	8	15	7	6	2

(07 Marks)

Module-3

- 5 a. Find the complex Fourier transform of the function, $f(x) = \begin{cases} 1 & \text{for } |x| \leq a \\ 0 & \text{for } |x| > a \end{cases}$

Hence evaluate $\int_0^x \frac{\sin x}{x} dx$.

(06 Marks)

b. If $\overline{f(z)} = \frac{2z^2 + 3z + 12}{(z-1)^4}$ find the value of u_0, u_1, u_2, u_3 (07 Marks)

c. Solve by using z-transforms, $u_{n+2} + 5u_{n+1} + 6u_n = 2^n$; $u_1 = 0, u_0 = 0$ (07 Marks)

OR

6 a. Find the Fourier sine transform of e^{-ax} , $a > 0$. (06 Marks)

b. Find the Fourier sine and cosine transform of $2e^{-3x} + 3e^{-2x}$. (07 Marks)

c. Solve by using Z-transforms,

$y_{n+2} + 2y_{n+1} + y_n = n$, with $y(0) = 0 = y$ (07 Marks)

Module-4

7 a. Use Taylor's series method to find $y(4.1)$ given that $\frac{dy}{dx} = \frac{1}{x^2 + y}$ and $y(4) = 4$. (06 Marks)

b. Use Fourth order Runge-Kutta method to solve $(x+y)\frac{dy}{dx} = 1$, $y(0.4) = 1$ at $x = 0.5$. Correct to four decimal places. (07 Marks)

c. The following table gives the solution of $5xy^1 + y^2 - 2 = 0$, find the value of y at $x = 4.5$ using Milne's Predictor and Corrector formulae, use the corrector formulae twice.

x	4	4.1	4.2	4.3	4.4
y	1	1.0049	1.0097	1.0143	1.0187

(07 Marks)

OR

8 a. Using modified Euler's method find y at $x = 0.2$ given $\frac{dy}{dx} = 3x + \frac{y}{2}$, with $y(0) = 1$ taking $h = 0.1$. (06 Marks)

b. Using Runge-Kutta method of fourth order find $y(0.2)$ for the equation $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$ taking $h = 0.2$ (07 Marks)

c. Apply Adams-Bashforth method to solve the equation $(y^2 + 1)dy - x^2 dx = 0$, at $x = 1$, given $y(0) = 1, y(0.25) = 1.0026, y(0.5) = 1.0206, y(0.75) = 1.0679$. Apply the corrector formulae twice. (07 Marks)

Module-5

9 a. Given $\frac{d^2y}{dx^2} - x^2 \frac{dy}{dx} - 2xy = 1$, $y(0) = 1$, $y'(0) = 0$, Evaluate $y(0.1)$ using Runge-Kutta method of order 4. (06 Marks)

b. A necessary condition for the integral $I = \int_{x_1}^{x_2} f(x, y, y') dx$ where $y(x_1) = y_1$ and $y(x_2) = y_2$ to be extremum that $\frac{\partial f}{\partial y} - \frac{d}{dx} \left(\frac{\partial f}{\partial y'} \right) = 0$. (07 Marks)

c. Show that the extremal of the functional $\int_0^1 y^2 \{3x(y'^2 - 1) + yy'^3\} dx$, subject to the conditions $y(0) = 0$, $y(1) = 2$, is the circle $x^2 + y^2 - 5x = 0$. (07 Marks)

OR

10 a. Apply Milne's method to compute $y(0.8)$. Given that $\frac{d^2y}{dx^2} = 1 - 2y \frac{dy}{dx}$ and the following table of initial values. (06 Marks)

x	0	0.2	0.4	0.6
y	0	0.02	0.0795	0.1762
y'	0	0.1996	0.3937	0.5689

b. Find the extremal of the functional $\int_a^b (x^2 y'^2 + 2y^2 + 2xy) dx$. (07 Marks)

c. Prove that Geodesics on a plane are straight line. (07 Marks)

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Question Paper Version : A

Third/Fourth Semester B.E Degree Examination, July/August 2022
Constitution of India, Professional Ethics and Cyber Law
(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the hundred questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

1. The members of the constituent assembly which drafted the constitution of India were ;
 - a) Nominated by the British Parliament.
 - b) Nominated by the Governor General.
 - c) Elected by the Legislative Assemblies of various Provinces.
 - d) Elected by the Indian National Congress and Muslim league.
2. Which of the following committees of constituent assembly were headed by Sardar Vallabhbhai Patel?
 - (i) Committes for negotiating with States.
 - (ii) Committes on Fundamental rights.
 - (iii) Committes on minorities.
 Select the correct answer using the codes given below ;
 - a) (i), (ii) and (iii)
 - b) (i) and (ii)
 - c) (ii) and (iii)
 - d) (iii) only
3. Who among the following was the Chairman of the Union Constitution Committee of the Constituent Assembly?
 - a) Jawaharlal Nehru
 - b) J.B. Kripalani
 - c) Dr. B. R. Ambedkar
 - d) Alladi Krishna Swami Ayyar
4. Which one of the following is a feature common to both the Indian federation and the American federation?
 - a) Independent Judiciary
 - b) Citizenship
 - c) Appointment of Governors
 - d) Independent centre and State
5. Which one of the following determines that the Indian Constitution is federal?
 - a) A written and rigid constitution
 - b) An Independent Judiciary
 - c) Vesting of residuary powers with the centre
 - d) Distribution of powers between the Centre and States

6. Which of the following Constitutional Provisions strengthen democracy?
- Single Citizenship
 - Rigidity of Constitution
 - Written Constitution
 - Emergency provisions in the Constitution
- Select the correct answer using the codes given below:
- (i) and (ii)
 - (ii) and (iii)
 - (ii) and (iv)
 - (i), (ii), (iii) and (iv)
7. The concept of Public Interest Litigation originated in ;
- United Kingdom
 - Australia
 - Canada
 - United States
8. Which one of the following words was not contained in the original preamble to the Indian Constitution?
- Sovereign
 - Secular
 - Democratic
 - Republic
9. With reference to the preamble as enshrined in the Indian Constitution, consider the following statements ;
- 'Equality' means removing all the differences among the Citizens of India.
 - 'Secular' means government will not interfere at all in the matters of religion.
 - 'Republic' means the head of the State is a nominated person.
- (i) only
 - (ii) and (iii)
 - (i), (ii) and (iii)
 - None of these
10. Which one of the following objectives is not embodied in the preamble to the Constitution of India?
- Liberty of thought
 - Economic liberty
 - Liberty of expression
 - Liberty of belief
11. In the Indian Constitution, the 'Right to Equality' is granted by ;
- Article 16 to 20
 - Article 15 to 19
 - Article 14 to 18
 - Article 13 to 17
12. Consider the following statements ;
- With reference to the Constitution of India, the Directive Principles of State Policy constitute limitations upon ;
- Legislative function
 - Executive function
- (i) only
 - (ii) only
 - Both (i) and (ii)
 - Neither (i) and (ii)
13. Which of the following is not a Fundamental duty as enshrined in the Constitution of India?
- To develop scientific temper
 - To promote brother hood
 - To respect the ideals of the Constitution
 - To develop physical strength
14. With reference to Fundamental duties, consider the following statements ;
- Fundamental duties place civic as well as moral duties on the Citizen.
 - Some Fundamental duties also extended to foreigners.
- (i) only
 - (ii) only
 - (i) and (ii)
 - Neither (i) and (ii)

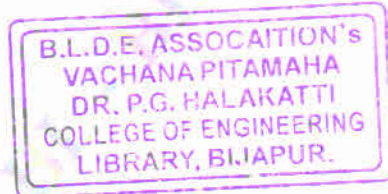
15. Under the Constitution of India, which one of the following is not a fundamental duty?
a) To Vote in public elections
b) To develop the scientific temper.
c) To safeguard public property
d) To abide by the Constitution and respect its ideals
16. Who headed the Interim Cabinet formed in the 1946?
a) Rajendra Prasad
b) Jawaharlal Nehru
c) Sardar Vallabhai Patel
d) Rajagopalachari
17. The Constituent Assembly was created under which of the following Constitutional schemes?
a) Cabinet mission plan
b) Indian Independence plan
c) Transfer of power plan
d) Mountbatten plan
18. Who among the following was the Chairman of the Union Constitution Committee of the Constituent Assembly?
a) B.R. Ambedkar
b) J.B.Kripalani
c) Jawaharlal Nehru
d) Alladi Krishnaswami Aiyar
19. Which one of the following determines that the Indian Constitution is federal?
a) A written and rigid Constitution
b) An Independent Judiciary
c) Vesting of residuary powers with the centre
d) Distribution of powers between the Centre and the State
20. The Indian Parliamentary system is different from the British Parliamentary system in which of the following respects?
a) Both a real and a nominal executive
b) A system of collective responsibility
c) Bicameral legislature
d) A different Judicial review
21. The mind of the makers of the Constitution of India is reflected in which of the following?
a) The Preamble
b) The Fundamental rights
c) The Directive principles of State policy
d) The Fundamental duties
22. Which one of the following rights was described by Dr.B.R.Ambedkar as the 'heart' and 'soul' of the Constitution?
a) Right to Freedom of religion
b) Right to Property
c) Right to Equality
d) Right to Constitutional remedies
23. Which of the following Articles of the Directive Principles of State policy deals with the promotion of International peace and security?
a) 48 A
b) 51
c) 43 A
d) 41
24. Which of the following are envisaged by the Right against exploitation in the constitution of India?
a) Prohibition of traffic in human beings and forced labour
b) Abolition of untouchability
c) Protection of the interests of minorities
d) Prohibition of employment of women

35. A deadlock between the Lok Sabha and Rajya Sabha calls for a joint sitting of the Parliament during the passage of ;
(i) Ordinary bill (ii) Money bill (iii) Finance bill
Select the correct answer using the codes given here ;
a) (i) only b) (ii) and (iii) only
c) (i) and (iii) only d) (i), (ii) and (iii)
36. Which one of the following is responsible for the preparation and presentation of Union budget of the Parliament?
a) Department of Revenue b) Department of Economic, Affairs
c) Department of Expenditure d) None of these
37. The power to enlarge the Jurisdiction of the Supreme Court of India with respect to any matter included in the union list of Legislative powers rests with ;
a) The President of India
b) The Chief Justice of India
c) The Parliament
d) The Union Ministry of Law, Justice and Company affairs
38. According to the Constitution of India, the term 'District judge' shall not include ;
a) Chief presidency magistrate b) Sessions Judge
c) Tribunal Judge d) Chief Judge of a small cause court
39. Which of the following judicial bodies are mentioned in the Constitution?
a) Grama Nyayalayas b) Fast Track Courts
c) Lok Adalats d) District Courts
40. The salaries and allowances of the Judges of the High Court are charged to the ;
a) Consolidated fund of India b) Consolidated fund of the State
c) Contingency fund of India d) Contingency fund of the State
41. Consider the following statements : Attorney general of India can ;
a) Vote in the Rajya Sabha
b) He must be from a Judicial background
c) Speak in the Rajya Sabha
d) He cannot defend accused persons in criminal prosecutions
42. The Speaker of the Lok Sabha derives his powers and duties from ;
a) The Constitution of India
b) The Rules of procedure and conduct of business of Lok Sabha
c) Parliamentary Conventions
d) All of these
43. Which one of the following is the largest (area wise) Lok Sabha Constituency?
a) Ludhiana b) Ladakh
c) Kachchh d) Amethi
44. Which of the following steps can be taken by a House of Parliament during the first 2 readings of a bill?
(i) Circulating the bill for eliciting public opinion
(ii) Rejecting the bill as a whole
(iii) Moving Amendments to the bill
(iv) Referring the bill to a Joint Committee of the two houses
Select the correct answer using the codes given below ;
a) (ii) and (iii) b) (i) and (ii)
c) (i) and (iii) d) (i), (iii) and (iv)

45. The authorization for the withdrawal of Funds from the Consolidated Fund of India may come from ;
 a) The President of India
 b) The Parliament of India
 c) The Prime Minister of India
 d) The Union Finance Minister
46. All revenues received by the Union Government by way of taxes and other receipts for all conduct of government business are credited to the ;
 a) Contingency Fund of India
 b) Public Accounts of India
 c) Consolidated Fund of India
 d) Deposits and Advances Fund
47. The power to increase the number of Judges in the Supreme Court of India is Vested in ;
 a) The President of India
 b) The Parliament
 c) The Chief Justice of India
 d) The Law Commission
48. There is a Parliamentary system of government in India because the ;
 a) Lok Sabha is elected directly by the people
 b) Parliament can amend the Constitution
 c) Rajyasabha cannot be dissolved
 d) Council of Ministers is responsible to the Lok Sabha
49. Which of the following persons are not eligible to Vote in elections of Legislative Councils?
 a) Two year work experience after post-graduation.
 b) Professor in a Government college
 c) Ex-officio member of Zila Parishad
 d) None of these
50. According to the Constitution of India, the term of 'District Judge' shall not include ;
 a) Chief Presidency magistrate
 b) Sessions Judge
 c) Tribunal Judge
 d) Chief Judge of a small cause court
51. Notifications in respect of by-elections to the Lok Sabha are issued by the ;
 a) Election Commission
 b) Speaker of Lok Sabha
 c) The whip
 d) No notification is required for by-election
52. Right to Vote in Lok Sabha and State Assembly elections is a ;
 a) Constitutional right
 b) Statutory right
 c) Fundamental right
 d) Moral right
53. The electoral system of India is largely based on the pattern of ;
 a) USA
 b) Britain
 c) France
 d) None of these
54. What is the system used to elect the President of India?
 a) Preferential system
 b) District election
 c) Secret ballot
 d) Proportional representation
55. Elections to Lok Sabha shall be held after every ;
 a) Two years
 b) Six years
 c) Five years
 d) As soon as Lok Sabha is dissolved

67. The term 'Fourth estate' refers to ;
 a) Press
 b) Judiciary
 c) Parliament
 d) Backward class residing in the State
68. Other Election Commissioner or Regional Election Commissioners shall be removed on the recommendation of the ;
 a) Chief Election Commissioner
 b) Governor
 c) President
 d) Prime Minister
69. Emergency provisions were borrowed from the Constitution of ;
 a) Germany
 b) USA
 c) Britain
 d) Ireland
70. Who is the person foundly known as the Chief Architect of the Indian Constitution?
 a) Dr. B. R. Ambedkar
 b) Dr. Rajendra Prasad
 c) Pandit Jawaharlal Nehru
 d) Sri. Mahatma Gandhi
71. One of the aims of studying engineering ethics is to ;
 a) Inspire Engineers to acquire in-depth knowledge in their field
 b) Stimulate moral imaginations
 c) Make Engineers self-conflict in discharging their duties
 d) Acquire new skills in Engineering testing
72. When an Engineer abuses Client-professional confidentiality it amounts to ;
 a) Misusing the truth
 b) Criminal breach of trust
 c) Self-deception
 d) None of these
73. Which of the following is not a Concept of responsibility?
 a) Minimalist
 b) Maximalist
 c) Reasonable care
 d) Good works
74. 'Being safe or Blaming others' is type of attitudes of responsibility of Engineers,
 a) Reasonable care
 b) Minimalist
 c) Good works
 d) None of these
75. This is not dishonest in Engineering ;
 a) Trimming
 b) Blending
 c) Negligently
 d) Intentionally
76. Which one is not the way of misusing truth?
 a) With holding information
 b) Failing to adequately promote the dissemination, of information
 c) Deliberate deceptions
 d) Patenting
77. To overcome an impediment 'Unicritical Acceptance' ; what step an Engineer has to take?
 a) Accept and Analyze
 b) Analyze and Accept
 c) Always say 'Yess Boss'
 d) None of these
78. The formulate of a soft drink is an example of ;
 a) Copy right
 b) Trade secret
 c) Patent
 d) Trade marks

