F.Y. B. SC. (COMPUTER SCIENCE) SEM – I (2014 COURSE) :
SUMMER - 2018

SUBJECT : MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE - I

Day : **Wednesday** **S-2018-0830** Time : **12.00 NOON TO 02.00 PM**
Date : **18/04/2018** Max. Marks : 40

N. B. :

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.

Q. 1 Attempt **ANY TWO** of the following: **(10)**

a) Prove the given logical equivalence $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$.

b) Give the indirect proof of following argument :

$\sim p \vee q,\ s \vee p,\ \sim q \mid -s.$

c) Check whether the poset $(D_{42}, |)$ is complemented lattice or not.

Q. 2 Attempt **ANY TWO** of the following: **(10)**

a) Prove that if [B, –, $\vee$, $\wedge$] is a Boolean algebra then the complement 'a'' of any element $a \in B$ is unique.

b) Find the number of integers between 1 to 1000 which are not divisible by 3, nor by 5, nor by 7.

c) Solve the recurrence relation:

$a_r - 8a_{r-1} + 16a_{r-2} = 0$ with initial conditions $a_2 = 16$ and $a_3 = 80$.

Q. 3 Attempt **ANY TWO** of the following: **(10)**

a) Prove that ${}^nC_r = {}^nC_{n-r}$

b) Solve the Fibonacci relation:
$a_n = a_{n-1} + a_{n-2}$ with the initial condition $a_0 = 0,\ a_1 = 1$.

c) Find Disjunctive Normal Form (DNF) of $f(x, y) = \bar{x} + y$

Q. 4 Attempt **ANY FIVE** of the following: **(10)**

a) Check whether the following proposition is tautology or not? And justify your answer: $(\sim q \wedge (p \rightarrow q)) \rightarrow \sim p$.

b) Draw Hasse diagram for poset $(D_{30}, |)$

c) Define: **i)** Bounded Lattice
ii) Distributive Lattice

d) State principle of exclusion – inclusion for two sets.

e) Find homogeneous solution for

$a_n - 9a_{n-1} + 20a_{n-2} = 2 + 5^n$.

f) How many ways are there to arrange the 7 letters in the word 'SYSTEMS'?

g) Define Total solution.

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