

[This question paper contains 5 printed pages.]

4670

Your Roll No.

B.Sc. Prog./III

AS

EL 310 (VII) – Computational and Discrete Mathematics

(Admissions of 2005 and onwards)

Time : 2 Hours

Maximum Marks : 38

(Write your Roll No. on the top immediately
on receipt of this question paper.)

All the Sections are compulsory.
Use of scientific calculator is allowed.

SECTION I

1. Find by Taylor's series method, the values of y at $x = 0.1$ and $x = 0.2$ to five decimals places from

$$\frac{dy}{dx} = x^2y - 1, \quad y(0) = 1$$

OR

Solve the differential equation $\frac{dy}{dx} = \frac{y-x}{y+x}$ with initial condition $y(0) = 1$ by the simple Euler's method with $h = 0.02$ to get $y(0.1)$. (6)

SECTION II

2. (a) Define Boolean Algebra. (5)

P.T.O.

- (b) Using definition of Boolean algebra B show that
 $xvx = x \quad \forall x \in B$.

OR

- (a) Show that $x\bar{y} + y\bar{z} + \bar{x}z = \bar{x}y + \bar{y}z + x\bar{z}$.

- (b) Find the value of $(\bar{1} + 0) \cdot (\bar{1} \cdot \bar{1})$

3. Construct a K-map for $F(x,y,z) = \bar{x}\bar{z} + xyz + y\bar{z}$. Use this map to find implicants, prime implicants and essential prime implicants of $F(x,y,z)$. (5)

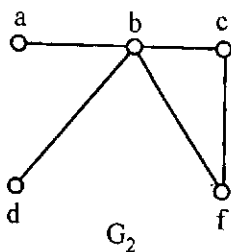
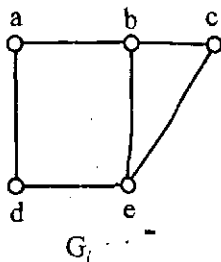
OR

Design circuit for light fixture controlled by two switches where flipping any one of the switches for the fixture turns the light on when it is off and turns light off when it is on.

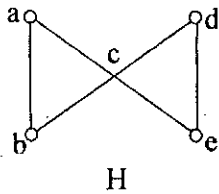
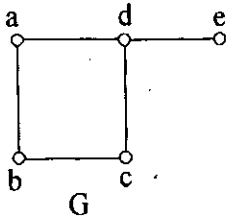
SECTION III

4. Attempt any two parts: (3+3)

- (i) Define union of two graphs. Find the union of the following graphs G_1 and G_2 .

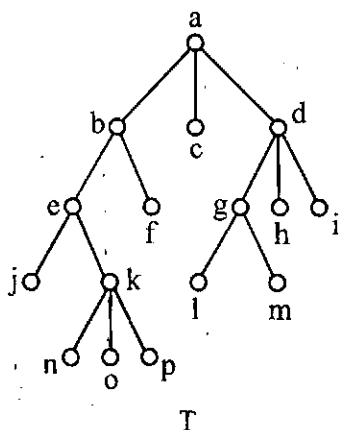


- (ii) Define a complete bipartite graph. Give an example.
- (iii) Show that neither of the following graph has a Hamilton circuit.



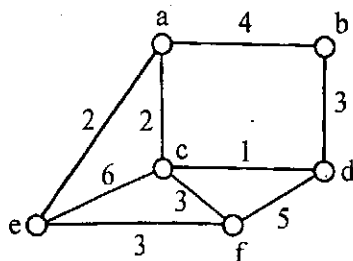
5. Attempt any **two** parts : (3+3)

- (i) Prove that a connected multigraph has an Euler circuit if and only if each of its vertices has even degree.
- (ii) What do you understand by saying that a graph is weakly connected? Give an example of a graph which is weakly connected but not strongly connected. Full explanation is required.
- (iii) In which order does an inorder traversal visit the vertices of the following ordered rooted tree T.

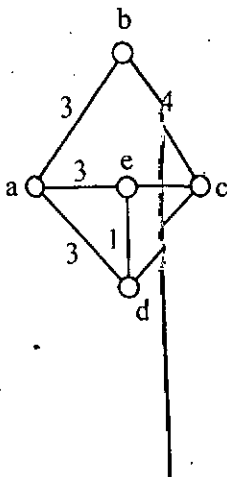


6. Attempt any one part : (4)

(i) Using Kruskal's algorithm, find the minimal spanning tree for the following weighted graph :



(ii) Using Prim algorithm, find the minimal spanning tree of the following weighted graph.



SECTION IV

7. (a) What is the difference between the functions "print" and "println" for output.
- (b) If $x = 10$, $y = 4$, what is the value of y/x ?
- (c) Obtain asymptotic upperbound for $3n + 5 \text{Log}n$.

OR

- (a) What is the value of i after the execution of the segment

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i = -2
do }
    i = i + 2
} while (i ≤ 9)
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- (b) Show that $2^n = O(n!)$ (6)