

SUBJECT: DISCRETE MATHEMATICS

Day: Saturday
Date: 11/05/2019

Time: 02.30 PM TO 05.30 PM
Max Marks : 60

S-2019-2571

N.B. :

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable calculator is **ALLOWED**.
- 4) Assume suitable data, if necessary.

Q.1 In the survey of 60 people, it was found that 25 read Newsweek magazine, (10)
26 read Time, 26 read Fortune, 8 read both Time and Fortune, 8 read no
magazine at all.

- i) Find out the number of people who read all the three magazines.
- ii) Fill in the correct numbers in all the regions of the Venn diagram.
- iii) Determine number of people who read exactly one magazine.

OR

Q.1 Explain with suitable example principal of inclusion-exclusion. (10)

Q.2 Write the algorithmic steps to find transitive closure using Warshall's (10)
algorithm.

OR

Q.2 Let P be the set of all people. Let R be a binary relation on P such that aRb (10)
iff a is brother of b. What properties of a relation are satisfied by R?

Q.3 Find numeric functions corresponding to (10)

i) $\frac{2+3z-6z^2}{1-2z}$ ii) $\frac{z^4}{1-2z}$

OR

Q.3 For a positive integer $n > 1$ prove that $1 + \frac{1}{4} + \frac{1}{9} \dots + \frac{1}{n^2} < 2 - \frac{1}{n}$ (10)

Q.4 Consider all positive integers with three different digits- (10)

- i) How many numbers are greater than 700?
- ii) How many numbers are even?
- iii) How many numbers are odd?
- iv) How many numbers are divisible by 5?

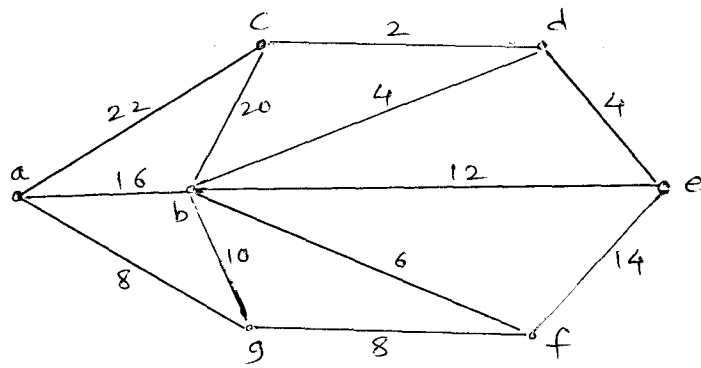
OR

Q.4 Five boys and five girls are to be seated in a row. In how many ways can (10)
they be seated if

- i) All boys must be seated in the five left-most seats.
- ii) No two boys can be seated together.

P.T.O.

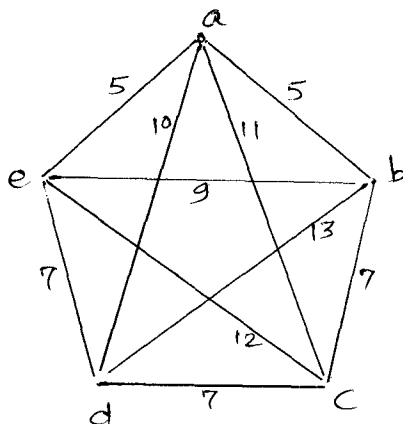
Q.5 Find shortest path using Dijkstra's algorithm. **(10)**



OR

Q.5 State Euler's formula for a planar graph. Draw 2 non-isomorphic simple planar graphs with 6 nodes and 9 edges. **(10)**

Q.6 Find minimum spanning tree using Kruskal's algorithm for following graph. **(10)**



OR

Q.6 Assuming suitable example, write steps to find shortest path using Prim's algorithm. **(10)**

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