79. Risk estimation can be done by using ;
 a) Cooking
 b) Trimming
 c) Event tree
 d) Both (a) and (b)
80. It is not a kind of trademark ;
 a) Design
 b) Sounds
 c) Symbols
 d) Good will
81. One of the characteristics of profession is ;
 a) It gives scope to exercise one's skill
 b) It gives monopoly on service
 c) It provides opportunity to help the poor and needy
 d) It demands high standard of honesty
82. Minimalist view means ;
 a) A minimalist view
 b) A narrow thinking
 c) A novel plan to minimize industrial loss
 d) A concept of responsibility
83. The fault tree is used to ;
 a) Improve safety
 b) Assess the risk involved
 c) Take free consent
 d) Claim Compensation
84. These are not trade secretes ;
 a) Formulas
 b) Principles
 c) Patterns
 d) Devices
85. Protection of the expression of ideas, but not the ideas themselves, is called ;
 a) Copyright
 b) Plagiarism
 c) Patent
 d) Forging
86. Which of the following is known as Malicious Software?
 a) Malicious ware
 b) Illegal ware
 c) Bad ware
 d) Malware
87. To protect yourself from Computer hacker, you should turn on a ;
 a) Fire wall
 b) Script
 c) Antivirus
 d) VLC
88. MCA fee is an example of ;
 a) Virus
 b) Quick heal
 c) Antivirus
 d) Photo editing software
89. Which of the following would most likely not be a symptom of a virus?
 a) Existing program files and icons disappear
 b) The CD-ROM stops functioning
 c) The web-browser opens to an unusual home page
 d) Odd message or images are displayed on the screen
90. 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



91. Which of the following is not done by Cyber Criminals?
 a) Unauthorized account access b) Mass attack using Trojans as botnets
 c) Email spoofing and spamming d) Report vulnerability in any system.
92. What is the name of the IT law that India is having in the Indian Legislature?
 a) India's Technology (IT) Act, 2000
 b) India's Digital Information Tehcnology (DIT) Act, 2000
 c) India's Information Technology (IT) Act, 2000.
 d) The Technology Act, 2008
93. What is meant by the term 'Cyber Crime'?
 a) Any crime that involves computers and networks.
 b) Any crime that use computers to jeopardize or attempt to jeopardize national security
 c) The use of computer network to commit financial or identity fraud
 d) The theft of digital information
94. Pharming is also known as ;
 a) Black Hat b) Web jacking
 c) Crackers d) None of these
95. The first computer virus is _____ ;
 a) Sasser b) Creeper
 c) Blaster d) I Love You
96. What is the name of the Act that governs internet usage in India?
 a) The Internet Consumption Act, 1998 b) The Information Technology Act, 2004
 c) The IT Gazette of India Act, 2004 d) None of these
97. What is Anti-Virus?
 a) It is a program code. b) It is a Company name
 c) It is a Computer d) It is an application
98. Which of the following is not a type of Cyber crime?
 a) Data theft b) Forgery
 c) Damage to data and systems d) Installing antivirus for protection
99. How many primary forces or mode of regulation of the internet are present?
 a) 4 b) 5
 c) 3 d) 6
100. Unauthorized changing of data before or during their input to a computer system ;
 a) Cyber stalking b) Bots
 c) Data diddling d) Spoofing

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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

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

OR

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

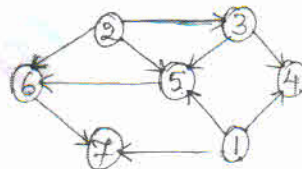
Module-2

- 3 a. 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)
- b. Apply both mergesort and quicksort algorithm to sort the characters VTUBELAGAVI. (10 Marks)

OR

- 4 a. Apply Strassen's algorithm for matrix multiplication to multiply the following matrices and justify how the Strassen's algorithm is better. (10 Marks)
- $$\begin{bmatrix} 4 & 3 \\ 1 & 2 \end{bmatrix} \times \begin{bmatrix} 1 & 2 \\ 6 & 5 \end{bmatrix}$$
- b. Obtain the topological sort for the graph , Fig. Q4(b) using i) Source Removal method (10 Marks)
 ii) DFS method.

Fig. Q4(b)



Module-3

- 5 a. 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 Prim's and Kruskal's algorithm to find the minimal cost spanning tree for the graph given in Fig. Q5(c). (10 Marks)

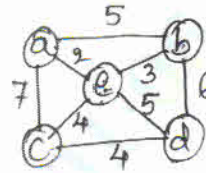


Fig. Q5(c)

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).

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

Fig. Q7(a)

(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

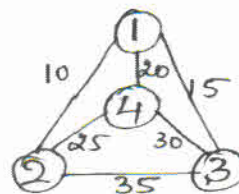
- 8 a. Construct an Optimal Binary search tree for the set of keys given in Fig. Q8(a). (10 Marks)

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)

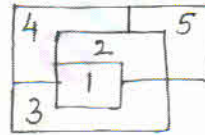
Fig. Q8(b)



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 $W = 10$

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

Fig. Q10(b)

(10 Marks)

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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. (05 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, SRTF, 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.

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) I 2 C 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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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)

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)

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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.
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- 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)

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18MATDIP41

Fourth Semester B.E. Degree Examination, July/August 2022 Additional Mathematics - II

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 rank of the matrix

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

(06 Marks)

- b. Solve the system of equations:
- $x + y + z = 9$
- ;
- $x - 2y + 3z = 8$
- ;
- $2x + y - z = 3$
- by Gauss elimination method. (07 Marks)

- c. Find all the eigen values and corresponding eigen vectors of
- $\begin{pmatrix} -5 & 9 \\ -6 & 10 \end{pmatrix}$
- (07 Marks)

OR

- 2 a. Find the rank of the matrix

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

(06 Marks)

- b. Using Gauss elimination method solve the system of equations
- $x + 2y + 3z = 6$
- ;
- $2x + 4y + z = 7$
- ;
- $3x + 2y + 9z = 14$
- . (07 Marks)

- c. Find the eigen values of the matrix
- $\begin{pmatrix} 1 & 2 & 3 \\ 0 & -2 & 6 \\ 0 & 0 & -3 \end{pmatrix}$
- (07 Marks)

Module-2

- 3 a. Use an appropriate Interpolation formula to compute
- $f(6)$
- .

x	1	2	3	4	5
y	1	-1	1	-1	1

(07 Marks)

- b. Evaluate
- $\int_0^6 3x^2 dx$
- by using Simpson's
- $\left(\frac{1}{3}\right)^{\text{rd}}$
- rule by taking
- $n = 6$
- . (07 Marks)

- c. Find a real root of the equation
- $x^3 - 2x - 5 = 0$
- by Newton Raphson method. (06 Marks)

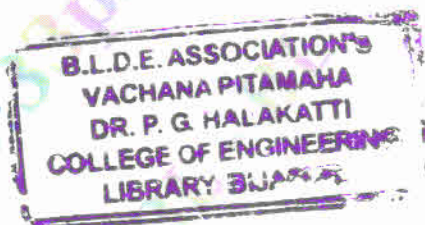
OR

- 4 a. Find solution using Newton's Interpolation formula, at
- $x = -1$
- .

x	0	1	2	3
f(x)	1	0	1	10

(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.



- b. Find the real root of the equation $\cos x = 3x - 1$ using Regula Falsi method. (07 Marks)
- c. Evaluate $\int_4^{5.2} \log_e x$ taking $n = 6$ by Weddle's rule. (06 Marks)

Module-3

- 5 a. Solve : $(D^3 - 2D^2 + 4D - 8)y = 0$ (06 Marks)
- b. Solve : $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 3y = e^{2x}$ (07 Marks)
- c. Solve : $\frac{d^2y}{dx^2} + 4y = \cos 4x$ (07 Marks)

OR

- 6 a. Solve : $\frac{d^3y}{dx^3} - 3\frac{dy}{dx} + 2y = 0$ (06 Marks)
- b. Solve : $(D^2 - 6D + 9)y = 7e^{-2x} - \log 2$ (07 Marks)
- c. Solve : $\frac{d^2y}{dx^2} - 16y = \sin 16x$ (07 Marks)

Module-4

- 7 a. Form the partial differential equation by eliminating the arbitrary constants from $z = (x - a)^2 + (y - b)^2$ (06 Marks)
- b. Solve : $\frac{\partial^2 z}{\partial x \partial y} = x^2 y$ (07 Marks)
- c. Solve : $\frac{\partial^2 z}{\partial y^2} - z = 0$; given that $z = \cos x$ and $\frac{\partial z}{\partial y} = \sin x$, when $y = 0$. (07 Marks)

OR

- 8 a. Form the partial differential equation by eliminating the arbitrary function 'f' from $f(x^2 + y^2, z - xy) = 0$ (06 Marks)
- b. Solve the equation $\frac{\partial^2 z}{\partial y^2} = \sin xy$ (07 Marks)
- c. Form the partial differential equation by eliminating the arbitrary constants
 $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ (07 Marks)

Module-5

- 9 a. Define : (i) Mathematical definition of probability
 (ii) Mutually exclusive events
 (iii) Independent events (06 Marks)
- b. If A and B are two events with $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{4}$.
 Find (i) $P(A/B)$ (ii) $P(B/A)$ (iii) $P(\bar{A}/\bar{B})$ (iv) $P(\bar{B}/\bar{A})$ (07 Marks)
- c. In a bolt factory there are four machines A, B, C, D manufacturing respectively 20%, 15%, 25%, 40% of the total production. Out of these 5%, 4%, 3%, 2% are defective. If a bolt drawn at random was found defective, what is the probability that it was manufactured by A? (07 Marks)

OR

- 10 a. State and prove Baye's theorem. (06 Marks)
- b. A card is drawn at random from a pack of cards. (i) What is the probability that it is a heart?
(ii) If it is known that the card drawn is red, what is the probability that it is a heart? (07 Marks)
- c. An Urn 'A' contains 2 white and 4 black balls. Another Urn 'B' contains 5 white and 7 black balls. A ball is transferred from the Urn A to the Urn B. Then a ball is drawn from the Urn B. Find the probability that it is white. (07 Marks)

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18MAT41

Fourth Semester B.E. Degree Examination, July/August 2022 Complex Analysis, Probability and Statistical Methods

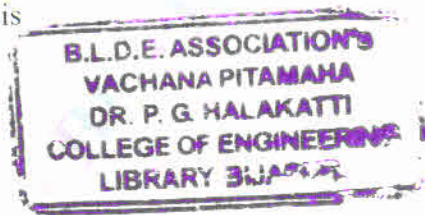
Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Derive Cauchy-Riemann equation in Polar form. (06 Marks)
 b. Find the analytic function $f(z)$ whose real part is $x \sin x \cosh y - y \cos x \sinh y$ (07 Marks)
 c. If $f(z)$ is analytic show that $\left[\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right] |f(z)|^2 = 4 |f'(z)|^2$ (07 Marks)



OR

- 2 a. Find the analytic function $f(z)$ given that the sum of its real and imaginary part is $x^3 - y^3 + 3xy(x - y)$ (06 Marks)
 b. Find the analytic function $f(z) = u + iv$ if $v = r^2 \cos 2\theta - r \cos \theta + 2$ (07 Marks)
 c. If $f(z)$ is analytic function then show that $\left\{ \frac{\partial}{\partial x} |f(z)| \right\}^2 + \left\{ \frac{\partial}{\partial y} |f(z)| \right\}^2 = |f'(z)|^2$ (07 Marks)

Module-2

- 3 a. State and prove Cauchy's Integral formula. (06 Marks)
 b. Evaluate $\int_0^{2+i} z^2 dz$ along (i) the line $y = \frac{x}{2}$ (ii) The real axis to 2 and then vertically to $2 + i$. (07 Marks)
 c. Find the bilinear transformation which maps the points 1, i , -1 onto the points i , 0 , $-i$ respectively. (07 Marks)

OR

- 4 a. Discuss the transformation $w = e^z$, with respect to straight lines parallel to x and y axis. (06 Marks)
 b. Using Cauchy's integral formula evaluate $\int_c \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$, where $c : |z| = 3$ (07 Marks)
 c. Find the bilinear transformation which maps the points $0, 1, \infty$ on to the points $-5, -1, 3$ respectively. (07 Marks)

Module-3

- 5 a. A random variable X has the following probability function for various values of X .

X	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	k ²	2k ²	7k ² +k

- Find i) k ii) $P(X < 6)$ iii) $P(3 < X \leq 6)$ (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.

- b. Out of 800 families with 5 children each, how many families would you expect to have
 (i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys (iv) atmost 2 girls, assuming equal probabilities for boys and girls. (07 Marks)
- c. The length in time (minutes) that a certain lady speaks on a telephone is a random variable with probability density function

$$f(x) = \begin{cases} Ae^{-x/5} & \text{for } x > 0 \\ 0 & \text{elsewhere} \end{cases}$$

Find the value of the constant A. What is the probability that she will speak over the phone for (i) More than 10 minutes (ii) Less than 5 minutes (iii) Between 5 and 10 minutes. (07 Marks)

OR

- 6 a. Find the constant C such that the function

$$f(x) = \begin{cases} Cx^2, & 0 < x < 3 \\ 0 & \text{otherwise} \end{cases} \text{ is a probability density function. Also compute } P(1 < x < 2),$$

$P(x \leq 1)$ and $P(x > 1)$ (06 Marks)

- b. 2% fuses manufactured by a firm are found to be defective. Find the probability that the box containing 200 fuses contains
 (i) No defective fuses (ii) 3 or more defective fuses (iii) At least one defective fuse. (07 Marks)

- c. If x is a normal variate with mean 30 and standard deviation 5 find the probabilities that
 (i) $26 \leq x \leq 40$ (ii) $x \geq 45$ (iii) $|x - 30| > 5$
 Given that $\phi(1) = 0.3413$, $\phi(0.8) = 0.2881$, $\phi(2) = 0.4772$, $\phi(3) = 0.4987$ (07 Marks)

Module-4

- 7 a. The following table gives the ages (in years) of 10 married couples. Calculate Karl Pearson's coefficient of correlation between their ages:

Age of husband (x)	23	27	28	29	30	31	33	35	36	39
Age of wife (y)	18	22	23	24	25	26	28	29	30	32

(06 Marks)

- b. In a partially destroyed laboratory record of correlation data only the following results are available:

Variance of x is 9 and regression lines are $8x - 10y + 66 = 0$, $40x - 18y = 214$. Find

- (i) Mean value of x and y
 (ii) Standard deviation of y
 (iii) Coefficient of correlation between x and y . (07 Marks)
- c. Fit a parabola of the form $y = ax^2 + bx + c$ for the data

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

(07 Marks)

OR

- 8 a. Obtain the lines of regression and hence find the coefficient of correlation of the data:

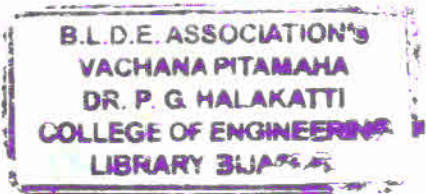
x	1	3	4	2	5	8	9	10	13	15
y	8	6	10	8	12	16	16	10	32	32

(06 Marks)

- b. Show that if θ is the angle between the lines of regression

$$\tan \theta = \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2} \left(\frac{1 - r^2}{r} \right)$$

(07 Marks)



c. Fit a straight line $y = a + bx$ to the data

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

(07 Marks)

Module-5

9 a. The joint probability distribution of the random variables X and Y is given below.

