

S.D.E.

M.C.A. Sem - I (Old Course) : WINTER - 2018
SUBJECT : MATHEMATICAL FOUNDATIONS

Day : Monday
Date : 03/12/2018

Time : 10.00 AM TO 1.00 PM
Max. Marks : 80

W-2018-4795

N.B.:

- 1) Attempt **ANY FIVE** questions from Section – I and attempt **ANY TWO** questions from Section – II.
- 2) Answers to both the sections should be written in the **SAME** answer book.
- 3) Figures to the right indicate **FULL** marks.

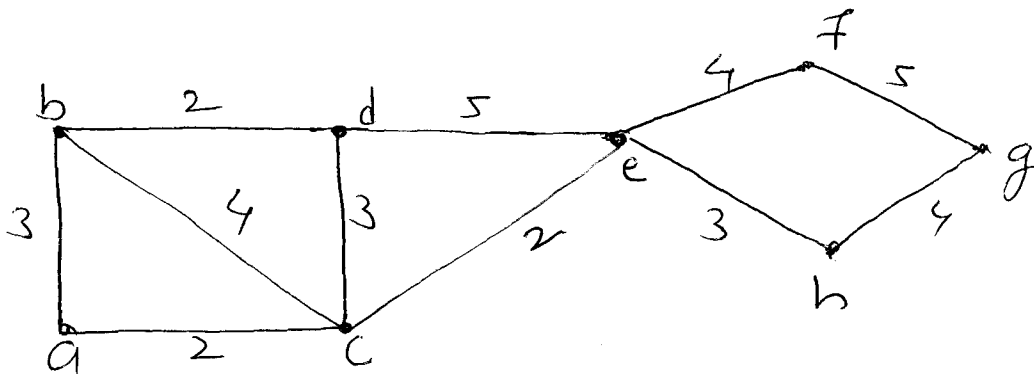
SECTION – I

- Q.1** a) Show that $(p \rightarrow q) \wedge (q \rightarrow p) \equiv (p \leftrightarrow q)$ is a tautology. [05]
b) Symbolize the expression “All the world respect selfless leaders”. [05]
- Q.2** a) To prove that $A - (B \cap C) \equiv (A - B) \cup (A - C)$. [05]
b) Prove using induction $1 + 4 + 7 + \dots + (3n - 2) = \frac{n(3n - 1)}{2}$. [05]
- Q.3** Let R be the relation represented by the matrix $M_R = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$. [10]
Find the matrices that represents: i) R^2 ii) R^3 iii) R^4 .
- Q.4** If Q is the set of all rational and $f : Q \rightarrow Q$ is a mapping, defined by $f(x) = 2x + 3, \forall x \in Q$ then prove that f is one – one & onto. Find f^{-1} . [10]
- Q.5** Describe Dijkstra’s algorithm. [10]
- Q.6** Write a Tree Traversal algorithm. [10]
- Q.7** Write short notes on the following: [10]
a) Automatic theorem proving
b) Heap sorting

P.T.O.

SECTION - II

Q.8 Write prim's algorithm. Using this algorithm find the minimal spanning tree for [15]
the following weighted connected graph.



Q.9 Explain Warshall's algorithm. Use it to find transitive closure of the relation [15]
 $R = \{(1, 1), (1, 4), (2, 1), (2, 3), (3, 1), (3, 2), (3, 4), (4, 2)\}$.

Q.10 a) Explain graph colouring in detail. [07]

b) Write an algorithm to search 14 from the following list: [08]
1 2 3 6 7 8 11 13 14 16 19 20 23 25.

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