Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5668]-201

S.E. (Information Technology) (First Semester) EXAMINATION, 2019

DISCRETE STRUCTURES

(2015 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. **:—** (*i*) Solve Q. Nos. **1** *or* **2**, **3** *or* **4**, **5** *or* **6**, **7** *or* **8**.
(*ii*) Neat diagrams must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Assume suitable data, if necessary.

1. (*a*) A bag contains 3 red, 6 white and 7 blue balls. What is the probability that two balls drawn are white and blue ? [6]

(*b*) Three cards are drawn from a well-shuffled pack of 52 cards. Find the probability that they are a king, a queen and a jack.[6]

Or

2. (*a*) How many 3-digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9, which are divisible by 5 and none of the digits is repeated ? [6]

(*b*) What is Multiset ? Let A and B be the multisets {*a, a, b, b, c, f*} and {*a, a, b, b, b, d, d*}, respectively. [6]
Find :
(*a*) A ∪ B
(*b*) A ∩ B
(*c*) A – B
(*d*) B – A.

3. (*a*) Prove by Mathematical Induction that for $n >= 1$: [6]
1.1!+2.2!+3.3!+.....+n.n!=(n+1)!1.

P.T.O.

(*b*) Define with example : [6]

(*i*) Equivalence relation

(*ii*) POSET

(*iii*) Lattice.

Or

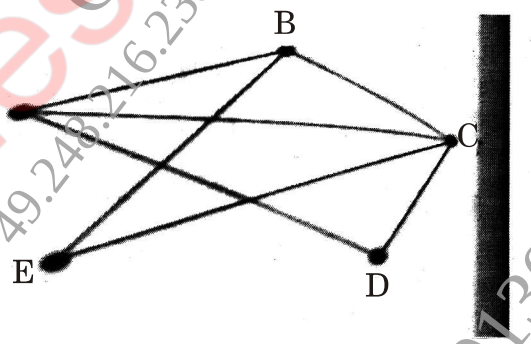
4. (*a*) Solve the following recurrence relation : [6]

$x(n) - 6x\ (n-1) + 9x\ (n-2) = 0$

$x(0) = 0$

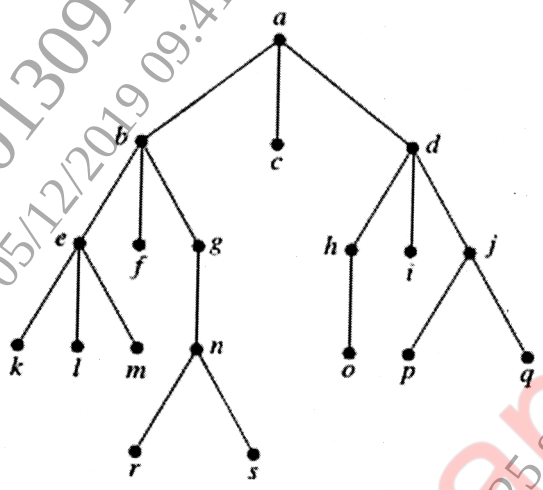
$x(1) = 3.$

(*b*) Consider the graph given in the figure, find the set V(G) of the vertices's present in G and that set E(G) of edges of G also find the degree of each vertex and show that sum of the degree of the vertices's is twice the number of edges in graph G : [6]



5. (*a*) Build a binary search tree for the words *banana*, *peach*, *apple*, *pear*, *coconut*, *mango*, and *papaya* using alphabetical order. Write sequence of visiting words in preorder and post-order traversal. [7]

(*b*) Determine the order in which a preorder, postorder and inorder traversal visits the vertices of the given ordered rooted tree. [6]



Or

6. (*a*) What is expression tree ?

Represent the expressions

(*i*) (x + xy) + (x/y)

(*ii*) x + ((xy + x)/y) [7]

using binary trees. Write each of these expressions in :

(*a*) prefix notation.

(*b*) postfix notation.

(*b*) For the following set of characters, construct Huffman code. Find average bit length of the code : [6]

Character	A	B	C	D	E
Frequency	0.1	0.15	0.25	0.2	0.3

7. (*a*) Let G = {even, odd} and binary operation $\oplus$ be define as : [7]

$\oplus$	even	odd
even	even	odd
odd	odd	even

Show that (G, $\oplus$) is a group.

(*b*) Define the following : [6]

(*a*) Group

(*b*) Monoid

(*c*) Abelian group.

Or

8. (*a*) Show that (G, $+_8$) is an abelian group where G = {0, 1, 2, 3, 4, 5, 6, 7}. [7]

(*b*) Prove that G = {0, 1, 2, 3, 4, 5} = Z_6 is an abelian group of order 6 with respect to addition modulo 6. [6]