X \ Y	-4	2	7
1	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$
5	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$

Find (i) $E[X]$ and $E[Y]$ (ii) $E[XY]$ (iii) $cov(X, Y)$ (iv) $\rho(X, Y)$.

Also, show that X and Y are not independent.

(06 Marks)

b. A manufacturer claimed that atleast 95% of the equipment which he supplied to a factory confirmed to specifications. An examination of a sample of 200 pieces of equipment revealed that 18 of them were faulty. Test his claim at a significance level of 1% and 5% ($z_{0.05} = 1.96, z_{0.01} = 2.58$).

(07 Marks)

c. A certain stimulus administered to each of the 12 patients resulted in the following change in blood pressure 5, 2, 8, -1, 3, 0, 6, -2, 1, 5, 0, 4. Can it be concluded that the stimulus will increase the blood pressure ($t_{0.05}$ for 11 d.f. is 2.201)

(07 Marks)

OR

10 a. Define the terms :

(i) Null hypothesis (ii) Type-I and Type - II errors (iii) Significance level (06 Marks)

b. In an experiment of pea breeding the following frequencies of seeds were obtained:

Round Yellow	Wrinkled Yellow	Round Green	Wrinkled Green	Total
315	101	108	32	556

Theory predicts that the frequencies should be in proportions 9:3:3:1

Is the experiment in agreement with theory ($\chi^2_{0.5}$ for 3 d.f is 7.815)

(07 Marks)

c. The joint probability distribution of two discrete random variable X and Y is given by $f(x, y) = k(2x + y)$ where x and y are integers such that $0 \leq x \leq 2, 0 \leq y \leq 3$. Find k and the marginal probability distribution of X and Y. Show that the random variables X and Y are dependent. Also, find $P(X \geq 1, Y \leq 2)$.

(07 Marks)

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18CS54

Fifth Semester B.E. Degree Examination, July/August 2022
Automata theory and Computability

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define the following terms with an example
 - i) Alphabet
 - ii) Power of an alphabet
 - iii) String
 - iv) String concatenation
 - v) language. (05 Marks)
- b. Explain the hierarchy of language classes in automata theory with diagram. (05 Marks)
- c. Design DFSM for each of the following language.
 - i) $L = \{\omega \in \{0,1\}^* : \omega \text{ does not end in } 01\}$
 - ii) $L = \{\omega \in \{a,b\}^* : \text{every } a \text{ in } \omega \text{ is immediately preceded and followed by } b\}$. (10 Marks)

OR

- 2 a. Use MiNDFSM algorithm to minimize M given in Fig Q2(a).

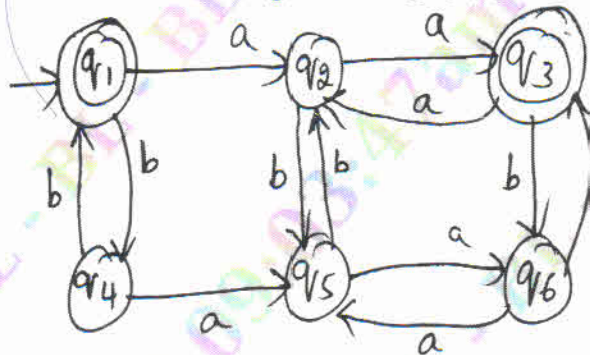


Fig Q2(a)

(08 Marks)

- b. Convert the following NDFSM given in Fig Q2(b) to its equivalent DFSM.

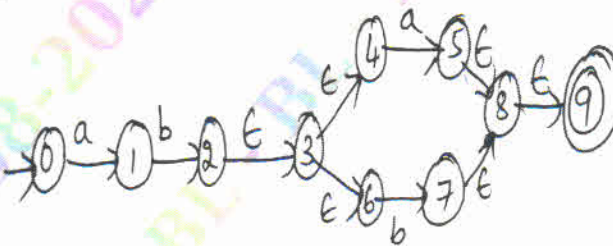


Fig Q2(b)

(08 Marks)

- c. Design a mealy machine that takes binary number as input and produces 2's complement of the number as output. (04 Marks)

Module-2

- 3 a. Define Regular expression. Write regular expression for the following language.
 - i) $L = \{0^n 1^m \mid m \geq 1, n \geq 1, mn \geq 3\}$
 - ii) $L = \{\omega \in \{a,b\}^* : \text{string with at most one pair of consecutive } a\text{'s}\}$ (08 Marks)
- b. Obtain NDFSM for the regular expression $(a^* \cup ab)(a \cup b)^*$. (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.

Module-3

- 5 a. How are assertions and triggers defined in SQL? Explain with examples. (08 Marks)
 b. Explain stored procedures in SQL with an example. (06 Marks)
 c. List out and explain the different types of JDBC drivers. (06 Marks)

OR

- 6 a. What is a three-tier architecture? What advantages it offer over single tier and two tier architectures? Give a short overview of the functionality at each of the three-tier. (10 Marks)
 b. How to create views in SQL? Explain with an example. (06 Marks)
 c. What is SQLJ? How it is different from JDBC? (04 Marks)

Module-4

- 7 a. Explain an informal design guidelines for relational schema design. (08 Marks)
 b. What is the need for normalization? Explain 1NF, 2NF and 3NF with examples. (08 Marks)
 c. What do you understand by attribute closure? Give an example. (04 Marks)

OR

- 8 a. What is functional dependency? Explain the inference rules for functional dependency with proof. (08 Marks)
 b. Define 4NF. When it is violated? Why is it useful? (06 Marks)
 c. Consider two sets of functional dependency $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$ and $G = \{A \rightarrow CD, E \rightarrow AH\}$. Are they equivalent? (06 Marks)

Module-5

- 9 a. Why concurrency control is needed? Demonstrate with an example. (10 Marks)
 b. Discuss the UNDO and REDO operations and the recovery techniques that use each. (06 Marks)
 c. Explain the ACID properties of a database transaction. (04 Marks)

OR

- 10 a. Discuss Two-Phase Locking Technique for concurrency control. (10 Marks)
 b. When deadlock and starvation problem occur? Explain how these problems can be resolved. (10 Marks)

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18CS54

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

Automata theory and Computability

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- Define the following terms with an example
 - Alphabet
 - Power of an alphabet
 - String
 - String concatenation
 - language.

(05 Marks)
 - Explain the hierarchy of language classes in automata theory with diagram. (05 Marks)
 - Design DFMSM for each of the following language.
 - $L = \{\omega \in \{0,1\}^* : \omega \text{ does not end in } 01\}$
 - $L = \{\omega \in \{a,b\}^* : \text{every } a \text{ in } \omega \text{ is immediately preceded and followed by } b\}$.

(10 Marks)

OR

- Use MiNDFSM algorithm to minimize M given in Fig Q2(a).

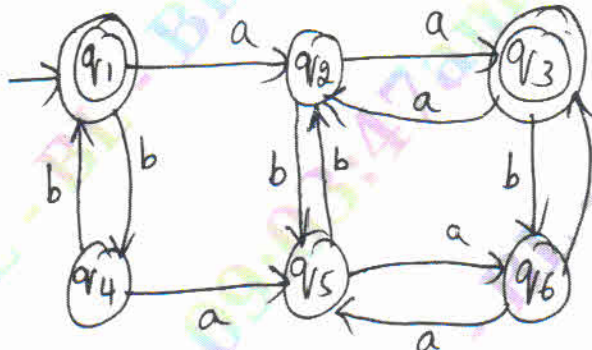


Fig Q2(a)

(08 Marks)

- Convert the following NDFSM given in Fig Q2(b) to its equivalent DFMSM.

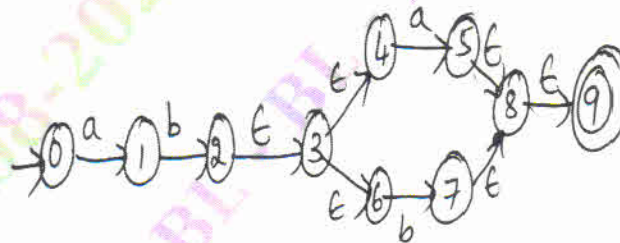


Fig Q2(b)

(08 Marks)

- Design a mealy machine that takes binary number as input and produces 2's complement of the number as output. (04 Marks)

Module-2

- Define Regular expression. Write regular expression for the following language.
 - $L = \{0^n 1^m \mid m \geq 1, n \geq 1, mn \geq 3\}$
 - $L = \{\omega \in \{a,b\}^* : \text{string with at most one pair of consecutive } a\text{'s}\}$

(08 Marks)
 - Obtain NDFSM for the regular expression $(a^* \cup ab)(a \cup b)^*$. (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. Build a regular expression for the given FSM in Fig Q3(c).

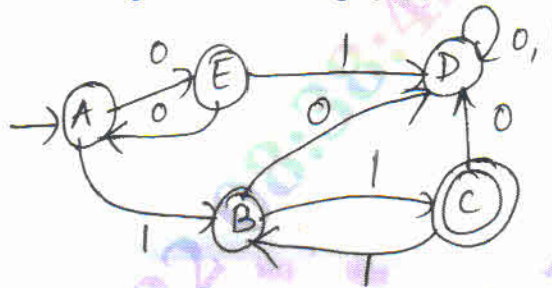


Fig Q3(c)

(07 Marks)

OR

- 4 a. State and prove pumping Lemma theorem for regular language. (08 Marks)
 b. Prove that regular languages are closed under complement. (05 Marks)
 c. Write regular expression, regular grammar and FSM for the languages
 $L = \{ \omega \in \{a, b\}^* ; \omega \text{ ends with pattern } aaaa \}$. (07 Marks)

Module-3

- 5 a. Define Context Free Grammar (CFG). Write CFG for the following languages
 $L = \{ 0^m 1^m 2^n : m \geq 1, n \geq 0 \}$. (05 Marks)
 b. What is ambiguity in a grammar? Eliminate ambiguity from balanced parenthesis grammar? (08 Marks)
 c. Simplify the grammar by removing productive and unreachable symbols
 $S \rightarrow AB|AC$
 $A \rightarrow aA b|\epsilon$
 $B \rightarrow bA$
 $C \rightarrow bCa$
 $D \rightarrow AB$ (07 Marks)

OR

- 6 a. Define PDA and design PDA to accept the language by final state method. (07 Marks)
 $L(M) = \{ \omega C \omega^R \mid \omega \in (a \cup b)^* \text{ and } \omega^R \text{ is reverse of } \omega \}$
 b. Convert the following grammar to CNF
 $S \rightarrow ASB|\epsilon$
 $A \rightarrow aAS|a$
 $B \rightarrow SbS|A|bb$ (08 Marks)
 c. Consider the grammar
 $E \rightarrow E + E | E * E | (E) | id$
 Construct LMD, RMD and parse tree for the string $(id + id * id)$. (05 Marks)

Module-4

- 7 a. Define Turing Machine (TM). Design a TM for language
 $L = \{ 0^n 1^n \mid n \geq 1 \}$. Show that the string 0011 is accepted by ID. (10 Marks)
 b. Explain multiple TM with a neat diagram. (05 Marks)
 c. Explain any two techniques for TM construction. (05 Marks)

OR

- 8 a. Design a TM for the language $L = \{1^n 2^n 3^n \mid n \geq 1\}$ show that the string 112233 is accepted by ID. (12 Marks)
- b. Demonstrate the model of Linear Bounded Automata (LBA) with a neat diagram. (08 Marks)

Module-5

- 9 a. Show that A_{DFA} is decidable. (05 Marks)
- b. Define Post Correspondence Problem (PCP). Does the PCP with two list $x = (b, bab^3, ba)$ $y = (b^3, ba, b)$ have a solution. (08 Marks)
- c. Explain quantum computation. (07 Marks)

OR

- 10 a. Prove the A_{TM} is undecidable. (05 Marks)
- b. Does the PCP with two list $x = (0, 01000, 01)$ $y = (000, 01, 1)$ have a solution. (05 Marks)
- c. State and explain Church Turning Thesis in detail. (10 Marks)

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18CS55

Fifth Semester B.E. Degree Examination, July/August 2022 Application Development using Python

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1.
 - a. List the salient features of Python Programming Language. (06 Marks)
 - b. List and explain the Syntax of all Flow control statements with example. (08 Marks)
 - c. Write a Python program to calculate the area of circle, rectangular and triangle. Print the results. (06 Marks)

OR

2.
 - a. What is a Function? How to define a function in Python? Explain with suitable example. (06 Marks)
 - b. Explain Local and Global scope of variable in Python with example. (08 Marks)
 - c. What is Exception Handling? How Exceptions are handed in Python? Write a Python program with exception handling code to solve divide – by – zero error situation. (06 Marks)

Module-2

3.
 - a. What is Lists? Explain the concept of list slicing with example. (06 Marks)
 - b. What is Dictionary? How it is different from List? Write a program to count the number of occurrences of character in a string. (07 Marks)
 - c. Write a Python program that accepts a sentence and find the number of words, digits, uppercase letters and lower case letters. (07 Marks)

OR

4.
 - a. List out all the useful string methods which supports in Python. Explain with an example for each method. (10 Marks)
 - b. What is the difference between copy.copy () and copy.deepcopy () Function applicable to a list or Dictionary in Python? Give suitable examples for each. (06 Marks)
 - c. Write a Python to Swap cases of a given string
 Input : Java
 Output : jAVA. (04 Marks)

Module-3

5.
 - a. What are Regular Expressions? What are the different steps to be follow to use a Regular Expression in Python. (06 Marks)
 - b. Describe the following with suitable Python code Snippet :
 i) Greedy and Non Greedy Pattern Matching.
 ii) findall () method of Regex object. (07 Marks)
 - c. Write a Python program to extract Phone numbers and Email addresses using Regular Expressions. (07 Marks)

OR

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.

