

S.D.E.

M.C.A. SEM - I : SUMMER - 2018
SUBJECT : MATHEMATICAL FOUNDATIONS

Day : Wednesday

Time : 10.00 A.M. TO 1.00 P.M.

Date : 06/06/2018

S-2018-4607

Max. Marks : 80

N.B.:

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

SECTION – I

- Q.1 a) Construct the Truth Table for: [05]
 $(p \rightarrow q) \vee (\sim p \rightarrow r) \vee r.$
- b) Show that $p \rightarrow (q \rightarrow p) \Leftrightarrow \sim p \rightarrow (p \rightarrow q)$ is an equivalence relation. [05]
- Q.2 a) If A, B and C are three sets, prove that $A \times (B \cap C) = (A \times B) \cap (A \times C).$ [05]
- b) How many words of three distinct letters can be formed from the letters of the word MASS? [05]
- Q.3 a) By mathematical induction method prove that [05]
 $1 + 4 + 7 + \dots + (3n - 2) = \frac{n(3n - 1)}{2}$
- b) Let $f(x) = x + 2$, $g(x) = x - 2 \forall x \in \mathbb{R}$, where \mathbb{R} is the set of real numbers. Find fog and gof. [05]
- Q.4 Explain inorder, preorder and postorder algorithm with example. [10]
- Q.5 Explain Heap Sort algorithm. [10]
- Q.6 a) Let $A = \{1, 2, 3, 4\}$, $B = \{1, 4, 9, 16\}$ and the relation [05]
 $R = \{(1, 1), (2, 4), (3, 9), (4, 16)\}.$ Draw the relation graph.
- b) Define Function. Also explain types of function with example. [05]
- Q.7 Write short notes on: [10]
- a) Topological sorting algorithm
 - b) Automatic theorem proving

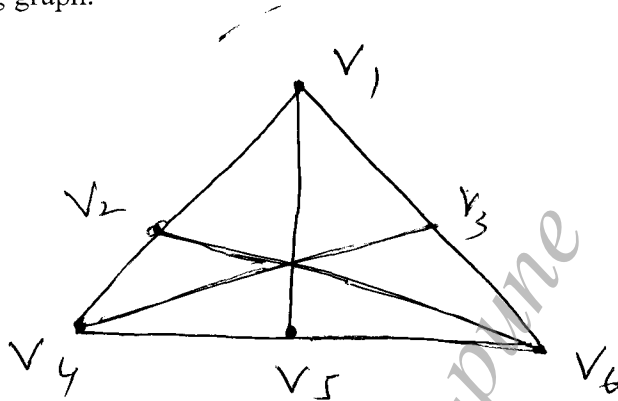
P.T.O.

SECTION – II

Q.8 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.9 a) If relation R is defined as $R = \{(a, b) \mid a \leq b\}$, state whether R is an equivalence relation. [07]

b) Use Welch-Powell algorithm and colour the graph. Find $\chi(G)$ for the following graph. [08]



Q.10 a) Show that the premises "A student in this class has not read the book", and "Everyone in this class passed the first exam" implies the conclusion "Someone who passed the first exam has not read the book". [07]

b) Explain Application of Set Theory. [08]

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