Total No. of Questions : 8]

P9115

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SEAT No. :

[Total No. of Pages : 5

[Max. Marks : 70

S.E. (Computer Engineering/ Computer Science & Design Engineering/ Artificial Intelligence & Data Science Engineering)

DISCRETE MATHEMATICS

(2019 Pattern) (Semester-III) (210241)

Time : 2¹/₂ Hours] Instructions to the candidates.

- Answer Question No. Q1 or Q2, and Q3 or Q4, and Q5 or Q6 and Q7 or Q8. 1)
- Neat diagram must be drawn whenever necessary. 2)
- Figures to the right indicate full marks. 3)
- Assume suitable data, if necessary. **4**)
- How many bit strings of length 8 bits can be constructed which will either *Q1*) a) Start with '1' or end with '00'? [6]
 - In how many ways can 6 Boys and 2 Girls be seating in a row such that b)
 - 2 Girls are seating together i)
 - 2 Girls are not seating together. ii)
 - How many bit strings can be formed of length 10 bits which contains?[6] c)
 - i) at least four 1
 - at most four ii)

OR

How many bit strings of length 10 can be formed which will contain *Q2*) a) either 5 consecutive 0s or 5 consecutive 1s? [6]

> A zip code contains 6 digits. How many different zip codes can be made with the digits 0-9 if.

- i) No digit is used more than once.
- The first digit is not '0' ii) **[6]**
- Use the Binomial theorem to expand $(3a-2b)^6$ c) [6]

- [6]

Q3) a) Find shortest path from vertex '0' to vertex '4' using Dijkstra's algorithm.



- What is planar Graph? A simple planar graph G contains 20 vertices and c) degree of each vertex is 3. Determine the number of regions in planar graph G? [5]
- For the following graph find different cut set and identify the max flow in *Q5*) a) given network [6] 6 D Ε 2 Find the optimal prefix code for the given characters with the frequency b) of occurrences as below. [6] Frequenc Character A E Ι NŻ 0 3 U 4 S 13 Т 1 Find minimum Spanning tree using prims algorithm c) B F 00.20 00.20 00.20 Ε 4 OR 3

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- **Q6**) a) Construct Binary search Tree: 21, 28, 14,18,11, 32, 25, 23, 37, 27, 5, 15, 19, 30, 12, 26
 - b) For the following transport network find the maximum flow using max flow min cut theorem. [6]

[6]

- C 2 3 D В 2 Find minimum spanning tree using Kruskals Algorithm [6] c) G В Let $Z_4 = \{0, 1, 2, 3\}$ and 'R be the relation under operation '+' defined as **Q7**) a) a+b=a+b : if (a+b)<4 a+b=a+b-4: if $(a+b) \le 4$ Where $a, b \in \mathbb{Z}_{4}$ Determine Algebraic System $(Z_4,+)$ is abellian group or not? [6] Explain: [6] i) Integral domain Field ii) Let $A=\{0,1,2,3\}$ and 'R' be the relation under operation ' \odot ' defined c)
 - as a \bigcirc b=a,b%4. Determine algebraic system (A, \bigcirc) is monoid or not? [5] OR

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Let $Zn = \{0, 1, 2, 3, ..., n-1\}$ **Q8**) a)

Let Zn={0,1,2,3,...n-1} Consider 'R' relation under operation '+' defined as "addition Modulo 5" and operation '*' defined as " multiplication modulo 5". Does the Algebraic system. (Z₅,+,*) forms Ring"? [8]

- Explain the following properties of Algebraic structure with example [4] **b**)
 - i) Identity
 - ii) Inverse

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Consider 'R' be the relation under binary operation '*' on a set Z c) Does the algebraic system (Z,*) is Abelian Group? [5]