- 6 a. How do we specify and handle Absolute Relative Path? (08 Marks)
b. Explain the File Reading / Writing process with suitable Python program. (06 Marks)
c. Write a Python program to create a folder PYTHON and under the hierarchy 3 files file1 , file2 and file3. Write the content in file1 as "VTU" and in file2 as "UNIVERSITY" and file3 content should be opening and merge of file1 and file2. Check out the necessary condition before write file3. (06 Marks)

Module-4

- 7 a. What is Class? How do we define a class in Python? How to instantiate the class and how class members are accessed? (08 Marks)
b. Write a Python program that uses datetime module within a class, takes a birthday as input and print users age and the Number of days , hours , minutes and seconds until their next birthday. (07 Marks)
c. Illustrate the concept of modifier with Python code. (05 Marks)

OR

- 8 a. Explain init and str method with an example Python program. (08 Marks)
b. What are Polymorphic functions? Explain with code Snippet. (06 Marks)
c. Illustrate the concept of Inheritance with example. (06 Marks)

Module-5

- 9 a. How do we download a file and save it to hard drive using request module? (06 Marks)
b. Write short notes on :
Creating , Copying and Rotating pages with respect to pdf. (06 Marks)
c. Explain Selenium's Web Drive method for Finding elements. (08 Marks)

OR

- 10 a. Write a program that takes a Number N from command line and creates an $N \times N$ Multiplication table in Excel Spread Sheet. (10 Marks)
b. What is CSV and JSON Files? Explain with an example, Program the usage of Json Module in Python. (10 Marks)

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CBCS SCHEME

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18CS56

Fifth Semester B.E. Degree Examination, July/August 2022 Unix Programming

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain Unix architecture with neat diagram. (09 Marks)
b. Explain the salient features of Unix operating system. (07 Marks)
c. Explain the following commands : (i) date (ii) echo (04 Marks)

OR

- 2 a. Explain three categories of files in unix. (06 Marks)
b. What are internal and external commands in unix? Explain them with example. (06 Marks)
c. Explain the following commands with syntax and example,
(i) cat (ii) mv (iii) wc (iv) mkdir (08 Marks)

Module-2

- 3 a. Discuss the significance of the seven fields of `ls - l` command. (09 Marks)
b. Explain three standard file and redirection in unix. (06 Marks)
c. Explain grep command with example. (05 Marks)

OR

- 4 a. What are file permission? Illustrate the different ways of setting the file permission. (10 Marks)
b. Explain shell interpreter cycle with flowchart. (05 Marks)
c. Explain for and while control statements in shell script with example. (05 Marks)

Module-3

- 5 a. Explain the following API's with prototype (i) open (ii) fcntl (10 Marks)
b. Explain the fork and v-fork system call. How fork system call differs from v-fork? (10 Marks)

OR

- 6 a. With neat sketch, explain memory layout of C program. (10 Marks)
b. Explain the `setjmp()` and `longjmp()` functions with an example C/C++ program. (10 Marks)

Module-4

- 7 a. What are pipes? Explain different ways to view a half-duplex pipe. Write a C/C++ program to send data from parent process to child process using pipes. (10 Marks)
b. What is FIFO? With a neat diagram, explain the client-server communication using FIFO. (10 Marks)

OR

- 8 a. Write a note on: (i) Process Accounting (ii) Process Time (10 Marks)
b. Explain briefly with example : (i) Message Queue (ii) Semaphore (10 Marks)

Module-5

- 9 a. What are daemon process? Mention and explain coding rules of daemon process. (10 Marks)
b. Explain `kill()` API and `alarm()` API. (10 Marks)

OR

- 10 a. Define signal. Explain Sigaction API with demonstrating program. (10 Marks)
b. What is error logging? With a neat block diagram, discuss the error login facility in BSD. (10 Marks)

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CBCS SCHEME

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Question Paper Version : A

Fifth Semester B.E. Degree Examination, July/August 2022 Environmental Studies

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the hundred questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

-
1. The word Tsunami is derived from Two Japanese word
 a) TSU (Big) and Nami (flow) b) TSU(harbor) and Name(wave)
 c) TSU (Big wave)and Nami (wave) d) None of the above.
 2. Green house gasses are
 a) Chloro fluro carbon b) Oxygen
 c) Chlorine d) Chloro Benzene.
 3. Taj Mahal at Agra may be damaged by
 a) Sulphur Dioxide b) Chlorine c) Earth quake d) All of these.
 4. Ozone day is observed on
 a) January 30 b) April 21 c) September 16 d) December 25.
 5. ELISA Test is used to detect
 a) Malaria b) AIDS c) Cholera d) Tuberculosis.
 6. Earth day is observed on
 a) 1st December b) 5th June c) April 22nd d) 1st January.

7. Lead Poisoning may cause
 a) Reduction in hemoglobin
 c) Mental retardation
 b) Kidney damage
 d) All of these.
8. Noise pollution limits at residential areas at Night is
 a) 45dB
 b) 80 dB
 c) 55dB
 d) 90dB.
9. Major purpose of most of the dams around the world is
 a) Power generation
 c) Flood control
 b) Drinking water supply
 d) Irrigation.
10. Herpetology is a branch of science which deals with
 a) Reptiles only
 c) Mammals
 b) Amphibians and Reptiles
 d) Fishes.
11. Water logging is a phenomenon in which
 a) Crop patterns are rotated
 b) Soil root zone becomes saturated due to over irrigation
 c) Erosion of soil occurs
 d) All of the above.
12. Coral reefs in India can be seen in
 a) Goa
 c) Andaman and Nicobar Islands
 b) Himalayan region
 d) Uttar Pradesh.
13. In which year salient valley was declared as National park
 a) 1984
 b) 1987
 c) 1983
 d) 1989.
14. SMOG is a mixture of
 a) Snow and fog
 c) Sulpher dioxide and fog
 b) Smoke and fog
 d) Snow and dust
15. Effect of modern Agriculture on soil is due to
 a) Erosion
 b) Acidification
 c) Salinization
 d) All of the above.
16. What percentage of its geographical area of a country should be under forest cover?
 a) 23%
 b) 43%
 c) 13%
 d) 33%.
17. About _____ % of the earth surface is covered by water
 a) 53%
 b) 19%
 c) 71%
 d) 90%.
18. Forest prevent soil erosion by binding soil particles in their
 a) Stems
 b) Roots
 c) Leaves
 d) Buds.
19. Blue baby syndrome (methane moglabinemia) is caused by contamination of water due to
 a) Phosphates
 b) Sulpher
 c) Arsenic
 d) Nitrates.

20. India has the largest share of which of the following
 a) Manganese b) Mica c) Copper d) Diamond.
21. What is the minimum Allowable concentration of fluorides in drinking water
 a) 1.0 mg/L b) 1.25 mg/L c) 1.50 mg/L d) 1.75 mg/L.
22. Nitrogen fixing Bacteria exists in – of plants
 a) Leaf b) Roots c) Stem d) Flower.
23. ___ are referred to as Earth's lungs
 a) Forests b) Carbon cycle c) Water sources d) Mines.
24. GIS means
 a) Geographic information source
 b) Spatial information system
 c) Geological information system
 d) Geographical information system.
25. Cholera and Typhoid are caused by
 a) Worms b) Virus c) Bacteria d) Fungus.
26. Remote sensing includes gathering of
 a) Images b) Changes c) Movements d) Sounds.
27. First satellites launched by India was and when
 a) Aryabhata - 1975 b) Apple - 1981 c) Bhaskara - 1981 d) Kalpana – 1983.
28. Biomedical waste may be disposed off by
 a) Incineration b) Autoclaving and land filling
 c) Both a) and b) d) None of the above.
29. Which atmospheric layer is closest to the earth surface
 a) Mesosphere b) Troposphere c) Stratosphere d) Thermosphere.
30. Sulabha Bio-gas plants are based on the use of
 a) Human excreta b) Cattle dung c) Agricultural wastes d) All of these.
31. National law day is celebrated on
 a) 1st April b) 26th January c) 26th November d) 1st June.
32. Geology is the study of
 a) Animals b) Mammals c) Science of earth d) Space.
33. Housing has become inaccessible to the poor due to
 a) Increased population b) Non-availability of food
 c) High cost d) None of above.

34. Major source of fluoride available in
 a) River water b) Ground water c) Food product d) Both a) and c).
35. World AIDS Day is celebrated on
 a) 15th Aug b) 1st Sept c) 1st Jan d) 1st December.
36. A food web consists of
 a) Portion of food chain b) Producers, Consumers and Decomposers
 c) Inter locking of food chains d) A set of similar consumers.
37. Eutricification is
 a) An improved water quality status of lakes
 b) The Result of Accumulation of plant nutrients in water bodies
 c) A process in carbon cycle
 d) A water purification techniques.
38. EIA can be expanded as
 a) Environmental and Industrial Activities
 b) Environment impact activities
 c) Environment impact assessment
 d) Environmental internal activities.
39. Identify the non renewable source of energy from the following :
 a) Coal b) Tidal power c) Wind power d) Wave power.
40. An Alternative eco-friendly fuel for Automobiles is
 a) Petrol b) Diesel c) CNG d) Kerosene.
41. Chernobyl nuclear disaster occurred in the year
 a) 1984 b) 1952 c) 1986 d) 1987.
42. Minamata disease is caused by
 a) Lead b) Mercury c) Cadmium d) Arsenic.
43. Bhopal gas Tragedy occur due to leakage of
 a) Methyl/iso cyanate b) Sulphur dioxide c) Mustard gas d) Methane gas.
44. Nuclear fusion reaction occurs in the
 a) Sun b) Stars c) Hydrogen bomb d) All of these.
45. Definition of noise is
 a) Loud sound b) Unwanted sound
 c) Constant sound d) Sound of high frequency.
46. Demography is the study of
 a) Animal behavior b) Geography c) Rivers d) Population growth.

47. Acid Rain is caused by increase in the atmospheric concentration of
 a) Ozone and dust b) SO_2 and NO_2 c) SO_3 and CO d) CO_2 and CO.
48. Global warming could affect
 a) Climate b) increase in sea level
 c) Melting of glaciers d) All of these.
49. The Wild Life Protection Act in India was passed in
 a) 1978 b) 1972 c) 1986 d) 1992.
50. Environment Protection Act was enacted in year.
 a) 1986 b) 1974 c) 1992 d) 1984.
51. Environment protection is the fundamental duties of the citizen of India under the article
 a) 48 - A b) 47 - A c) 51 - A d) 21 - B.
52. The Forest Conservation Act was enacted in the year
 a) 1986 b) 1974 c) 1980 d) 1972.
53. The major contributors of the acid rain are known as
 a) Pre cursors b) Processors c) Protons d) Pollutants.
54. Typical Acid Rain pH is
 a) 4.0 b) 5.5 c) 6.0 d) 4.0 - 6.0.
55. Pesticide causes
 a) Eye irritation b) Skin irritation
 c) Respiratory ailments d) All of Above.
56. Percentage of fresh water available below the earth is
 a) 2.8% b) 2.2% c) 9.8% d) 2.15%.
57. The Quantity of solar energy received by the earth
 a) 71% b) 99% c) 45% d) 15%.
58. Which pyramid is always upright
 a) Energy b) Biomass c) Number d) Food chain.
59. The leader of Chipko movement is
 a) Sunderlal Bahuguna b) Medha Patkar
 c) Vandana Shiva d) Suresh Heblkar.
60. Padma Shri was received by immense contribution toward conservation of Trees Recently
 a) Saalumarada Thimakka b) Tulsi Gowda
 c) Vandana d) Ramnath.
61. The first international earth summit was held in
 a) New Delhi b) Kyoto c) Stockholm d) Rio de Janeiro.

62. Ozone layer thickness is measured in
 a) PPM b) PPb c) Decibels d) Dobson unit.
63. Who first discovered ozone hole
 a) Shanklin b) Charles Fabry c) Henri Baisson d) John Macculay.
64. Noise is measured in
 a) Decibels b) Jouls c) PPM d) NTU.
65. Terrace farming is practiced in
 a) Coastal areas b) Deserts c) plains d) Hills.
66. _____ was awarded Padma Shri for constructing primary school at his village by his earnings
 a) Harekala Hajabba b) Tulsi gowda c) Chalus Fabry d) None of above.
67. Geothermal energy is a
 a) Heat energy b) Current energy c) Wind energy d) Solar energy.
68. Cauvery water dispute is between
 a) Karnataka and Maharastra b) Karnataka and Kerala
 c) Karnataka and Tamil Nadu d) Uttar Pradesh and Madya Pradesh.
69. The word ecology is produced by
 a) Ernst Haeckel b) Helena Curtis
 c) Charels south wick d) Charles Alton.
70. Mining means
 a) To conserve and preserve minerals b) To extract minerals and ores
 c) To check pollution due to mineral resources d) None.
71. Fossil fuels are converted into energy by
 a) Burning b) Cooling c) Sublimation d) Melting.
72. Physical pollution of water due to
 a) Dissolved oxygen b) P^{II} c) Turbidity d) None of above.
73. Molasses from sugar industry is used to generate
 a) Biodiesel b) Hydrogen c) Bio-ethanol d) Bio-methanol.
74. The most important fuel used by Nuclear power plant is
 a) U - 235 b) U - 238 c) U - 245 d) U - 248.
75. Liquid waste generated from Bath rooms and kitchens are called
 a) Domestic sewage b) Runoff c) Salvage d) All of above.

76. Water day is celebrated on this day
 a) 22nd March b) 25th April c) 15th June d) 5th June.
77. Loss of water content through the plants into the atmosphere is called
 a) Evaporation b) Vaporization c) Hydraulic cycle d) Transpiration.
78. The hydrological cycle is related to
 a) Water and electricity b) Water characterization
 c) Hydro power d) Water cycle and Balance.
79. The World Environment Day is celebrated on
 a) June 5th b) November 5th c) April 5th d) December 26th.
80. Nuclear power plant in Karnataka is located at
 a) Bhadravathi b) Sandur c) Raichur d) Kaiga.
81. Cell phones emits _____ type of Radiation
 a) Radio frequency Radiation b) UV radiation
 c) X ray radiation d) None of Above.
82. Water bearing rock readily Transmitts water to well and springs
 a) Aquifer b) Porosity c) Permeability d) None of Above.
83. Karnataka State Pollution Control Board (KSPCB) was established in the year.
 a) 1947 b) 1982 c) 1986 d) 1974.
84. In the world's population, India Accounts for
 a) 10% b) 5% c) 17.7% d) 16%.
85. Which of the following is not a biodegradable pollutant
 a) Plastic b) Skins of vegetable and Fruits
 c) Dry leaves d) Paper.
86. Sundarbans is the name of place in
 a) Assam b) West Bengal c) Karnataka d) None of these.
87. Western ghats are locate in
 a) North East India b) Maharashtra c) Peninsular India d) Gujarat.
88. DDT is a
 a) Fungicide b) Pesticide c) Fertilizer d) Disinfectant.
89. Kala Azar is spread by
 a) Sand files b) Mosquitoes c) Rats d) Tapeworms.

90. SARA refer to
 a) Severe acute respiratory syndrome
 b) Self acute respiratory system
 c) Severe acute respiratory system
 d) Self accurate rest syndrome
91. Landslides are caused by
 a) Earth quakes b) Dam buildings c) Mining d) All of these.
92. The virus that causes AIDS is
 a) HIV b) TMV c) H1N1 d) None of these.
93. Rearing fish is called
 a) Sericulture b) Fish culture c) Pisciculture d) Horticulture.
94. Percentage methane content of Biogas is
 a) 50 to 70% b) 85% c) 5% d) 95%
95. Environment means
 a) A beautiful landscape
 c) Air and water
 b) Industrial production
 d) Sum of total all condition.
96. Taungya system is
 a) Agro forestry b) Mining c) Exhaustible d) None of these.
97. Lithosphere means
 a) Air b) Water c) Micro-organisms d) Rock and Soils.
98. Which among the following is a climate factor
 a) Pressure b) Humidity c) Temperature d) All of these.
99. The forest is
 a) Abiotic b) Biotic c) Both A and B d) None of these.
100. Store hours of minerals is
 a) Soil b) Water c) Forest d) All of these.

