Total No. of Questions – [06]

Total No. of Printed Pages: 2

G.R. No.	

DECEMBER 2021 - ENDSEM EXAM

S. Y. B. TECH. (INFORMATION TECHNOLOGY) (SEMESTER - I)

COURSE NAME: DISCRETE MATHEMATICS

COURSE CODE: ES21201IT

(PATTERN 2020)

Time: [1 Hour]

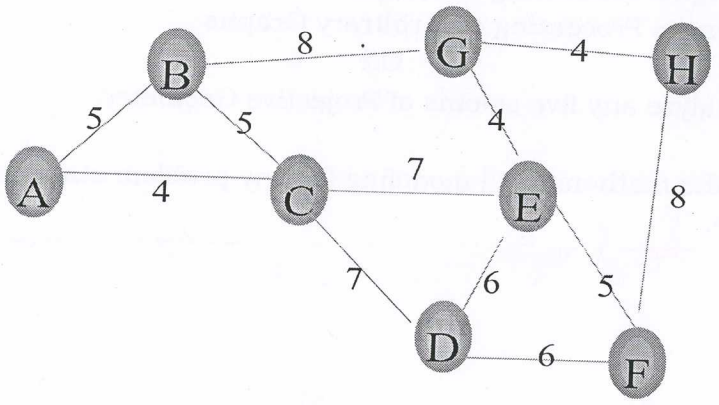
[Max. Marks: 30]

Instructions to candidates:

1) **Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1 a Give the significance of traversing binary tree and list the process of pre-order, in-order and post-order traversal [4]

Q.1 b Using Kruskal's Algorithm find the cost of MST. [6]



OR

Q2 a With Reference to s-t cut problem in the transport network, comments on the following : [4]

i. In s-t cut flow, what are the conditions for flow capacity?

ii. In s-t cut flow, what are the conditions for flow conservation?

Q2 b Comments on the following concepts with suitable example with reference to MST algorithm i.e Prim's and Kruskal algorithm : [6]

Concept 01 : If all the edge weights are distinct, then both the algorithm are guaranteed to give the same MST

Concept 02 : If all the edge weights are not distinct, then both the algorithm may not produce the same MST

Q.3 a Determine following types of RING with one example each. [4]

i) Null Ring and Unity Ring
ii) Commutative Ring
iii) Ring with zero divisor
iv) Ring without zero divisor

Q.3 b Let R = $\{0^0, 60^0, 120^0, 180^0, 240^0, 300^0\}$ and '*' is a binary operation so that a and b in R, a * b is overall angular rotation corresponding to successive rotation by a and then by b. Show that (R, *) is a GROUP. [6]

OR

Q.4 a Consider the set A = { -1, 0, 1 }. Determine whether A is closed under [4]

i) Addition and
ii) Multiplication.

Draw Composition table for both operations and justify the reason.

Q.4 b Justify whether MONOID is a part of Groups or Ring. [6]

Consider an algebraic system $(E,+_8)$ where E= {0,2,4,6} and $+_8$ is addition modulo 8 operation. Draw the composition table and Show that $(E,+_8)$ is a MONOID.

Q.5 a Define Galois theory and discuss the connection between field theory and group theory. [4]

Q.5 b Discuss the following terms from applied perspective: (Any one) [6]

i) Signal Processing on Graphs
ii) Image Processing on Arbitrary Graphs

OR

Q.6 a List and analyze any five axioms of Projective Geometry. [4]

Q.6 b Construct the mathematical modeling for any problem statement of your choice. [6]