

BACHELOR OF SCIENCE (COMPUTER SCIENCE) (CBCS - 2018 COURSE)
F.Y.B.Sc.(Computer Science) Sem-I : WINTER :- 2021
SUBJECT: MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Day : Friday
Date 21-01-2022

W-20068-2021

Time : 10:00 AM-01:00 PM
Max. Marks: 60

N.B:

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

Q.1 Attempt **ANY TWO** of the following: **(12)**

- a) Prove the following logical equivalence by using truth table:
i) $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$ ii) $(p \vee q) \vee r \equiv p \vee (q \vee r)$
- b) Translate into symbolic form and test the validity of the following argument:
If Sachin's computer program is correct, then he will be able to complete his computer science assignment in two hours.
If Sachin completes assignment in two hours then he knows pascal.
Sachin knows pascal.
- c) Solve the recurrence relation: $a_n - 2a_{n-1} = 3^n$, where $a_1 = 1$.

Q.2 Attempt **ANY TWO** of the following: **(12)**

- a) State and prove inclusion- exclusion principle for three sets.
- b) Draw a Hasse diagram of poset $(D_{45}, |)$ and find a complement for each element if exists.
- c) How many integers between 1 to 200 are divisible by 7 or by 11 ?

Q.3 Attempt **ANY TWO** of the following: **(12)**

- a) Prove that, if $[B, -, \vee, \wedge]$ is a Boolean algebra, then the complement a' of any element $a \in B$ is unique.
- b) How many strings of three decimal digits can be formed, with repetitions allowed ;
 - i) that begin with an odd digit
 - ii) have exactly two digits that are 4's.
- c) A committee of 5 members is to be selected from 6 boys and 5 girls. Determine the number of ways of selecting the committee, if it is to consist of at least one boy and one girl.

P.T.O.

Q.4 Attempt **ANY THREE** of the following: **(12)**

- a) Solve the recurrence relation
 $a_r - 8a_{r-1} + 16a_{r-2} = 0$ with $a_2 = 16$ and $a_3 = 80$.
- b) Find the particular solution of the difference equation.
 $a_n = -5a_{n-1} - 6a_{n-2} + 42 \times 4^n$.
- c) Write negation of the following statement:
 - i) All roses in the garden are either pink or white.
 - ii) For some real numbers x and y , $x^2 - y^4$ is negative.
- d) Show that a poset $(D_{12}, |)$ is a lattice.

Q.5 Attempt **ANY FOUR** of the following: **(12)**

- a) Prove that ${}^n C_r = {}^n C_{n-r}$.
- b) How many different arrangements are there of the letters in word 'MISSISSIPPI' ?
- c) Write down any two rules of inferences in logic.
- d) Define the terms:
 - i) Lower bound
 - ii) Upper bound
- e) Find homogenous solution for $a_n - 7a_{n-1} + 12a_{n-2} = 3 + 2n$.
- f) Check whether the following proposition is tautology or not? And justify your answer:
 $((p \vee q) \wedge \sim p) \rightarrow q$.

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