

**B.Sc. (A & G) Sem. – II (Animation & Gaming) (CBCS - 2015
COURSE) : SUMMER - 2019
SUBJECT: MATHEMATICS FOR COMPUTING**

Day : Tuesday
Date : 07/05/2019

S-2019-1321

Time : 02.30 pm to 05.30 pm
Max. Marks : 60

N. B. :

- 1) Attempt **ANY SIX** questions.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of calculator is **NOT ALLOWED**.
- 4) Assume suitable data, if necessary.

Q. 1 a) Use De Morgan's Law to write the negation of the expression and translate the negation in English: **(04)**

- i) Tom is a math major but not computer science major
- ii) John is healthy and wealthy but not wise

b) Let A = "Aldo is Italian" and B = "Bob is English" **(06)**

Formalize the following sentences:

- i) "Aldo isn't Italian.
- ii) "Aldo is Italian while Bob is English"
- iii) "If Aldo is Italian then Bob is not English"
- iv) "Aldo is Italian or if Aldo isn't Italian then Bob is English"
- v) "Either Aldo is Italian and Bob is English, or neither Aldo is Italian nor Bob is English"

Q. 2 a) Prove the following argument is valid: **(04)**

$$p \rightarrow \neg q, r \rightarrow q, r \vdash \neg p$$

b) Test the validity of the following argument: **(06)**

- i) If John gets a raise, then he will buy a house.
- ii) If John buys a house, he will run for a position on the neighborhood council.
- iii) Therefore, if John gets a raise, he will run for a position on the neighborhood council.

Q. 3 A graph $G(V,E)$ is defined by $V(G) = \{A, B, C, D, J, K, L, M\}$ and $E(G) = \{(A, B), (A, C), (A, D), (C,L), (C, K), (K, M), (J, K), (J, M), (L, M)\}$

a) List the order in which the nodes will be visited in a Depth First Search. **(05)**

b) Find a Minimum Spanning Tree and the weight of the minimum spanning tree if the edges of $G(V,E)$ have the following weights: **(05)**

AB-2; AD-1; AC-1; CL-3; CK-4; LM-2; KM-1; JK-3; JM-1.

P. T. O.

- Q. 4 a)** Answer the following with respect to a Binary Tree with N nodes: **(04)**
- i) What is the maximum height of the tree?
 - ii) What is the minimum height of the tree?
 - iii) What is the maximum number of leaves possible?

- b)** The pre-order and in-order traversals of a binary tree are as shown below: **(06)**
Reconstruct the tree.

Pre-Order: A-B-D-E-F-C-G-H-J-L-K

In-Order: D-B-F-E-A-G-C-L-J-H-K

- Q. 5** Find the eigen value and eigen vector of the matrices given below: **(10)**

$$\begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix}$$

- Q. 6** Solve the following system of equations by:

- a) Gauss Elimination Method **(05)**
- b) Gauss Jordan Method **(05)**

$$\begin{aligned} x + y + z &= 9 \\ x - 2y + 3z &= 8 \\ 2x + y - z &= 3 \end{aligned}$$

- Q. 7 a)** Show that the vectors $u = [6 \ 2]^T$ and $v = [-1 \ 3]^T$ are orthogonal. **(04)**

- b)** Solve the following system of linear equations: **(06)**

$$\begin{aligned} 2x - y &= -1 \\ x + 3y - z &= 5 \\ y + 2z &= 5 \end{aligned}$$

- Q. 8** In the context of Complex Numbers:

- a) State De'Moivre's Theorem **(02)**
- b) Apply De'Moivre's Theorem to compute the cube root of -8 **(04)**
- c) Apply De'Moivre's Theorem to compute the fifth root of $(\sqrt{3} + i)^5$ **(04)**

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