[Total No. of Questions: 09]
Uni. Roll No. ....

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Program: B.Tech. (Batch 2018 onward)
Semester: 5th

EVENING

Name of Subject: Discrete Mathematics

3 0 DEC 2022

Subject Code: PCIT-110
Paper ID: 16441
Scientific calculator is Allowed

Time Allowed: 03 Hours

Max. Marks: 60

NOTE: 1. Parts A and B are compulsory
2. Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
3. Any missing data may be assumed appropriately

Part – A
[Marks: 02 each]

Q1.

   a) What is inclusion and exclusion principle?

   b) State Pigeonhole principle.

   c) Define Euler Graph.

   d) What do you understand by Isomorphism of Graph.

   e) Determine distinct number of permutations formed from all letters of the word "ENGINEERING".

   f) Identify the Chromatic number of K^n graph (Complete Graph).

Part – B
[Marks: 04 each]

Q2. Compare Hamiltonian and Eulerian circuits with suitable examples.

Q3. Explain different properties of Groups and show that G= {1,2,3,4,5,6} is a Group.

Q4. If R is the equivalence relation on set A, then show that R^{-1} is also the equivalence relation on A.

Q5. If R= {(1,1), (2,2), (3,3), (1,2)}

Determine whether given relation is:

(a) Reflexive; (b) Symmetric; (c) Transitive

Q6. Solve the Recurrence relation:

$a_n=3a_{n-1}+2$ subject to $a_0=1$.

Q7. Minimize the following Boolean expression using Predicate Logic:

$F(A,B,C)=A'B+BC'+BC+AB'C'$

P.T.O.

Part – C   [Marks: 12 each] 3 0 DEC 2022

Q8.   a. Find a generating function for 1,3,5,7,9,….

b. Functions f. g. h are defined on a set. X= {1,2,3} as f= {(1,2) (2,3) (3,1)} g = {(1,2} (2,1) {3,3)} h = {(1. 1) (2,2) (3,1)} (i) Find fog. gof are they equal ? (ii) Find fogoh and fohog.

OR

a)   In a group of 100 students. 72 students can speak English and 43 students can speak Hindi. Based on these data. answer the following questions:

i.   Find the number of students who can speak English only.
ii.   Find the number of students who can speak Hindi only.
iii.   Find the number of students who can speak both English and Hindi.

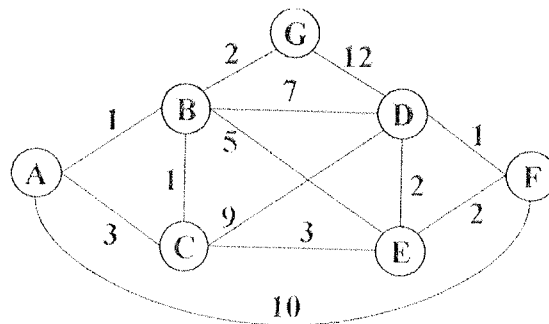b)   What is Monoid? Also explain how it is different from a group.

Q9.   Compare and contrast the differences between Floyd Warshall's and Kruskal's Algorithm.
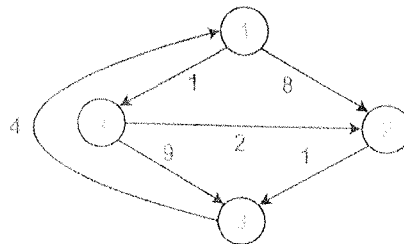
Using Floyd Warshall Algorithm, find the shortest path distance between every pair of vertices.

OR

Consider the following undirected, weighted graph:

Using Dijkstra's Algorithm, determine the shortest path from source to every other vertex. (Source= A)

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