

S.D.E.
M.C.A. Sem - I (Old Course) : SUMMER - 2019
SUBJECT : MATHEMATICAL FOUNDATIONS

Day : Wednesday
Date : 08/05/2019

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

S-2019-5254

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 **SAME** answer books.
- 3) Figures to the right indicate **FULL** marks.

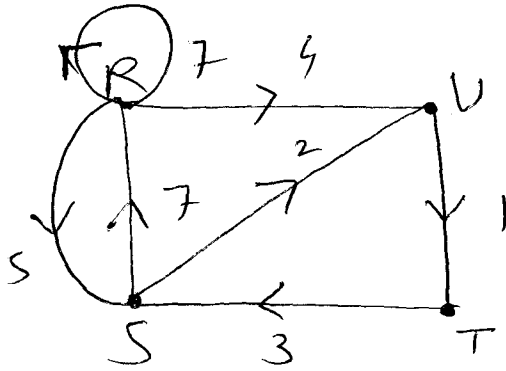
SECTION – I

- Q.1** a) Construct the Truth Table for the following: [05]
 $(\sim p \rightarrow r) \wedge (p \leftrightarrow q)$
- b) Show that the following statement is tautology: [05]
 $(p \wedge (p \rightarrow q)) \rightarrow q$
- Q.2** a) By mathematical induction method show that [05]
 $1^3 + 2^3 + \dots + n^3 = (1 + 2 + \dots + n)^2$.
- b) Prove that $A - (B \cap C) = (A - B) \cup (A - C)$. [05]
- Q.3** a) Represent the following relation on $\{1, 2, 3\}$ with a matrix [05]
 $\{(1, 1), (1, 2), (1, 3)\}$.
- b) Find the partitions of $X = \{a, b, c, d\}$. [05]
- Q.4** a) Let function f and g be defined by $f(x) = 2x + 2$, $g(x) = x^2 - 2$ find $f \circ g$ and $g \circ f$. [05]
- b) How many numbers between 1,000 and 10,000 can be formed with the digits [05]
1, 3, 5, 7, 9 each digit being used only once in each number?
- Q.5** Describe Merge sort algorithm with example. [10]
- Q.6** Explain Traversing algorithm. [10]
- Q.7** Write short notes on: [10]
- a) Binary 2 – trees
 - b) Types of Function

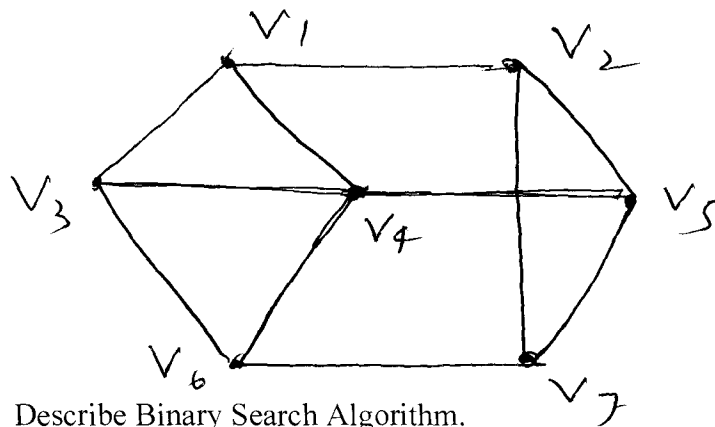
P.T.O.

SECTION - II

Q.8 Describe Warshall's algorithm. Use this algorithm to find shortest path. [15]



Q.9 a) Find $\chi(G)$ for the graph, as shown in figure using Welch-Powell algorithm. [07]



b) Describe Binary Search Algorithm. [08]

Q.10 Explain Huffman's algorithm. Use this algorithm to solve the problem with the following assigned weight: [15]

Data item	A	B	C	D	E	F	G	H
Weight	22	05	11	19	02	11	25	03

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