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Sixth Semester B.E. Degree Examination, July/August 2022
System Software and Compilers

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain in detail SIC/XE Machine Architecture. (10 Marks)
- b. List the various machine independent assembler features. Explain the control sections how the assembler convert them into object code. (10 Marks)

OR

- 2 a. Write an algorithm for One Pass Assembler and give sample object program from One Pass Assembler. (10 Marks)
- b. What are the basic functions of loader? Explain two ways of program relocation in loaders. (10 Marks)

Module-2

- 3 a. Explain various phases of Compiler. Show the translations for an Assignment statement.
Position = Initial + rate * 60.
Clearly indicate the output of each phase. (12 Marks)
- b. What are the applications of Compiler? Explain. (08 Marks)

OR

- 4 a. Write a brief note on Language Processing System. (06 Marks)
- b. Explain the concept of input buffering in the Lexical analysis with its implementation. (10 Marks)
- c. Define Token, Lexeme and Pattern with example. (04 Marks)

Module-3

- 5 a. Define Context Free Grammar. Obtain CFG to generate strings of a's and b's having substring "ab". (10 Marks)
- b. Consider grammar given below from which any arithmetic expressions can be obtained.
 $E \rightarrow E + E$ $E \rightarrow E - E$ $E \rightarrow E * E$ $E \rightarrow E | E$ $E \rightarrow id$
Show that the grammar is ambiguous for the sentence $id + id * id$. (10 Marks)

OR

- 6 a. Write an algorithm to eliminate left recursion from a grammar. Eliminate left recursion from the given grammar. $S \rightarrow Aa | b$ $A \rightarrow Ac | Sd | \epsilon$. (10 Marks)
- b. Define Shift - Reduce Parser and Handle. What are conflicts in shift - reduce parse, explain with example. (06 Marks)
- c. List and explain different actions of shift - reducer parser (04 Marks)

Module-4

- 7 a. Explain the three basic section of LEX program with example. (10 Marks)
- b. Write LEX program to count word, character and line count in a given file. (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. What is YACC? Explain the different sections used in writing the YACC specification. Explain with example program. (10 Marks)
- b. Define Regular Expression. What is the use of following Meta characters :
 i) \cdot ii) $*$ iii) \wedge iv) $\$$ v) $\{ \}$ vi) $?$ (07 Marks)
- c. Discuss how Lexes and Parser communicate. (03 Marks)

Module-5

- 9 a. Define S – Attribute and I – Attribute with respect to SDD and construct Syntax tree, Parse tree and annotated tree for string $5 * 6 + 7$ by using given grammar.
- | | |
|-----------------------------------|--------------------------------------|
| $S \rightarrow E n$ | $T \rightarrow T F$ |
| $E \rightarrow E + T E - T T$ | $T \rightarrow F$ |
| $T \rightarrow T * F$ | $F \rightarrow (E) \text{digit} $ |
| | $n \rightarrow ;$ (10 Marks) |
- b. What are the different three address code instructions? Translate the arithmetic expression $a + b - (-c)$ into quadruples , triplets and indirect triples. (10 Marks)

OR

- 10 a. Define SDD. Give SDD for simple type declaration. Construct a dependency graph for the declaration `int a, b ;` (10 Marks)
- b. Explain the issues in design of code generation. (10 Marks)

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18CS62

Sixth Semester B.E. Degree Examination, July/August 2022 Computer Graphics and Visualization

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain Refresh Cathode ray tube with neat diagram. (10 Marks)
b. What is Computer Graphics? Explain the application of Computer Graphics. (10 Marks)

OR

- 2 a. With a neat diagram, explain the architecture of a raster display system with integrated display processor. (10 Marks)
b. Explain Bresenham's Line drawing algorithm, with an example. (10 Marks)

Module-2

- 3 a. What is the need of Homogeneous Coordinate System? Explain Translation, Rotation and Scaling in 2D Homogeneous Coordinate System, with matrix representation. (10 Marks)
b. Explain with example any two algorithms used to identify interior and exterior area of a polygon. (05 Marks)
c. Explain two dimensional viewing transformation pipe line. (05 Marks)

OR

- 4 a. Explain Scan Line polygon fill algorithm. (10 Marks)
b. Explain different OpenGL routines used for manipulating display window. (05 Marks)
c. Explain OpenGL 2D – viewing function. (05 Marks)

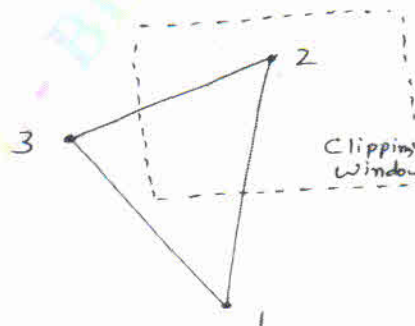
Module-3

- 5 a. What is Clipping? Explain Cohen – Sutherland Line Clipping algorithm, with suitable example. (10 Marks)
b. Explain Basic Illumination Model and explain Phong's Lighting model. (10 Marks)

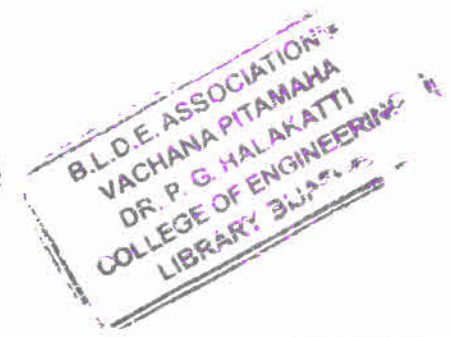
OR

- 6 a. Explain Sutherland – Hodgman Polygon Clipping algorithm. Find the final clipping polygon for the following Fig. Q6(a). (10 Marks)

Fig. Q6(a)



- b. Write an OpenGL program to rotate a cube in all directions. (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.

Module-4

- 7 a. Explain with example, Depth buffer algorithm used for visible surface detection. Discuss the advantages and disadvantages. (10 Marks)
- b. Explain 3D viewing pipeline with neat diagram and transformation from World to viewing coordinates. (10 Marks)

OR

- 8 a. Explain Orthogonal Projection in details. (10 Marks)
- b. Explain Perspective Projection with reference point and vanishing point with neat diagram. (05 Marks)
- c. Explain Symmetric Perspective – Projection Frustum. (05 Marks)

Module-5

- 9 a. What are the different Logical input devices and explain with an example. (10 Marks)
- b. Discuss the various input modes with diagram. (05 Marks)
- c. Explain the creation of display list with an example. (05 Marks)

OR

- 10 a. List the properties of Bezier curve and also explain Beizer techniques of generating curves. (10 Marks)
- b. Describe the various features that a good interactive program should incorporate. (05 Marks)
- c. Explain how menus in OpenGL are created. (05 Marks)

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18CS63

Sixth Semester B.E. Degree Examination, July/August 2022 Web Technology and its Applications

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- What is HTML? Explain the structure of HTML document with an example. (08 Marks)
 - What are contextual selectors? Identify and explain 4 different contextual selectors. (08 Marks)
 - Write the syntax of below mentioned HTML elements and briefly explain with examples.:
(i) `<a>` (ii) `` (04 Marks)

OR

- Illustrate the CSS box model. Be sure to label and briefly explain each component of the box. (08 Marks)
 - List the HTML5 semantic elements and explain any three with suitable examples. (08 Marks)
 - Describe the embedded style sheet with example. (04 Marks)

Module-2

- Write HTML code for the following table with appropriate styling:

Year : 2021							
Month	Days		Dates				
	Name	Id					
March	Mon	1	1	8	15	22	29
	Tue	2	2	9	16	23	30
	Wed	3	3	10	17	24	31
	Thu	4	4	11	18	25	
	Fri	5	5	12	19	26	
	Sat	6	6	13	20	27	
	Sun	7	7	14	21	28	

- What is responsive design? Explain in brief the four key components that make a responsive design work. (08 Marks)
 - Illustrate and briefly explain the use of number and range HTML5 controls. (04 Marks)

OR

- Illustrate the construction of multi column layouts with example. (08 Marks)
 - Explain the different types of buttons defined in HTML. (08 Marks)
 - How the block level and inline elements are displayed in the normal flow? (04 Marks)

Module-3

- Write Javascript code that uses function for the following problems:
(i) For the string input the output should be to display the position of left most vowel.
(ii) For the numeric input output should be to display the reverse of a number. (08 Marks)
 - Explain the two approaches to embed PHP script in HTML with suitable and compare the two approaches. (08 Marks)
 - What is DOM? Briefly explain the different types of nodes. (04 Marks)

OR

- 6 a. Explain the PHP module in Apache and describe the difference between multi-threaded and multi-process setup. (08 Marks)
- b. Discuss the different ways the javascript can be included in HTML page and which is the most preferred way and why? (08 Marks)
- c. List the Web Server's responsibilities. (04 Marks)

Module-4

- 7 a. What are super globals? List the different super globals and briefly explain any two. (08 Marks)
- b. Explain the support of object oriented design in PHP. (08 Marks)
- c. Write a PHP code that checks for valid MIME types and file extensions. (04 Marks)

OR

- 8 a. Write a PHP program to create a class called "Artist" with suitable constructor. All it's data members are accessible only inside the class.
Data members : first name, last name, birth city, birth date
Data functions : getters and setters
Using above class instantiate two objects and displays the artist details. (08 Marks)
- b. Explain the two techniques provided in PHP for reading/writing files and also list comparative advantages and disadvantages. (08 Marks)
- c. What is a visibility of a class member? Briefly explain the different levels of visibility. (04 Marks)

Module-5

- 9 a. What is session state? How does session state works with suitable example. (08 Marks)
- b. Demonstrate the manipulation of attributes, properties and styles of the element using jQuery with suitable examples. (08 Marks)
- c. What is JASON? Explain with the code example, how to convert string to JASON and vice versa. (04 Marks)

OR

- 10 a. What is AJAX? Using an UML diagram, explain how the asynchronous request is handled. (08 Marks)
- b. Explain the loading and processing of an XML document in javascript with suitable example. (08 Marks)
- c. Using functions, emulate a class with data members and member functions in javascript. (04 Marks)

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Sixth Semester B.E. Degree Examination, July/August 2022 Introduction to Data Structures and Algorithms

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 basic structure of a C program with example. (10 Marks)
- b. What are basic data types available in C? Write the significance of each data. (06 Marks)
- c. Write a C program that computes the size of int, float, double and char. (04 Marks)

OR

- 2 a. What are Arrays? Explain the declaration and initialization of one dimensional and two dimensional array with an example. (10 Marks)
- b. What are structures? Explain the C syntax of structure declaration with example. (06 Marks)
- c. What is a pointer? Explain how the pointer variable declared and initialized. (04 Marks)

Module-2

- 3 a. What is an algorithm? Write its criteria and characteristics. (10 Marks)
- b. What are the various basic asymptotic efficiency classes? Explain Big O, Ω omega and θ theta notation. (10 Marks)

OR

- 4 a. Write a non-recursive algorithm to find maximum of element in a set of values. (05 Marks)
- b. What are the general plans for analyzing the time efficiency of non recursive algorithm? (05 Marks)
- c. Explain the different types of data structure with example. (10 Marks)

Module-3

- 5 a. What is a Linked List? Explain the different types of Linked List with neat diagram. (07 Marks)
- b. What is a doubly linked list? Write a C program to perform the following operations on doubly linked list: (i) Insert node at beginning (ii) Delete node at beginning (08 Marks)
- c. Write a C function to count number of element present in a singly linked list. (05 Marks)

OR

- 6 a. Define a stack. List the operation on stack and write a C implementation of those functions. (10 Marks)
- b. List out the application of stack and convert the following in fix expression :
 $A + B * C - D / E * H$ into its equivalent postfix. (05 Marks)
- c. What is the output of given post fix expression $6523 + 8 * + 3 + *$ (05 Marks)

Module-4

- 7 a. What is a queue? Explain primitive operation on queue. (05 Marks)
- b. Write a C function to insert, delete and display an element in a linear queue. (10 Marks)
- c. What is double ended queue? Explain the operation that can be performed on queue. (05 Marks)

OR

- 8 a. What is binary tree? Explain the following with suitable diagram:
 (i) Strictly binary tree
 (ii) Complete binary tree
 (iii) Almost complete binary tree (10 Marks)
- b. Write the algorithm for pre-order, post order and in order, find the three order traversals of the following binary tree. [Refer Fig.Q8(b)]

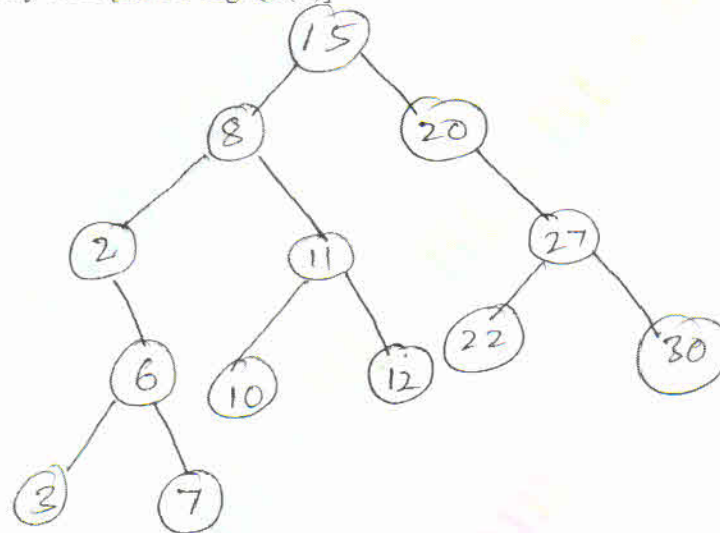


Fig.Q8(b)

(10 Marks)

Module-5

- 9 a. Design a bubble sort algorithm with suitable example and find its time complexity. (10 Marks)
 b. Design a selection sort algorithm with suitable example, and find its time complexity. (10 Marks)

OR

- 10 a. Design a binary search algorithm with suitable example and find its best case worst case time complexity. (10 Marks)
 b. What is hashing? Explain any one hash collision resolution technique. (05 Marks)
 c. Write a short note on Graph Representation. (05 Marks)

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Sixth Semester B.E. Degree Examination, July/August 2022 Data Mining and Data Warehousing

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 a Three – Tier Data Warehouse. (10 Marks)
 b. List and explain Data Warehouse Models. (10 Marks)

OR

- 2 a. With suitable example, explain Star schema , Snow Flake schema , Fact Constellation schema for Multidimensional database. (10 Marks)
 b. Explain OLAP Operations with example. (10 Marks)

Module-2

- 3 a. Explain OLAP Data indexing for Bitmap Index and Join index. (10 Marks)
 b. Differentiate ROLAP , MOLAP and HOLAP Servers. (10 Marks)

