II B. Tech I Semester Supplementary Examinations, January - 2023
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Computer Science & Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions, each Question from each unit
All Questions carry **Equal** Marks
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UNIT-I

1 a) Obtain the Principal conjunctive normal form of $(P\wedge Q)\vee(\sim P\vee Q\vee R)$. [8M]

b) "If there was a ball game, then travelling was difficult. If they arrived on time, then travelling was no difficult. They arrived on time. Therefore, there was no ball game." Show that these statement constitute a valid argument. [7M]

Or

2 a) Prove that the premises $a \rightarrow b \rightarrow c$, $d \rightarrow b \wedge \neg c$ and $a \wedge d$ are inconsistent. [8M]

b) Prove or disprove the validity of the following arguments [7M]
All dogs are carnivorous.
Some animals are dogs.
Therefore, some animals are carnivorous.

UNIT-II

3 a) Draw Hasse diagram representing the partial ordering on $\{(a,b) : a \mid b\}$ on $\{1,2,3,4,6,8,12\}$. [8M]

b) Determine whether * defined by a*b=(a-b)/a on a set N is binary operation. [7M]

Or

4 a) Let $X = \{1,2,3,4\}$ be a set and R is a relation on the set X such that $R = \{(1,1),(1,4),(4,1),(4,4),(2,2),(2,3),(3,2),(3,3)\}$. Draw its matrix and graph. Also prove that R is an equivalence relation. [8M]

b) Define semi-group and monoid. Give examples and properties of each. [7M]

UNIT-III

5 a) 15 males and 10 females are seated in a round table meeting. How many ways they can be seated if all the females seated together? [8M]

b) Find the greatest common divisors of the following pairs of integers 18 and 63. [7M]

Or

6 a) State and prove multinomial theorem? Determine the coefficient of $x^3\, y^3\, z^2$ in the expansion of $(2x - 3y + 5z)^8$? [8M]

b) In how many ways can 14 people be partitioned into 6 teams when the first and second teams have 3 members each and the third, fourth, fifth, and sixth teams have 2 members each? [7M]
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UNIT-IV

7 a) Solve the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 0$ for $n \geq 2$ using generating functions. [8M]

b) Solve $a_n = (a_{n-1})^2(a_{n-2})^3$ where $a_0=4$ and $a_1=4$. [7M]

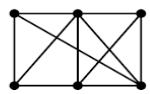
Or

8 a) Solve $na_n + (n-1)a_{n-1} = 2^n$ where $a_0=1$. [8M]

b) Solve the recurrence relation $a_n - 8a_{n-1} + 21a_{n-2} - 18a_{n-3}=0$ for $n\geq3$. [7M]

UNIT-V

9 a) Show that this graph is planar by drawing it in the plane without any edges crossing. Verify Euler's formula for this graph. [8M]



b) Is there a non-simple graph with degree sequence (1,1,3,3,3,4,6,7). Give its diagram. [7M]

Or

10 a) What is the chromatic number of the following [8M]

i) C_n ii) K_n iii) $K_{m,n}$ iv) tree with n vertices

b) Explain Breadth First Search algorithm with example. [7M]