Total No. of Questions—8] [Total No. of Printed Pages—3

Seat No.	

[5559]-201

S.E. (I.T.) (First Semester) EXAMINATION, 2019

DISCRETE STRUCTURES

(2015 PATTERN)

Time : 2 Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q. 1 *or* Q. 2, Q. 3 *or* Q. 4, Q. 5 *or* Q. 6 and Q. 7 or Q. 8.

(*ii*) Figures to the right indicate full marks.

(*iii*) Assume suitable data, if necessary.

Q1 **A)** A single card is drawn from an ordinary deck of 52 cards. Find the probability *p* that: **6**

(i) the card is a face card
(ii) the card is face card and heart
(iii) the card is face card or heart.

B) In a survey of 60 people it was found that : **6**

25 read Business India
26 read India Today
26 read Times of India
11 read both Business India and India Today
9 read both Business India and Times of India
8 read both India Today and Times of India
8 read none of these.

(*i*) How many read all three?
(*ii*) How many read exactly one?

OR

Q2 **A)** Use mathematical induction to show that : **6**

$$\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \ldots\ldots + \frac{1}{n(n+1)} = \frac{n}{n+1} \quad \text{for all } n >= 1$$

B) In a country club 60% of the players play tennis, 40% players play golf, 20% players play both tennis and golf. A member is chosen at random : **6**

(*i*) Find the probability that a member neither plays tennis nor golf.
(*ii*) If a member plays tennis, find the probability that member plays golf.
(*iii*) If a member plays golf, find the probability that member plays tennis.

$$\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \ldots\ldots + \frac{1}{n(n+1)} = \frac{n}{n+1} \quad \text{for all } n >= 1$$

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(*ii*) If a member plays tennis, find the probability that member plays golf.
(*iii*) If a member plays golf, find the probability that member plays tennis.

Q3 **A)** . Let A={1,2,3,4,5} and R be the relation on A such that **6**

B) Define the following with suitable example:

(*i*) Cut set
(*ii*) Factors of graph
(*iii*) Weighted graph.

OR

Q4 **A)** Find the solution to the recurrence relation **6**

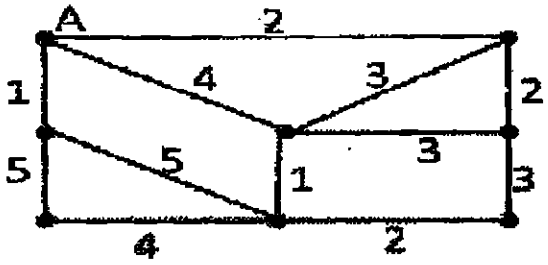
$$a_n = 6\,a_{n-1} - 11\,a_{n-2} + 6a_{n-3}$$

with initial condition $a_0 = 2$, $a_1 = 5$ and $a_2 = 15$.

B) Determine the number of edges in a graph with 6 nodes, 2 of degree 4 and 4 of degree 2. Draw two such graphs. **6**

Q5 **A)** Construct an optimal binary tree for the set of weights as {15, 22, 9, 11, 10, 13, 8}. Find the weight of an optimal tree. Also assign the prefix codes and write the code words. **6**

B) Find the minimum cost spanning tree of the following graph using Prim's algorithm. **7**

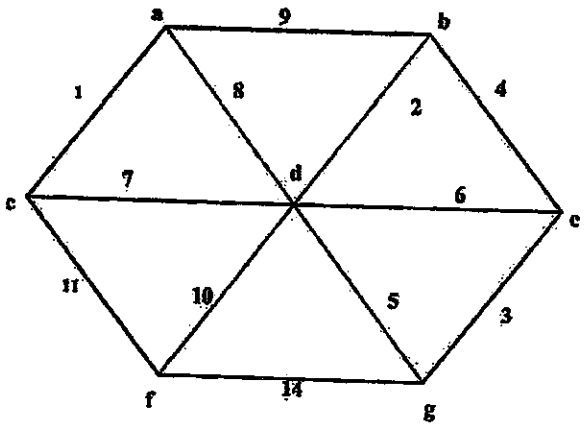


OR

Q6 **A)** Suppose data items A,B,C,D,E,F,G occur in the following frequencies. Construct Huffman code for data and find minimum weighted path length **6**

Items	A	B	C	D	E	F	G
Weight	10	30	5	15	20	15	5

B) Use Kruskal's algorithm to find minimum spanning tree of this graph. **7**



Q7 **A)** Consider the group(Z,+), **7**
Prove that (Z,*) is an abelian group where * is binary operation defined by a*b=a+b+1 for all a,b ϵ Z

B) Define the following with example : **6**

(i) Monoid
(ii) Cyclic group
(iii) Abelian group

OR

Q8 **A)** Let Z_8= {0,1,2,3,4,5,6,7}.Let R is a relation under the operations addition modulo 7 and multiplication modulo 7 .Does this system form a ring ? Is it a commutative ring? **7**

B) What is homomorphism and automorphism in an algebraic system? Explain by giving example of each. **6**