

**B.SC. (I. T.) SEM. - II (CBCS - 2015 COURSE) : SUMMER - 2018**

**SUBJECT: MATHEMATICS FOR COMPUTING**

Day : **Thursday**  
Date : **17/05/2018**

Time: **10.00 a.m. to 01.00 p.m.**  
Max Marks: 60

**S-2018-0945**

**N.B**

- 1) Attempt any **SIX** questions.
- 2) Figures to the right indicate **FULL** marks.

**Q.1 a)** Write the negation of each statement symbolically and in plain language: **(04)**

- i) If she works she will earn money.
- ii) He swims if and only if the water is warm.
- iii) If it rains, then they do not drive the car.
- iv) He is neither a coward, nor lazy nor rich.

**b) i)** Define “Tautology” and “Contradiction”. **(06)**

ii) Verify whether the proposition  $(p \rightarrow q) \leftrightarrow (\neg q \rightarrow \neg p)$  is a tautology or contradiction.

**Q.2 a)** Determine the validity of the argument  $p \rightarrow q, \neg p \vdash \neg q$  **(04)**

**b)** Consider the following arguments:

A1 : If I am guilty, I must be punished; I am not guilty, thus I must not be Punished.

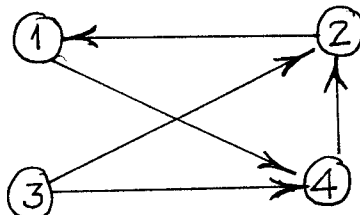
A2: If I am guilty, I must be punished; I must not be punished, thus I am not guilty

A3: If I am guilty, I must be punished: I must be punished, thus I am guilty

i) Represent the arguments symbolically. **(02)**

ii) Verify which of the arguments is logically correct **(04)**

**Q.3 a)** Write the adjacency and incidence matrices for the graph shown below **(06)**



**b)** Define the terms Simple Path, Trail, Closed Path, and Cycle. **(04)**

**P.T.O**

- Q.4** A graph  $G(V, E)$  is defined by  $V = \{A, B, C, D, J, K, L, M\}$  and  $E = \{AB, AC, AD, CL, CK, KM, JK, JM, LM\}$
- a) List the order in which the nodes will be visited in a Depth First Search. (05)
- b) Find a minimum spanning tree if the edges of  $G$  have the following weights : (05)  
 AB-2, AD-1, AC-1, CL-3, CK-4, LM-2, KM-1, JK-3, JM-1

- Q.5** a) Eight data items have frequencies as shown: (08)
- |            |    |    |    |    |    |    |    |    |
|------------|----|----|----|----|----|----|----|----|
| Data :     | A  | B  | C  | D  | E  | F  | G  | H  |
| Frequency: | 22 | 05 | 11 | 19 | 02 | 11 | 25 | 05 |
- Construct a Huffman code for the letters.
- b) State the conditions for the existence of an Eulerian path in a graph. (02)

- Q.6** a) The sum of three numbers is 2. If we subtract the second number from twice the first number, we get 3. By adding double the second number and the third number we get 0. Represent it algebraically and find the numbers using matrix method. (06)
- b) What is Rank of a matrix? How can you find consistency of a system of linear equations using rank? (04)

- Q.7** Given the matrix  $A = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$
- a) Compute the eigenvalues of  $A$ . (04)
- b) Which are the corresponding eigenvectors? (04)
- c) Choose any two eigenvectors and verify that the multiplication of the eigenvectors by  $A$  is equivalent to multiplication by the eigenvalues. (02)

- Q.8** a) Write in the form  $(a + ib)$  the following complex numbers: - (06)
- i)  $z = i^5 + i + 1$
- ii)  $w = (3 + 3i)^8$
- b) Simplify :  $2i(i - 1) + (\sqrt{3} - i)^3 + (1 - i)(1 + i)$  (04)