EVENING

[Total No. of Questions: 09]

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[Total No. of Pages: 02]

Uni. Roll No. ....

Program: B.Tech. (Batch 2018 onward)

Semester:4ᵗʰ

Name of Subject: Discrete Mathematics

Subject Code: PCCS-103

Paper ID: 16213

Scientific calculator is Not 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

<center>Part – A   [Marks: 02 each]</center>

Q1.

    a)   List all the partitions of S = {1,2,3}.

    b)   In how many ways can five examinations be scheduled in a week so that no two examinations are scheduled on a same day considering Sunday as a holiday?

    c)   Show that the identity element of a group is always unique.

    d)   State Euler's formula for planer graphs.

    e)   Let A, B be two sets then prove $A-B=A \cap B^C$.

    f)   Determine domain and range R = {(x, x^3), x is a prime number less than 10}.

<center>Part – B   [Marks: 04 each]</center>

Q2. Out of 6 boys and 4 girls a committee of 6 is to be formed. In how many ways can this be done if the committee contains:

    a) exactly 2 girls   b) at least 2 girls.

Q3. Let f: R→R and g: R→R be two functions on R defined by f(x): 2x+3, g(x)=x² show that fog ≠ gof.

Q4. Compare Hamiltonian and Eulerian chains with suitable examples.

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Q5. Prove that the following statement is a tautology.

$$\sim(p \land q) \Leftrightarrow \sim p \lor \sim q$$

Q6. Minimize the following switching circuit

$$\sum m\ (1,5,6,7,11,12,13,15)$$

Q7. Write the generating function of $5+(-1)^n$.

<div align="center">Part – C   [Marks: 12 each]</div>

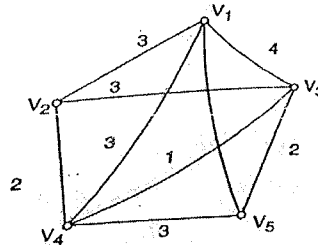**Q8.** Solve $S(k)-6S(k-1) + 9S(k-2) = 3^k$

<div align="center">OR</div>

For the recurrence relation $S(n)-6S(n-1) + 8S(n-2) = 0$ for $n \geq 2$ and S (0) =10 and S (1) =25

Find a) generating function   b) sequence that satisfied it.

Q9. Construct minimum spanning tree of weighted graph using Kruskal's algorithm.

<div align="center">OR</div>

Consider G = {1,5,7,11,13,17} under multiplication modulo 18.
a) Build the multiplication table of G.
b) Find 5^{-1}, 7^{-1} and 17^{-1}.
c) Find the order and group generated by: (i) 5, (ii) 13.
d) Identify whether G is cyclic?

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