F.Y. B. SC. (COMPUTER SCIENCE) SEM – I (2014 COURSE) : WINTER - 2017

SUBJECT : MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE - I

Day : Monday
Date : 30/10/2017

W-2017-0730

Time : 12.00 NOON TO 02.00 PM
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 $p \wedge (q \vee r) \equiv (p \wedge q) \vee (p \wedge r)$

b) If x is an integer then prove that x is even if and only if x^2 is even.

c) Check whether the poset $(D_{15}, |)$ is lattice or not.

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

a) State and prove De-Morgan's law.

b) If coin is flipped 10 times, what is the probability of 8 or more heads?

c) Find the number of integers between 1 to 200 are divisible by 7 or 11.

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

a) Find the particular solution of the recurrence relation:
$a_n = -5a_{n-1} - 6a_{n-2} + 42 \times 4^n$.

b) Find the first six terms of the sequence defined by the following recurrence relation:
$a_n = a_{n-1} + 3a_{n-2}$; $a_0 = 1$, $a_1 = 2$.

c) Find Disjunctive Normal Form (DNF) of boolean function:
$f(x, y, z) = x(y + z)$

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

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

b) Draw Hasse diagram for poset $(D_{12}, |)$

c) Define the terms: **i)** Lower bound
ii) Upper bound.

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

e) Prove that ${}^{n}P_r = {}^{n}C_r \cdot r!$

f) Find homogeneous solution for
$a_n - 7a_{n-1} + 12a_{n-2} = 3 + 2n$.

g) Write the negation of given statement :
$\exists x (P(x) \wedge \sim Q(x))$.

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