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**R-15**

**Code: 5P2B26**

M.C.A. II Semester Supplementary Examinations January 2018

**Data Structures**

Max. Marks: 60

Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 12 = 60 Marks )

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**UNIT-I**

1. a) What is asymptotic analysis? Explain different asymptotic notations with suitable examples. 8M
- b) What is recursive algorithms and how to analyze these algorithms? 4M

**OR**

2. a) How to calculate time complexity when there are many if, else statements inside loops? 4M
- b) Explain different classification of Data structures. 8M

**UNIT-II**

3. Implement a queue using 2 stacks. Analyze the running time of queue operations. 12M

**OR**

4. a) SPAN STOCK PROBLEM: Given a series of n daily price quotes for a stock. The span of the stock's price on a certain day is the maximum number of consecutive days up to the current day that the price of the stock has been less than or equal to its price on that day. Write the algorithm to find the Span of the stock's price and also find the running time of the algorithm. 6M
- b) Write the algorithm to find the Span of the stock's price using STACK and also find the running time of this algorithm. 6M

**UNIT-III**

5. a) Using Quick sort, show the contents of the array after first pivot has been placed in its correct position. Identify the three sublists that exist at that point.  
25, 57, 48, 37, 12, 92, 86, 33  
Discuss the running time of quick sort in best case, average case and worst case. 8M
- b) Explain Fibonacci search with example. 4M

**OR**

6. a) Execute the insertion sort on the following elements of the array and discuss the running time in worst case and best case.  
25, 57, 48, 37, 12, 92, 86, 33. 6M
- b) Write Binary search algorithm and Explain why binary search preferred over Ternary Search. 6M

**UNIT-IV**

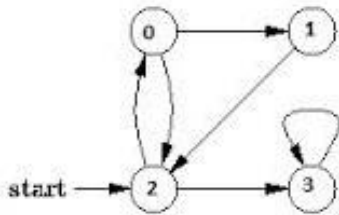
7. a) Draw a binary tree with 9 nodes. Write the preorder, inorder and postorder traversal. 6M  
 Write a function (in pseudocode) to construct an expression tree for a given  
 b) arithmetic expression. 6M

**OR**

8. a) What is hashing? Explain the collision handling mechanism in Hashing. 8M  
 b) Consider a hash table with 100 slots. Collisions are resolved using chaining. Assuming simple uniform hashing, what is the probability that the first 3 slots are unfilled after the first 3 insertions? 4M

**UNIT-V**

9. a) Execute the Breadth First Search algorithm on given graph. In each step, following should be clearly shown.  
 (i) Order of vertices in BFS.  
 (ii) Shortest distance of vertices of the graph from source.  
 Discuss the time complexity of the algorithm.



- 8M  
 b) What is splay Trees? Explain its application. 4M

**OR**

10. a) What are the advantages of BST over Hash Table 6M  
 b) What is AVL tree? Explain Insertion operation in AVL tree. 6M

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**Code: 5P2C23**

M.C.A. II Semester Supplementary Examinations January 2018

**Numerical Methods**

Max. Marks: 60

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 12 = 60 Marks )

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**UNIT-I**

1. a) Discuss the types of errors 6M  
 b) Find a real root of  $x^3 - 5x + 3 = 0$  , using Bisection method 6M

**OR**

2. a) Find a real root of  $x e^x = 3$  using Regular-Falsi method 6M  
 b) Evaluate  $\sqrt[28]{2}$  to four decimal places by Newton's-Raphson method 6M

**UNIT-II**

3. Solve the following system of equations by Gauss-Seidal iterative method 12M  
 $27x + 6y - z = 85, 6x + 15y + 2z = 72, x + y + 54z = 110$

**OR**

4. Find the largest eigen value and the corresponding eigen vector of the matrix 12M  
 using power method,  $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$

**UNIT-III**

5. a) Fit a straight line by the method of least squares to the data 6M
- |   |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|
| x | 0  | 5  | 10 | 15 | 20 | 25 | 30 |
| y | 10 | 14 | 19 | 25 | 31 | 36 | 39 |

- b) Fit a least square geometric curve  $y = a x^b$  to the data 6M
- |   |     |   |     |   |      |
|---|-----|---|-----|---|------|
| x | 1   | 2 | 3   | 4 | 5    |
| y | 0.5 | 2 | 4.5 | 8 | 12.5 |

**OR**

6. Find the least square regression equation of  $X_1$  on  $X_2$  &  $X_3$  from the following data 12M
- |       |    |    |    |    |    |    |
|-------|----|----|----|----|----|----|
| $X_1$ | 3  | 5  | 6  | 8  | 12 | 14 |
| $X_2$ | 16 | 10 | 7  | 4  | 3  | 2  |
| $X_3$ | 90 | 72 | 54 | 42 | 30 | 12 |

**UNIT-IV**

7. Apply Newton's forward interpolation formula, compute the value of  $f(5.5)$ , given that  $f(5) = 2.236, f(6) = 2.449, f(7) = 2.646$  and  $f(8) = 2.828$  correct upto three decimal places. 12M

**OR**

8. Use Gauss's forward interpolation formula to find  $f(30)$  given that  $f(21)=18.4708, f(25)=17.8144, f(29)=17.1070, f(33)=16.3432$  and  $f(37)=15.5154$  12M

**UNIT-V**

9. Find  $y(0.1)$  and  $y(0.2)$  using Euler's modified formula given that  $\frac{dy}{dx} = x^2 - y; y(0)=1$  12M

**OR**

10. Using Runge-Kutta method, solve  $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}; y(0) = 1$  . Find  $y(0.2)$  and  $y(0.4)$  12M

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**Code: 5P2C24**

M.C.A. II Semester Supplementary Examinations January 2018

**Operations Research**

Max. Marks: 60

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 12 = 60 Marks )

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**UNIT-I**

1. a) What is Operations Research ? Explain characteristics and the applications of Operations Research in management decision making.
- b) What are the different Models in Operations Research? Explain.

