

B.Sc. (I. T.) Sem. - II (CBCS - 2015 Course) : WINTER - 2018

SUBJECT: MATHEMATICS FOR COMPUTING

Day : Thursday
Date : 22/11/2018

W-2018-1069

Time : 02.30 p.m. to 05.30 p.m.
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.
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Q. 1 a) Check whether the argument $(p \rightarrow q) \vee (p \rightarrow \neg q)$ is valid or not. **(04)**

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

If John gets a raise, then he will buy a house.

If John buys a house, he will run for a position on the neighborhood council.

Therefore, if John gets a raise, he will run for a position on the neighborhood council.

Q. 2 a) Consider a propositional language where **(05)**

i) P means "Paola is happy"

ii) q means "Paola paints a picture",

iii) r means "Renzo is happy".

Formalize the following sentences:

i) "if Paola is happy and paints a picture then Renzo isn't happy"

ii) "if Paola is happy, then she paints a picture"

iii) "Paola is happy only if she paints a picture"

b) Use the truth tables method to determine whether $p \rightarrow (q \wedge \neg q)$ and $\neg p$ are logically equivalent. **(05)**

Q.3 a) Define the following terms: **(04)**

i) Binary Tree

ii) Binary Search Tree

iii) Height of a Binary Tree

iv) Leaf

b) Construct a binary Search Tree from the following data set of 12 elements. **(06)**
What is the height of the tree?

50 30 25 75 82 28 63 70 04 43 74 35

P. T. O.

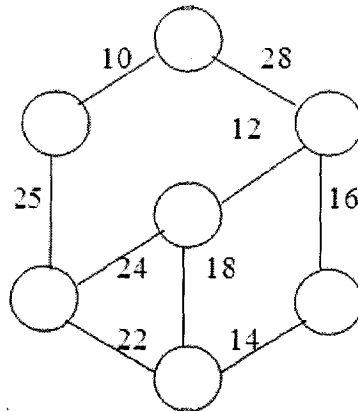
- Q. 4 a)** Let A, B, C, D, E, F, G, H be eight data items with the following frequencies of occurrence: **(08)**

Data Item:	A	B	C	D	E	F	G	H
Frequency:	22	5	11	19	2	11	25	5

Construct a Huffman code for the letters.

- b)** State the conditions for the existence of an Eulerian Path in a graph. **(02)**

- Q. 5** Calculate the total cost using Kruskal's algorithm for the graph below: **(10)**



- Q. 6** Consider the following system of linear equations:

$$x + 2y + 6z = 5$$

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

$$x - 4y - 2z = 1$$

- a)** Write the above system of equations in the matrix form $Ax = B$ **(04)**
- b)** Determine whether or not the system of equations is consistent. **(06)**

- Q. 7** Given the matrix:

$$A = \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$$

- a)** Compute the eigen values of A. **(05)**
- b)** Which are the corresponding eigen vectors? **(05)**
- Q.8 a)** Write in the "algebraic" form $(a + ib)$ the following complex numbers: **(06)**

i) $z = i^5 + i + 1$

ii) $w = (3 + 3i)^8$

- b)** Use De Moivre's Theorem to compute $(\sqrt{3} + i)^5$ **(04)**

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