OR

- 4 a. Explain Data – preprocessing steps and the challenges faced in Data Mining. (10 Marks)
 b. Briefly explain Similarity and Dissimilarity between the objects. Find the SMC and Jacquard coefficient of Two binary vectors.
 $X = (1, 0, 0, 0, 0, 0, 0, 0, 0, 0)$ $Y = (0, 0, 0, 0, 0, 0, 0, 0, 0, 1)$. (10 Marks)

Module-3

- 5 a. Explain the rule generation in Apriori Algorithm with example. (10 Marks)
 b. Explain the Alternative method for generating frequent itemset. (10 Marks)

OR

- 6 a. Briefly explain FP growth algorithm. (10 Marks)
 b. Explain the objective measure of Interestingness for evaluating association patterns. (10 Marks)

Module-4

- 7 a. With a neat block diagram, explain general approach to solve classification problems with application. (10 Marks)
 b. Explain with example, how to build decision tree using Hunt's algorithm. (10 Marks)

OR

- 8 a. Explain different method for comparing classifier. (10 Marks)
 b. Explain the rule based classifier with example. (10 Marks)

Module-5

- 9 a. Describe K – means clustering algorithm. What are its limitations? (10 Marks)
 b. With example, explain Agglomerative Hierarchical clustering with example. (10 Marks)

OR

- 10 a. With Time and Space complexity, explain DBSCAN Clustering Algorithm. (10 Marks)
 b. Explain the BRICH Scalable Algorithm. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Sixth Semester B.E. Degree Examination, July/August 2022 Advanced JAVA and J2EE

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. What are enumerations? Explain values() and valueOf() methods with example program. (08 Marks)
- b. What is autoboxing? Write a Java program that demonstrates autoboxing/unboxing occurs inside expressions. (06 Marks)
- c. What are annotations? Explain the following built-in annotations: (06 Marks)
(i) override (ii) inherited (iii) retention

OR

- 2 a. Explain the various type wrappers used in Java. (08 Marks)
- b. Explain the following methods of Java.lang.Enum with example: (08 Marks)
(i) ordinal (ii) compareTo (iii) equals()
- c. Demonstrate marker annotations with example. (04 Marks)

Module-2

- 3 a. What is collection framework? Explain the methods define by the collection interface. (07 Marks)
- b. Demonstrate ArrayList class collection with an example. (06 Marks)
- c. Explain any four legacy collection of framework. (07 Marks)

OR

- 4 a. Explain the following map classes: (i) HashMap (ii) TreeMap (08 Marks)
- b. Explain ArrayList class and explain the following methods: (08 Marks)
(i) binarySearch (ii) copy (iii) equals (iv) fill
- c. Explain Queue interface. List different methods defined in Queue. (04 Marks)

Module-3

- 5 a. What is string in Java? Write a Java program that demonstrates any four constructors of String class. (08 Marks)
- b. Explain the following StringBuffer methods with an example: (08 Marks)
(i) insert (ii) append (iii) replace (iv) substring
- c. Differentiate between equals() and == with respect to string comparison. (04 Marks)

OR

- 6 a. Explain the following StringBuffer class with examples: (08 Marks)
(i) capacity() (ii) reverse() (iii) charAt() (iv) deleteCharAt()
- b. Write a program to remove duplicate characters from a given string and display the resultant string. (08 Marks)
- c. How compareTo() method differs from compareToIgnoreCase () method? (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. Explain the life cycle of Servlet. (06 Marks)
b. Explain the difference between servlets and CGI programs. (06 Marks)
c. Describe the core interfaces that are provided in Javax.Servlet.http package. (08 Marks)

OR

- 8 a. What is JSP? Explain the various types of JSP tags with examples. (10 Marks)
b. What are cookies? How cookies are handled in JSP? Write a JSP program to create and read a cookie. (10 Marks)

Module-5

- 9 a. What are database drivers? Explain the different JDBC driver types. (06 Marks)
b. Describe the various steps of JDBC with code snippets. (10 Marks)
c. Write any two syntax of established a connection to a database. (04 Marks)

OR

- 10 a. What is connection pooling? Explain connection pooling with neat diagrams with code snippets. (10 Marks)
b. Describe the following concepts:
(i) Scrollable result set
(ii) Callable statement
(iii) Transaction processing
(iv) Updatable result set (10 Marks)

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17CS71

Seventh Semester B.E. Degree Examination, July/August 2022
Web Technology and Its Applications

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 structure of HTML document with an example. (08 Marks)
 b. Explain the following elements with example : (08 Marks)
 (i) <a> (ii) (iii) <P> (iv) <h2>.
 c. Write a HTML document to make an ordered list of your five favorite books. (04 Marks)

OR

- 2 a. Define CSS. Explain its benefits. (03 Marks)
 b. List and explain different selectors of CSS. (08 Marks)
 c. Explain the 3 different location of CSS styles with suitable examples. (09 Marks)

Module-2

- 3 a. Write a HTML document to display the following table:

Column 1	Column 2	Column 3
Row 1 Cell 1	Row 1 Cell 2	Row 1 Cell 3
	Row 2 Cell 2	Row 2 Cell 3
Row 3 Cell 1		

- b. Explain different form widgets created with <input> tag. (07 Marks)
 c. Explain how forms work with a neat diagram. (08 Marks)
 (05 Marks)

OR

- 4 a. Explain how to construct multicolumn layouts using both positioning and floats. (10 Marks)
 b. Explain how to use absolute and relative positioning as a layout techniques in CSS with suitable examples. (10 Marks)

Module-3

- 5 a. Describe the 3 different ways of linking an HTML page to Javascript with examples for each. (04 Marks)
 b. Explain String and Date objects of Javascript with built-in functions. (08 Marks)
 c. Explain keyboard and mouse events supported by Javascript with examples. (08 Marks)

OR

- 6 a. Write a PHP program to greet the user based on time. (08 Marks)
 b. With a neat diagram, explain client and server side script execution. (08 Marks)
 c. Write a PHP program to keep track of number of visitors visiting the web page and to display this count of visitors with proper headings. (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.

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Module-4

- 7 a. Explain the following concept of object orientation in PHP with an example:
(i) Data encapsulation
(ii) Inheritance. (08 Marks)
- b. List and define superglobal arrays. Design a PHP program to display the following information:
(i) IP address of requestor.
(ii) Operating system and browser that client is using.
(iii) Server software. (04 Marks)
- c. Explain the different error handling methods of PHP, with suitable examples. (08 Marks)

OR

- 8 a. Explain how the data will flow from HTML form to PHP and \$_GET and \$_POST array? Illustrate with example and diagram. (07 Marks)
- b. Explain the different approaches to restrict the file size in the file upload with suitable code snippets. (06 Marks)
- c. Write a PHP program to create a class Person with the following specifications:
Data members – Name, Age, Weight, Height
Member functions – Readdata () and Writedata () (07 Marks)

Module-5

- 9 a. Design and explain how to read and write a cookie with an example. (10 Marks)
- b. Define session state. Explain how session state works with a neat sketch. (10 Marks)

OR

- 10 a. Sketch and explain UML sequence diagram for AJAX request. (10 Marks)
- b. Describe how XML is processed in PHP and Javascript. (10 Marks)

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17CS72

Seventh Semester B.E. Degree Examination, July/August 2022 Advanced Computer Architecture

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain different shared memory multiprocessor models. (08 Marks)
- b. Explain PRAM model. (06 Marks)
- c. What are different static interconnection networks? Explain any two networks. (06 Marks)

OR

- 2 a. Explain the Bernstein's conditions for parallelism. For the program statements given draw the dependence graph.
S1: $A = B + D$, S2: $C = A \times 3$, S3: $A = A + C$, S4: $E = A/2$. (10 Marks)
- b. Explain Amdahl's law. In a multi-processor system with 9 processors, the portion for parallel programming is 75% then calculate overall speedup. If number of processors is doubled and with same program conditions what is the new speed up. Use Amdahl's law to calculate the speed-up. (10 Marks)

Module-2

- 3 a. Explain with diagram general CISC and RISC architectures. (10 Marks)
- b. Explain VLIW architecture with its instruction pipelining. (10 Marks)

OR

- 4 a. Explain different virtual memory models. (10 Marks)
- b. What are different page-replacement policies? A certain program generates following page trace.
Page trace: 0 1 2 4 2 3 7 2 1 3 1
These pages are to be mapped on to three page frames (PFs). Use LRU algorithm and show the pages residing in the page frames. Calculate the hit ratio. (10 Marks)

Module-3

- 5 a. With a diagram, explain backplane bus system. (10 Marks)
- b. Explain sequential and weak consistency memory models. (10 Marks)

OR

- 6 a. Explain with diagram the asynchronous and synchronous models of linear pipeline processors. (08 Marks)
- b. Explain arithmetic pipeline stages with an adder unit. (06 Marks)
- c. What are different branch prediction methods? Explain briefly. (06 Marks)

Module-4

- 7 a. Explain cross bar network and cross-point switch design in a multiprocessor system. (06 Marks)
b. What is cache coherence problem in data sharing? Explain different causes for that. (08 Marks)
c. What are different vector access memory schemes? Explain any one. (06 Marks)

OR

- 8 a. What are the different latency hiding techniques? Explain two of them. (10 Marks)
b. Explain static, dynamic and pure dataflow machines. (10 Marks)

Module-5

- 9 a. What are different programming models? Explain message-passing model. (08 Marks)
b. Explain the compilation phases in parallel computing environment with a diagram. (06 Marks)
c. Explain testing algorithm with dependence test. (06 Marks)

OR

- 10 a. What are the different synchronization schemes in multiprocessor system? Explain any two of them. (10 Marks)
b. Explain the following terms in parallel architecture:
i) Operand Forwarding
ii) Reorder buffer. (10 Marks)

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CBCS SCHEME

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17CS73

Seventh Semester B.E. Degree Examination, July/August 2022 Machine Learning

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Define machine learning. Discuss with examples, some useful application of machine learning. (06 Marks)
 b. Describe in detail all the steps involved in designing a learning system. (06 Marks)
 c. Describe Find-S algorithm. Explain its working taking the Enjoysports concept and training instances given below:

Example	Sky	Air Temp.	Humidity	Wind	Water	Forecast	Enjoy Sports
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	Yes
4	Sunny	Warm	High	Strong	Cool	Change	No

(08 Marks)

OR

- 2 a. What do you mean by well-posed learning problem? Explain with example. (04 Marks)
 b. Explain the various stages involved in designing a learning system in brief. (08 Marks)
 c. Consider the following training example and apply candidate elimination algorithm:

RID	Origin	Manufacture	Color	Decade	Type	Class
1	Japan	Honda	Blue	1980	Economy	Positive
2	Japan	Toyota	Green	1970	Sports	Negative
3	Japan	Toyota	Blue	1990	Economy	Positive
4	USA	Chrysler	Red	1980	Economy	Negative
5	Japan	Honda	White	1980	Economy	Positive

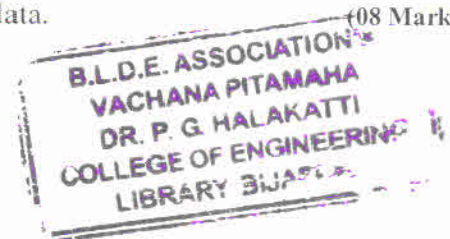
(08 Marks)

Module-2

- 3 a. Discuss the two approaches to prevent over fitting the data. (08 Marks)
 b. Consider the following set of training example:

Instance	Classification	a_1	a_2
1	+	T	T
2	+	T	T
3	-	T	F
4	+	F	F
5	-	F	T
6	-	F	T

- (i) What is the entropy of this collection of training example with respect to the target function classification?
 (ii) What is the information gain of a_2 relative to these training examples? (08 Marks)
 c. Discuss the decision learning algorithm. (04 Marks)



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OR

- 4 a. List the issues of decision tree learning. (04 Marks)
 b. Define decision tree. Construct the decision tree to represent the following Boolean functions:
 (i) $A \vee \neg B$ (ii) $A \vee [B \wedge C]$
 (iii) $A \text{ XOR } B$ (iv) $[A \cap B] \vee [C \wedge D]$ (10 Marks)
 c. Write the ID3 algorithm and explain. (06 Marks)

Module-3

- 5 a. Define perceptron. Explain the concept of single perceptron with neat diagram. (06 Marks)
 b. What is Artificial Neural Network? What are the types of problems in which ANN can be applied? (07 Marks)
 c. Discuss the perceptron training rule and delta rule that solves the learning problem of perceptron. (07 Marks)

OR

- 6 a. List the appropriate problems for neural network learning. (04 Marks)
 b. Explain the back propagation algorithm. Why is it not likely to be trapped in local minima? (10 Marks)
 c. What is gradient descent and delta rule? Why stochastic approximation to gradient descent is needed? (06 Marks)

Module-4

- 7 a. Explain Naïve Bayes classifier and Bayesian belief networks. (10 Marks)
 b. Consider a medical diagnosis problem in which there are two alternative hypothesis:
 (i) That the patient has a particular form of cancer (+) and (ii) That the patient does not (-).
 A patient takes a lab test and the result comes back positive. The test returns a correct positive result in only 98% of the cases in which the disease is actually present, and a correct negative in only 97% of the cases in which the disease is not present. Furthermore, 0.008 of the entire population has this cancer. Determine whether the patient has cancer or not using MAP hypothesis. (10 Marks)

OR

- 8 a. Explain the concept of EM algorithm. Discuss what are Gaussian mixtures. (08 Marks)
 b. Define MAP hypothesis. Derive the relation for hMAP using Bayesian theorem. (08 Marks)
 c. Describe Brute-Force MAP learning algorithm. (04 Marks)

Module-5

- 9 a. Define the following terms:
 (i) Sample error (ii) True error (iii) Random variable
 (iv) Expected value (v) Variance (10 Marks)
 b. Explain locally weighted linear regression. (04 Marks)
 c. Explain the Q function and Q learning algorithm. (06 Marks)

OR

- 10 a. Write short notes on the following:
 (i) Estimating Hypothesis Accuracy (08 Marks)
 (ii) Binomial Distribution
 b. Discuss the learning task and Q learning in the context of reinforcement learning. (08 Marks)
 c. Write a short note on radial basis function. (04 Marks)

CBCS SCHEME

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17CS743

Seventh Semester B.E. Degree Examination, July/August 2022 Information Network Security

Time: 3 hrs.

Max. Marks: 100

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

Module-1

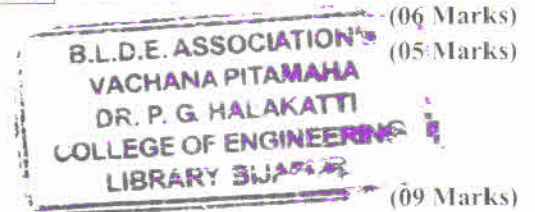
- 1 a. What is information security? Explain crypto as a black box. (06 Marks)
- b. Explain simple substitution with an example. Given the Caesar's Cipher, find plain text from the Cipher text. DQWUDOHSVSRQJERHEROR. (07 Marks)
- c. What is double transposition cipher? Encrypt the message, "We are all together". Using a double transposition cipher with 4 rows and 4 columns, using row permutation (1, 2, 3, 4) \rightarrow (2, 4, 1, 3) and column permutation (1, 2, 3, 4) \rightarrow (3, 1, 2, 4) (07 Marks)

OR

- 2 a. Using Vernam Cipher encrypt the plaintext "heilhitler" to cipher text and from Ciphertext to plaintext using the key.
110 101 110 101 111 100 000 101 110 000
and the corresponding binary representation of letter as below table.