**OR**

2. a) Use duality to solve the following LP:  $Max\ z = 4x_1 + 2x_2$   
 Subject to the constraints  $-x_1 - x_2 \leq -3, -x_1 + x_2 \geq -2, x_1, x_2 \geq 0$
- b) Solve the following transportation problem

		supply			
		D1	D2	D3	
Demand	M1	2	7	4	5
	M2	3	3	1	8
	M3	5	4	7	7
	M4	1	6	2	14
		7	9	18	

**UNIT-II**

3. Solve the following linear programming problem using Simplex method  $Max\ z = 20x_1 + 30x_2$  Subject to the constraints
 

$5x_1 + 3x_2 \leq 36$   
 $5x_1 + 2x_2 \leq 50$   
 $2x_1 + 6x_2 \leq 60$   
 $x_1, x_2 \geq 0$

**OR**

4. Use the graphical method to solve the following LP Problem.  
 $Min\ z = 20x_1 + 10x_2$  Subject to the constraints
 

$x_1 + 2x_2 \leq 40$   
 $3x_1 + x_2 \geq 30$   
 $4x_1 + 3x_2 \geq 60$   
 $x_1, x_2 \geq 0$

**UNIT-III**

5. There are 5 jobs each of which is to go through the machines A, B, C, and D in the order ABCD. Determine the sequence of these jobs and minimize total elapsed time

	A	B	C	D
1	14	5	3	10
2	2	6	2	12
3	12	4	4	8
4	8	7	1	15
5	10	3	5	16

**OR**

6. Explain the methods for obtaining Initial Basic Feasible solution of a Transportation problem.

<b>UNIT-IV</b>
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7. Define the following terms related to Game theory.
- (a) Pure strategy      (b) Mixed strategy      (c) Saddle point  
 (d) Two- Persons Zero –Sum game      (e) Dominance Principle.

**OR**

8. The following failure rates have been observed for a certain type of light bulbs

Week	1	2	3	4	5
Percentage failed by the end of week	10	25	50	80	100

There are 1000 bulbs in use and it costs Rs 2 to replace an individual bulb which has burnt out. If all bulbs were replaced simultaneously it cost 50 paise per bulb. It is proposed to replace all bulbs at fixed intervals of time where or not they have burnt out and to continue replacing burnt out bulbs as and when they fail. At what interval should all the bulbs be replaced? At what group replacement price per bulb would a policy of strictly individual replacement become preferable to the adopted policy?

<b>UNIT-V</b>
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9. Write the differences between PERT and CPM.

**OR**

10. A particular item has a demand of 9000 per year. The setup cost is Rs. 100 and the holding cost per unit is Rs. 2.40 per year. The replacement is finite and the shortage cost is Rs. 5 per unit per year

Determine    **a)** Economic large size    **b)** The number of orders per year  
**c)** time interval between orders    **d)** variable cost    **e)** Total cost per year if the cost of 1 unit is Rs.1.

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**Code: 5P2B21**

M.C.A. II Semester Supplementary Examinations January 2018

**Computer Organization**

Max. Marks: 60

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 12 = 60 Marks )

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**UNIT-I**

1. a) Discuss the concept of compliments used to represent signed numbers. 6M  
b) Design full adder. 6M

**OR**

2. a) Implement the following Boolean function using 8:1 MUX. 6M  
 $F(w,x,y,z) = \sum m(0, 3, 5, 8, 9, 10, 12, 14)$   
b) Simplify the following function F using K map 6M  
 $F(w,x,y,z) = \sum m(1,3,5,7,9,11,13,15)$

**UNIT-II**

3. a) Derive the expression for Match Logic and implement it using logic gates. 6M  
b) I. Differentiate Cache Memory Vs Virtual Memory.  
II. Compare and contrast direct and associative mapping techniques. 6M

**OR**

4. a) Describe how Read and Write operations are performed in Associative Memory.  
b) With a suitable diagram explain associative memory.

**UNIT-III**

5. a) Explain various instruction formats in intel 8086. 6M  
b) Discuss various CPU organizations. 6M

**OR**

6. Describe intel 8086 addressing modes. 12M

**UNIT-IV**

7. a) Elaborate 8086 arithmetic instructions. 6M  
b) Write an 8086 assembly language program to find the sum of given integers. 6M

**OR**

8. a) Discuss conditional and unconditional instructions in 8086. 6M  
b) Write an 8086 assembly language program to find maximum value among the given integers. 6M

**UNIT-V**

9. a) What are elements required in designing a Control Unit. 6M  
b) Using the mapping procedure generate the micro instruction address for the following op-codes.  
i. 0010  
ii. 1011  
iii. 1111 6M

**OR**

10. a) What is Microprogramming? Explain with a simple example. 6M  
b) Write short notes on control memory. 6M

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