

S.D.E.
M.C.A. SEM. – I (CBCS – 2018 COURSE) : WINTER – 2018
SUBJECT : DISCRETE STRUCTURES

Day : Saturday
Date : 01/12/2018

Time : 10.00 AM TO 1.00 PM
Max. Marks : 70

W-2018-4789

N.B.

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

SECTION – I

- Q.1** a) Verify that $(\sim p \wedge (p \vee q)) \rightarrow q$ is a tautology. (05)
b) Obtain the DNF of $(p \wedge q) \vee \sim (p \rightarrow q)$. (05)
- Q.2** a) Show that $A \cap (B - C) = A - (B \cap C)$. (05)
b) Write all operation on Fuzzy set. (05)
- Q.3** Let $f: R \rightarrow R$ and $g: R \rightarrow R$ be two functions defines as $f(x) = x^2$ and $g(x) = 3x + 1$ find $gof(x)$ and $fog(x)$. (10)
- Q.4** a) Find the GCD of (875, 288). (05)
b) Find the values of q and r for pair of integers a and b such that $a = bq + r$ and $0 \leq r < b$ $a = 112, b = 5$. (05)
- Q.5** a) How many ways can 7 students arrange themselves in a row, if 2 particular students take the corner seats? (05)
b) Using mathematical induction prove that $1 + 2 + 3 + 4 \dots + n = \frac{n(n+1)}{2}$. (05)
- Q.6** Write short notes on any **TWO**: (10)
a) Modus Ponens and modus tollens
b) Complexity of algorithm
c) Logic gates

SECTION – II

- Q.7** a) Using the recursive method, solve the following recurrence relation: (07)
 $a_r = a_{r-1} + 3$ for $r \geq 1$ and $a_0 = 1$.
b) Find the solution of the recurrence relation $a_r + 5a_{r-1} + 6a_{r-2} = 3r^2$. (08)
- Q.8** a) Define the following: (07)
i) Language ii) Grammar
b) Design a DFA that checks whether a given decimal number is even or not. (08)
- Q.9** a) Simplify the following: (07)
 $F = x + x'y + xy$
b) Let $A = \{1, 2, 3\}$ and $R = \{(1,3)(2,2)(1,2)(2,1)(2,3)\}$ Determine whether the relation R is anti symmetric. (08)

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