Letter	e	h	i	k	l	r	s	t
Binary	000	001	010	011	100	101	110	111

- b. Explain the taxonomy of cryptanalysis. (06 Marks)
- c. Write a short note on : (05 Marks)
- (i) Project VENONA
 - (ii) Codebook cipher.
 - (iii) Confusion and diffusion.



Module-2

- 3 a. What is cryptographic hash function? What are the needs that cryptographic hash function must provide? (06 Marks)
- b. Explain birthday problem and birthday attack. (06 Marks)
- c. Explain Tiger hash outer round and inner round for F... with a neat diagrams. (08 Marks)

OR

- 4 a. Explain HMAC function. (08 Marks)
- b. Explain the following in brief. (06 Marks)
- (i) Online bids.
 - (ii) Spam reduction.
- c. Explain the techniques used in information hiding. (06 Marks)

Module-3

- 5 a. Explain any two types freshness of mechanisms. (07 Marks)
- b. Explain dynamic password scheme with a neat diagram. (09 Marks)
- c. Discuss the problems of passwords. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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OR

- 6 a. Explain the typical AKE protocol goals. (07 Marks)
b. Explain the challenges and the stages of the protocol design. (07 Marks)
c. Explain random number generation. (06 Marks)

Module-4

- 7 a. What are the reasons for cryptographic key with finite lifetime? (05 Marks)
b. Explain generic unique key per transaction and its schemes. (10 Marks)
c. Explain key life cycle. (05 Marks)

OR

- 8 a. Explain the various techniques used to provide tamper resistance. (08 Marks)
b. Write a note on:
(i) Key usage. (07 Marks)
(ii) Governing key management. (05 Marks)
c. Explain certificate life cycle.

Module-5

- 9 a. With a neat diagram, explain SSL handshake protocol description. (05 Marks)
b. Explain cryptography for secure payment card transactions. (10 Marks)
c. Write a note S/MIME. (05 Marks)

OR

- 10 a. Explain the application of cryptography in email-security. (10 Marks)
b. With a neat diagram, explain GSM authentication and encryption. (10 Marks)

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17CS754

Seventh Semester B.E. Degree Examination, July/August 2022 Storage Area Networks

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain evolution of storage architecture with neat diagram. (08 Marks)
- b. Discuss the key characteristics of a data center, with a neat diagram. (08 Marks)
- c. Explain the concept of virtualization. (04 Marks)

OR

- 2 a. What is RAID? Explain the RAID level with reference to nested RAID, RAID2, RAID4 and RAID5 with neat diagram. (08 Marks)
- b. Discuss the components of intelligent storage system with a neat diagram. (08 Marks)
- c. Describe the concepts of mirroring and parity. (04 Marks)

Module-2

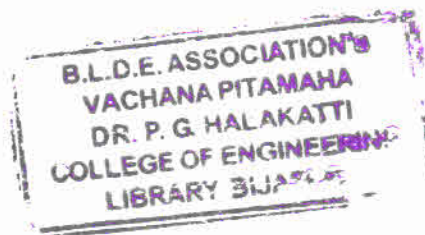
- 3 a. Define FCOE? Explain the concepts of FCOE network. (08 Marks)
- b. What is NAS? Explain the NAS implementation in detail. (08 Marks)
- c. Define zoning with its types. (04 Marks)

OR

- 4 a. List and explain the benefits of NAS. (06 Marks)
- b. Explain the fibre channel protocol stack with neat diagram. (08 Marks)
- c. Explain FCIP topology with neat diagram. (06 Marks)

Module-3

- 5 a. Differentiate between synchronous and asynchronous based remote replication. (08 Marks)
- b. Explain backup in virtualized environments. (08 Marks)
- c. Define the following terminologies:
 - (i) MTBF
 - (ii) RPO
 - (iii) MTTR
 - (iv) RTO



(04 Marks)

OR

- 6 a. Discuss data deduplication implementations. (08 Marks)
- b. Describe the failure analysis in BC. Mention some important BC technology solutions. (08 Marks)
- c. Explain any two backup topologies with neat diagram. (04 Marks)

Module-4

- 7 a. Define cloud computing. List and explain essential characteristics of cloud computing. (08 Marks)
- b. Explain the benefits of cloud computing in detail. (04 Marks)
- c. List and explain the various cloud services available. (08 Marks)

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OR

- 8 a. List and explain the challenges faced in cloud computing.
b. Explain cloud deployment models in detail.

(10 Marks)

(10 Marks)

Module-5

- 9 a. Explain the storage management activities in detail.
b. Discuss IPSAN security implementation in storage networking.
c. Explain different types of security threats.

(08 Marks)

(08 Marks)

(04 Marks)

OR

- 10 a. Explain the concept of Kerberos with neat diagram.
b. Discuss two methods of storage tiering.
c. List and describe storage infrastructure management activities.

(08 Marks)

(08 Marks)

(04 Marks)

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Seventh Semester B.E. Degree Examination, July/August 2022 Web Technology & its Applications

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Write the syntax to define links in HTML documents with suitable scripts. (04 Marks)
- b. With suitable script segments, outline the role of:
- (i) <nav>
- (ii) <aside> (06 Marks)
- c. Explain the role of CSS selectors with suitable CSS and HTML scripts.
- (i) id selector
- (ii) pseudo selector (06 Marks)

OR

- 2 a. Develop the HTML script for the following:
Professional courses
- (i) Engineering
- Computer
 - Mechanical
 - Electronics
- (ii) Health Sciences
- Medical
 - Nursing.
 - Pharmacy
- (iii) Management
- Business
 - Finance
 - Tourism (06 Marks)
- b. Write the role of CSS properties with suitable script segments.
- (i) Position
- (ii) Overflow. (04 Marks)
- c. Define 'Specificity'. Outline specificity algorithm and illustrate with suitable CSS segments. (06 Marks)

Module-2

- 3 a. Write the typical structure of <form> element. Illustrate the role of attributes : action and method. (06 Marks)
- b. Illustrate different button control elements with suitable scripts. (04 Marks)
- c. Explain the role of media queries in responsive web design with syntax and script segments. (06 Marks)

OR

- 4 a. Illustrate different text input control with suitable script segments. (04 Marks)
- b. Explain the role of CSS padding and float properties with script segments of CSS and HTML. (06 Marks)

c. Explain the role of CSS properties:

- (i) Display
- (ii) Z-index
- (iii) Clear.

With suitable script segments of CSS and HTML.

(06 Marks)

Module-3

- 5 a. Illustrate three ways of linking Java Script to HTML page with code segments of HTML and Java Script. (06 Marks)
- b. Explain two approaches for event handling in Javascript with code segments. (04 Marks)
- c. With a sequence diagram, explain the stages of PHP script reaction with Zend engine. (06 Marks)

OR

- 6 a. Explain the role of :
- (i) get Element ById ()
 - (ii) get Element ByTagName ()
 - (iii) innerHTML
- in accessing and modifying elements with suitable script segments. (06 Marks)
- b. With code segments, explain two approaches to embed PHP script in HTML. (04 Marks)
- c. Develop a script in HTML to read a number through <form> element. Develop a PHP script which reads a number and generates a fibonacci sequence. Integrate HTML and PHP script to display fibonacci series. (06 Marks)

Module-4

- 7 a. With data flow diagrams, explain the role of PHPs \$_GET and \$_POST arrays in web application development. (06 Marks)
- b. With suitable script and UML class diagram, explain the support for inheritance in PHP. (06 Marks)
- c. List and explain the role of three error reporting flags in PHP. (04 Marks)

OR

- 8 a. Develop the suitable scripts in HTML and PHP to upload a file onto server with a restriction on file size of 200 KB. (06 Marks)
- b. Explain defining and implementing interfaces in PHP with suitable code segments. (06 Marks)
- c. Explain object oriented exception handling constructs in PHP with code segments. (04 Marks)

Module-5

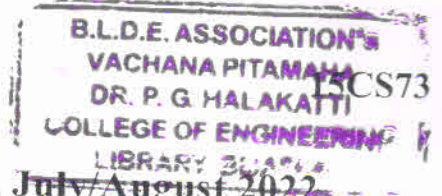
- 9 a. Define two types of cookies. Explain creating and using cookies in PHP with code segments. (06 Marks)
- b. Explain the role of attr () and prop () methods in jQuery with code segments. (04 Marks)
- c. Explain the methods used for XML processing in jQuery and PHP with code segments. (06 Marks)

OR

- 10 a. Explain session state with an example. Write PHP code segments to access session state and checking session existence. (06 Marks)
- b. Explain AJAX Get requests with syntax and code segments. (04 Marks)
- c. Explain JSON format with an example. Write a Javascript code segment to process a simple JSON file. (06 Marks)

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

Machine Learning

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1. a. What is Machine Learning? List the applications of Machine learning. (03 Marks)
- b. Explain with neat diagram, the choices in designing a learning system. (10 Marks)
- c. Describe briefly the issues in machine learning. (03 Marks)

OR

2. a. Describe the Find-S algorithm. Explain its working by taking enjoy sport concept and training instances given below:

Ex	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

- b. Describe candidate elimination algorithm with example. (08 Marks)

Module-2

3. a. With an example describe decision tree representation. (04 Marks)
- b. Discuss the characteristics of appropriate problems for decision tree learning. (04 Marks)
- c. Write the basic decision tree learning algorithm (ID3) (04 Marks)
- d. Discuss the capabilities and limitation of ID3. (04 Marks)

OR

4. a. Give entropy and information gain measure and calculate the information gain of all 4 attributes for the following training example. (10 Marks)

Day	Outlook	Temperature	Humidity	Wind	Play Tennis
D ₁	Sunny	Hot	High	Weak	No
D ₂	Sunny	Hot	High	Strong	No
D ₃	Overcast	Hot	High	Weak	Yes
D ₄	Rain	Mild	High	Weak	Yes
D ₅	Rain	Cool	Normal	Weak	Yes
D ₆	Rain	Cool	Normal	Strong	No
D ₇	Overcast	Cool	Normal	Strong	Yes
D ₈	Sunny	Mild	High	Weak	No
D ₉	Sunny	Cool	Normal	Weak	Yes
D ₁₀	Rain	Mild	Normal	Strong	Yes
D ₁₁	Sunny	Mild	Normal	Strong	Yes
D ₁₂	Overcast	Mild	High	Strong	Yes
D ₁₃	Overcast	Hot	Normal	Weak	Yes
D ₁₄	Rain	Mild	High	Strong	No

Table Q4 (a)

- b. Explain the issues in decision tree learning. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-3

- 5 a. Describe the appropriate problems for Neural Network Learning. (06 Marks)
 b. Explain perception, gradient descent and delta rule. (06 Marks)
 c. Write the gradient descent algorithm. (04 Marks)

OR

- 6 a. Explain the Back propagation algorithm for multilayer feed forward network. (10 Marks)
 b. Discuss the remarks on the back propagation algorithm. (06 Marks)

Module-4

- 7 a. Explain Brute Force MAP learning algorithm. (08 Marks)
 b. Discuss the features of Bayesian learning method. (04 Marks)
 c. Derive the expression for maximum likelihood hypothesis for predicting probabilities. (04 Marks)

OR

- 8 a. Explain Naïve Bayes classifier algorithm for example given in Table 4(a). (08 Marks)
 b. Explain in detail EM algorithm. (08 Marks)

Module-5

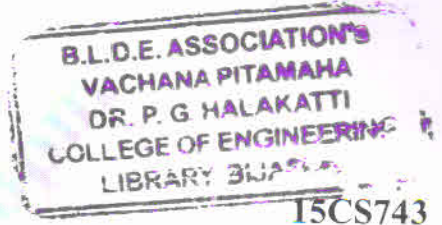
- 9 a. Explain K-Nearest Neighbour learning algorithm. (08 Marks)
 b. Explain Q-learning algorithm with an example. (08 Marks)

OR

- 10 a. Define the following with respect to Binomial distribution: (06 Marks)
 (i) Mean and Variance
 (ii) Estimation Bias.
 (iii) Confidence interval.
 b. Write a note on: (03 Marks)
 (i) Two sided and one sided bound. (03 Marks)
 (ii) Hypothesis testing. (03 Marks)
 (iii) Comparing learning algorithm. (04 Marks)

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Seventh Semester B.E. Degree Examination, July/August 2022 Information and Network Security

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1. a. List four classic Ciphers. Explain Simple Substitution Cipher, with an example. (05 Marks)
b. Encrypt the message "Attack at dawn", using a double transposition cipher with 3 rows and 4 columns, using a row permutation (1, 2, 3) → (3, 2, 1) and column permutation (1, 2, 3, 4) → (4, 2, 1, 3). (03 Marks)
c. Explain One – time pad is a provably secure. Also discuss why One – time pad can be used only once. (08 Marks)

OR

2. a. Differentiate between : i) Plain text and Cipher text ii) Block and Stream Cipher
iii) Diffusion and Confusion. (06 Marks)
b. Write a note on Code book Cipher. (05 Marks)
c. Give the Taxonomy of Cryptography. (05 Marks)

Module-2

3. a. What is a Cryptographic Hash function? Demonstrate a Birthday Attack with an example. (06 Marks)
b. Justify Tiger Hash is fast and secure. Also explain its working. (10 Marks)

OR

4. a. Explain HMAC structure. With a neat diagram. (08 Marks)
b. Explain Steganography and Digital Water marking methods of Information hiding. (08 Marks)

Module-3

5. a. Differentiate between Non deterministic and Deterministic generators. (04 Marks)
b. Explain different types of Freshness Mechanisms. (10 Marks)
c. What is Zero Knowledge Mechanism? (02 Marks)

OR

6. a. Explain how a simple protocol is analyzed, with an example. (08 Marks)
b. Explain Diffie – Hellman key agreement protocol, with an example. (08 Marks)

Module-4

7. a. Illustrate the Key Life Cycle in Key Management, with a neat diagram. (06 Marks)
b. Explain distribution of Public keys with relevant diagram. (10 Marks)

OR

8. a. Illustrate X.509 Public Key certificate. (08 Marks)
b. Explain the Certification Life Cycle. (08 Marks)

Module-5

- 9 a. Illustrate Handshake Protocol, with a neat diagram. (06 Marks)
b. Describe the application of Cryptography for Secure payment and Card transaction. (08 Marks)
c. List application of Cryptography on the Internet. (02 Marks)

OR

- 10 a. Explain about Cryptography use in Video broadcasting. (08 Marks)
b. Explain the applications of Cryptography in :
i) File protection ii) Email security. (08 Marks)

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

Big Data Analytics

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Discuss the various system roles in an HDFS components or deployment. (10 Marks)
 b. Describe HDFS block replication with an example. (10 Marks)

OR

- 2 a. Briefly explain HDFS NameNode Federation, NFS gateway, Snapshots. (10 Marks)
 b. Write a program to Read and Write HDFS file using java. (10 Marks)

Module-2

- 3 a. Discuss the usage of Apache Pig. (08 Marks)
 b. Explain Apache Sqoop to Acquire Relational data with an example. (08 Marks)
 c. Give the Apache Flume to acquire data streams. (04 Marks)

OR

- 4 a. Demonstrate the working of Hive with Hadoop. (08 Marks)
 b. Explain YARN application framework with an example. (08 Marks)
 c. Explain briefly how to manage Hadoop with Apache Ambari. (04 Marks)

Module-3

- 5 a. List and explain any 3 areas of applications of Business Intelligence (BI). (10 Marks)
 b. Define Data Warehouse. Explain design consideration for data warehouse. (10 Marks)

OR

- 6 a. What is Data Mining? What are supervised and unsupervised learning techniques? (10 Marks)
 b. What is Data visualization? Explain how visualization tools are used. (10 Marks)

Module-4

- 7 a. Using the Data given in Dataset as shown below, create a regression model to predict the Test2 from Test1 score. Then predict the score for the one who got a 46 in Test1. (10 Marks)

Test 1	59	52	44	51	42	42	41	45	27	63	54	44	50	47
Test 2	56	63	55	50	66	48	58	36	13	50	81	56	64	50

- b. Write the different steps involved in developing an artificial neural network. (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. Construct a Decision tree that helps to make decision about approving the play of an outdoor game.

