

**B.SC. (I. T.) SEM. - II (CBCS - 2015 COURSE) : WINTER -  
2017**

**SUBJECT: MATHEMATICS FOR COMPUTING**

Day : **Thursday**  
Date : **21/12/2017**

**W-2017-0845**

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.

**Q.1 a)** Prove that the argument  $p \rightarrow \neg q, r \rightarrow q, r \vdash \neg p$  **(04)**

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

If I study then I will not fail math

If I do not play then I will study

But I failed math

Therefore I must have played

**Q.2 a)** Formalize the following argument symbolically and verify whether it is a fallacy or not: - **(07)**

*If you play and you study, you will pass the exams, while if you play and you don't study, you won't pass. Thus if you play, either you study and you pass, or you don't study and you won't pass.*

**b)** Let  $A = \{1, 2, 3, 4, 5\}$ . Determine the truth value of each of the following: - **(03)**

i)  $(\exists x \in A)(x + 3 = 10)$

ii)  $(\exists x \in A)(x + 3 < 5)$

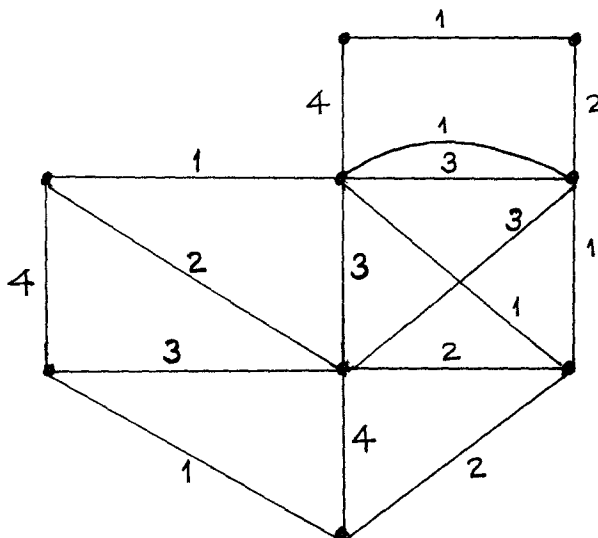
iii)  $\forall x \forall y, x^2 + y^2 < 12$

**Q.3** For the graph shown below: -

**a)** Draw a minimum spanning tree. **(05)**

**b)** Find its weight. **(02)**

**c)** Redraw the minimum spanning tree as a rooted tree and find its depth. **(03)**



**P.T.O.**

- Q.4 a)** For a binary tree with N nodes: **(04)**
- i) What is the maximum height (depth)?
  - ii) What is the minimum height?
  - iii) What is the maximum number of leaves possible?

- b)** The pre-order and in-order traversals of a binary tree are as shown. **(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** Consider the phrase “MATH IS FUN”.

- a)** Generate a Huffman code for the letters. **(05)**
- b)** Based on the code generated by you, discuss whether the Huffman code is **(05)**  
 more efficient than a fixed length code.

**Q.6** Given the system of linear equations:

$$3x - 2y + 3z = 8$$

$$x + 3y + 6z = -3$$

$$2x + 6y + 12z = -6$$

- a)** Determine whether the system is consistent. **(04)**
- b)** If the system is consistent, then solve for x, y and z using matrix method. **(06)**

**Q.7 a)** Compute the eigenvalues and eigenvectors of  $A = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$  **(06)**

- b)** Find the absolute value and conjugate of: **(04)**
- i)  $z = (1 + i)^6$
  - ii)  $w = i^{17}$

**Q.8 a)** State D’Moivre’s theorem for complex numbers. **(02)**

- b)** Apply D’Moivre’s theorem to compute: **(08)**
- i) cube root of  $-8$
  - ii) square roots of  $z = (-1 - i)$