Outlook	Temp	Humidity	Windy	Play
Sunny	Hot	Normal	True	?

Outlook	Temp	Humidity	Windy	Play
Sunny	Hot	High	False	No
Sunny	Hot	High	True	No
Overcast	Hot	High	False	Yes
Rainy	Mild	High	False	Yes
Rainy	Cool	Normal	False	Yes
Rainy	Cool	Normal	True	No
Overcast	Cool	Normal	True	Yes
Sunny	Mild	High	False	No
Sunny	Cool	Normal	False	Yes
Rainy	Mild	Normal	False	Yes
Sunny	Mild	Normal	True	Yes
Overcast	Mild	High	True	Yes
Overcast	Hot	Normal	False	Yes
Rainy	Mild	High	True	No

(10 Marks)

- b. Apply Apriori Algorithm for the following table, assume support count (minsup) = 2.

T _{ID}	items
T ₁	I ₁ , I ₂ , I ₅
T ₂	I ₂ , I ₄
T ₃	I ₂ , I ₃
T ₄	I ₁ , I ₂ , I ₄
T ₅	I ₁ , I ₃
T ₆	I ₂ , I ₃

(10 Marks)

Module-5

- 9 a. List and explain different types of Text Mining applications. (10 Marks)
 b. What is Naïve-Bayes technique? Explain its model. (10 Marks)

OR

- 10 a. What is SVM? With a neat diagram, explain support vector machine model. (10 Marks)
 b. Define social network analysis? Explain different types of network topologies. (10 Marks)

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17CS834

Eighth Semester B.E. Degree Examination, July/August 2022 System Modeling and Simulation

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. List any five circumstances, when the simulation is the appropriate and when it is not. (05 Marks)
- b. Write the advantages and disadvantages of simulation. (05 Marks)
- c. Explain with a flow chart the steps involved in simulation study. (10 Marks)

OR

- 2 a. Explain event-scheduling / Time advance algorithm with example. (10 Marks)
- b. Develop a manual simulation table for single server queuing system of a grocery shop for 6 customers and find, (i) Average waiting time of customer (ii) Idle time of server (iii) Average time customer spends in system. (iv) Probability wait customers arrive at shop randomly from 1 to 8 minutes and have equal probability. Service time varies from 1 to 6 minutes. The random digits for IAT and ST are 913, 727, 015, 948, 309 and 84, 10, 74, 53, 17, 79 respectively.

ST	1	2	3	4	5	6
P	0.10	0.20	0.30	0.25	0.10	0.05

(10 Marks)

Module-2

- 3 a. Explain discrete distribution and continuous distribution with examples. (10 Marks)
- b. What is Poisson process? Mention the properties of Poisson process. (10 Marks)

OR

- 4 a. Explain the characteristics of a queuing system. (10 Marks)
- b. State and explain Kendal's notation for queuing system. (10 Marks)

Module-3

- 5 a. Explain combined linear congruential method for random number generation. (10 Marks)
- b. The sequence of numbers 0.44, 0.81, 0.14, 0.05, 0.93 has been generated. Use the Kolmogorov-Smirnov test with $\alpha = 0.05$ to determine if the hypothesis that the numbers are uniformly distributed on the interval (0, 1) can be rejected. Compare $F(X)$ and $S_n(X)$ on a graph (where $D_\alpha = 0.565$) (10 Marks)

OR

- 6 a. Write a step by step procedure to generate random variate using inverse transform technique for exponential distribution. (10 Marks)
- b. Explain acceptance rejection technique. Generate 3 Poisson variate with mean = 0.2. Consider the random numbers 0.4357, 0.4146, 0.8353, 0.9952, 0.8004 (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.

Module-4

- 7 a. List the steps involved in the development of a useful model of Input data and also write the important suggestions to be noted while collecting the data. (10 Marks)
- b. Explain the different methods used to identifying the distribution with data. (10 Marks)

OR

- 8 a. Using goodness of fit test, test whether random numbers are uniformly distributed based on Poisson assumption with level of significance $\alpha = 0.05$, $\hat{\alpha} = 3.64$. Sample data are

Interval	0	1	2	3	4	5	6	7	8	9	10	11
Observed frequency	12	10	19	17	10	8	7	5	5	3	3	1

[where $\chi_{0.05}^2(11.1)$]

(10 Marks)

- b. Explain the types of simulation with respect to the output analysis. (10 Marks)

Module-5

- 9 a. Explain with neat diagram, model building, verification and validation. (10 Marks)
- b. Describe the three steps approach to validation by Naylor and Finger. (10 Marks)

OR

- 10 a. Explain output analysis for terminating and steady state simulation. (10 Marks)
- b. Explain optimization vice simulation. (10 Marks)

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Eighth Semester B.E. Degree Examination, July/August 2022 Big Data Analytics

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. With a diagram, explain the HDFS components. (08 Marks)
 b. Briefly explain HDFS block replication, Name node high availability, Snap shots and Safe mode. (08 Marks)

OR

- 2 a. Discuss the general HDFS commands. (08 Marks)
 b. Write a HDFS Java application example for reading, writing and deleting files from HDFS. (08 Marks)

Module-2

- 3 a. With block diagram, discuss the various frameworks that run under YARN. (08 Marks)
 b. With diagram, explain the concept of Apache squoop (08 Marks)

OR

- 4 a. List the importance of Apache Flume, explain with weblog example. (08 Marks)
 b. With respect to Oozie, describe the following i) DAG ii) Workflow definition. (08 Marks)

Module-3

- 5 a. List three business intelligence applications in the hospitality industry. (08 Marks)
 b. What are the two Data warehousing development approaches? Compare and contrast DW and Data mining. (08 Marks)

OR

- 6 a. List and explain BI Applications. (06 Marks)
 b. Explain BIDM cycle with respect to BI. (06 Marks)
 c. What is a confusion matrix? (04 Marks)

Module-4

- 7 a. With example illustrate decision tree algorithm? Describe three criteria for choosing splitting variable. (08 Marks)
 b. What is a regression model? What are the advantages and disadvantages? (08 Marks)

OR

- 8 a. Explain the design principles of an Artificial Neural Network. (08 Marks)
 b. Using the data below, determine the number of clusters and the center points of those clusters.

Data Set

x	2	2	5	4	8	6	5	5	6	4
y	4	6	6	7	3	6	2	7	3	4

(08 Marks)

Module-5

- 9 a. Define Text mining. Discuss the issues of private security by considering case study of whatsapp. (08 Marks)
 b. Compare and contrast Text mining and Data mining. (08 Marks)

OR

- 10 a. What are the three types of web mining? Explain privacy issues in web mining. (08 Marks)
 b. Discuss Page Rank application with reference to social network analysis. (08 Marks)

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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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15CS834

Eighth Semester B.E. Degree Examination, July/August 2022 System Modeling and Simulation

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. What is Simulation? Explain with neat flow diagram the step involved in simulation study. (08 Marks)
- b. Develop a simulation table for eight (8) customers in a grocery system with one check – out counter. Find the average waiting time of customer in Queue, idle time of server, and average service time. The Inter – Arrival Time (IAT) and Service Time (ST) are given in minutes :

IAT	3	2	6	4	4	5	8
S.T	3	5	5	8	4	6	2

Assume first customer arrives at time $t = 0$.

(08 Marks)

OR

- 2 a. What is system and system environment? Explain the major concept of Discrete Event simulation with example. (08 Marks)
- b. Develop a simulation table for Dump truck system where six dump trucks are used to carry coal from the entrance of a small mine to the rail road. Each truck is loaded by one of two loaders. After loading truck immediately moves to the scale to be weighed. Loader and scale have first – come – first serve (FCFS) Queue. The travel time from loader to scale is negligible. After being weighed, a truck begins a travel time, afterwards unloads the coal and returns to the loader queue. It is assumed that five trucks are at the loader and one is at the scale at time $t = 0$. Carryout simulation process till the computation of two weighing from the scale. The activities of loading, weighing and travel time are given in the following table :

Loading time	10	5	5	10	15	10	19
Weighing time	12	12	12	16	12	16	
Travel time	60	100	40	40	80		

Calculate the i) Busy time of both the loaders and the scale

ii) Average loader and scale utilization.

(08 Marks)

Module-2

- 3 a. Explain Poisson process and its properties with example. List out the assumption which are needed to fulfill the counting process $\{N(t), t \geq 0\}$, is said to be Poisson process with mean rate λ . (10 Marks)
- b. Forty percent of the assembled ink-jet printers are rejected at the inspection station.
 - i) Find the probability that the first acceptable ink-jet printer is the third one inspected
 - ii) Find the probability that the third printer inspected is the second acceptable printer.

(06 Marks)

OR

- 4 a. Explain with an example the characteristics of Queuing system? What does the format A/B/C/N/K represent? (10 Marks)
- b. Suppose that the life of an industrial lamp is in thousands of hours, is exponentially distributed with failure rate $\lambda = 1/3$ (one failure every 3000hours, on the average). Find the probability that the lamp will last longer than its mean time o life. Also find the probability that the industrial lamp will last between 2000 and 3000hours. (06 Marks)

Module-3

- 5 a. What are pseudo-random Numbers? Explain the important consideration for the selection of routines to generate random numbers. (08 Marks)
- b. What are 3 ways of achieving maximum periods in random number generation? Generate a sequence of 5 random numbers with given seed 45, constant multiplier 21, increment 49 and modulus 40. (08 Marks)

OR

- 6 a. The sequence of random numbers 0.54, 0.73, 0.98, 0.11 and 0.68 has been generated. Use Kolmogorov – Smirnov Test with $\alpha = 0.05$ to determine if the hypothesis that the number are uniformly distributed on the interval $[0,1]$ can be rejected Take $D_{0.05,5} = 0.565$. (08 Marks)
- b. What are Acceptances – Rejection technique? Generate three Poisson random variants with mean $\alpha = 0.2$ and take random numbers as : $R_1 = 0.4357$, $R_2 = 0.4146$, $R_3 = 0.8353$, $R_4 = 0.9952$ and $R_5 = 0.8004$. (08 Marks)

Module-4

- 7 a. List and explain the steps involved in the development of a useful model for a given set of input data. (08 Marks)
- b. Records pertaining to the monthly number of job related injuries at an underground coal mine were being studied by a federal agency. The values for the past 100 months were as follows:

Injuries per months	Frequency of occurrences
0	35
1	40
2	13
3	6
4	4
5	1
6	1

Apply the chi-square test these data to test the hypothesis that the underlying distribution is Poisson. Use the level of significance $\alpha = 0.05$ and $\chi_{0.05,2}^2 = 5.99$. (08 Marks)

OR

- 8 a. List and explain the steps involved in selection of input models without data. (08 Marks)
- b. Let X_1 represent the average lead time (in month) to deliver the industrial robots and X_2 represent the annual demand for industrial robots. The following data are available on demand and lead for last 10 years.

Lead time	6.5	4.3	6.9	6.0	6.9	6.9	5.8	7.3	4.5	6.3
Demand	103	83	116	97	112	104	106	109	92	96

Find the dependency between lead time and demand. (08 Marks)

Module-5

- 9 a. What are the different suggestions given in verification process? (08 Marks)
- b. Explain in detail model building, verification and validation process through a diagram. (08 Marks)

OR

- 10 a. What is output analysis? Explain the types of simulation with respect to output analysis. (08 Marks)
- b. Describe the three step approach by Naylor and Finger in the validation process. (08 Marks)

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18CS823

Eighth Semester B.E. Degree Examination, July/August 2022
NOSQL Database

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 NOSQL? Explain briefly about aggregate data models with a neat diagram. Considering example of Relations and Aggregates. (08 Marks)
- b. Briefly describe the value of Relational databases. (07 Marks)
- c. Explain briefly about impedance mismatch, with a neat diagram. (05 Marks)

OR

- 2 a. Write short notes on :
- i) Consequences of Aggregate Orientation ii) Key – value data model. (08 Marks)
- iii) Document data model iv) Column family stores. (07 Marks)
- b. Explain about graph databases, with a neat diagram. (05 Marks)
- c. What are Schemaless databases? Explain. (05 Marks)

Module-2

- 3 a. What are the distribution models? Briefly explain two paths of data distribution. (10 Marks)
- b. Explain about Update consistency and Read consistency, with an example. (10 Marks)

OR

- 4 a. Write short notes on :
- i) Single server ii) Combining Sharding and Replication (07 Marks)
- b. Explain the following :
- i) Relaxing consistency ii) CAP theorem (08 Marks)
- iii) Relaxing Durability iv) Quorums. (05 Marks)
- c. Define Version Stamps. Explain briefly about various approaches of constructing version stamps. (05 Marks)

Module-3

- 5 a. Explain with a neat diagram, the partitioning and combining in Map reduce. (10 Marks)
- b. Explain two stages Map- Reduce example, with a neat diagram. (10 Marks)

OR

- 6 a. Explain Basic Map – Reduce, with a neat diagram. (07 Marks)
- b. How are calculations composed in Map – Reduce? Explain with a neat diagram. (08 Marks)
- c. What are Key value Stores? List out some popular key value database. Explain how all the data is stored in a single bucket of key value data store. (05 Marks)

Module-4

- 7 a. What are Document Databases? Explain with an example. List and explain any 2 features of document databases. (10 Marks)
- b. Elaborate the suitable use cases of document databases. When document databases are not suitable? Explain. (10 Marks)

OR

- 8 a. Briefly explain scaling feature in document databases, with a neat diagram. (10 Marks)
b. Describe some example queries to use with document databases. (10 Marks)

Module-5

- 9 a. What are Graph databases? Explain with example graph structure. (08 Marks)
b. Briefly describe relationships in graph databases, with a neat diagram. (08 Marks)
c. Describe the Query features and transactions of graph databases. (04 Marks)

OR

- 10 a. Explain Scaling and Application level sharding of nodes with a neat diagram. (10 Marks)
b. Explain some suitable usecases of graph databases and describe when we should not use graph databases. (10 Marks)
