Code No: 133BC **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, August/September - 2022
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSE, IT)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Prove that $R \to S$ can be derived from the premises $p \to (Q \to S)$, $\neg R \vee P$ and Q

b) Prove that $p \to (q \to r) \Leftrightarrow (p \wedge q) \to r$ [8+7]

2.a) Prove that $S \vee R$ is tautologically implied by $(P \vee Q), (P \to R), (Q \to S)$

b) Obtain the principal conjunctive normal form of $(P \wedge Q) \vee (\neg p \wedge R)$ [8+7]

3. Consider the relation R={(a,b),(b,c),(b,d),(d,a),(c,c)}.
a) Draw a digraph for the relation R.
b) Draw a digraph for the relation inverse of R that is R^{-1}.
c) Draw a digraph for the relation complement of R, that is R^c (or) $\overline{R}$.
d) Draw a digraph for the relation intersection of R and inverse of R, $R \cap R^{-1}$. [15]

4. An advertising agency has 1,000 clients. Suppose that T is the set of clientsthat use television advertising, R is the set of clients that use radio advertising, and N is the set of clients who use newspaper advertising. Suppose that |T| = 415, |R| = 350, |N| = 280, 100 clients use all 3 types of advertising, 175 use television and radio, 180 use radio and newspapers, and 165 use televisionand newspapers. Find:
a) How many clients use radio and newspaper advertising but not television?
b) How many clients use television and radio advertising but not newspapers?
c) How many uses television but do not use newspaper advertising and do not use radio advertising?
d) How many clients do not use all three types of advertisements? [15]

5.a) How many integral solutions are there to $x_1+x_2+x_3+x_4+x_5 \leq 19$?

b) Find the number of integers <500 and divisible by 9 or 11 or 13. [7+8]

6.a) A certain question paper contains two parts A and B each containing five questions. How many different ways a student can answer six questions by selecting at least two questions from each part.

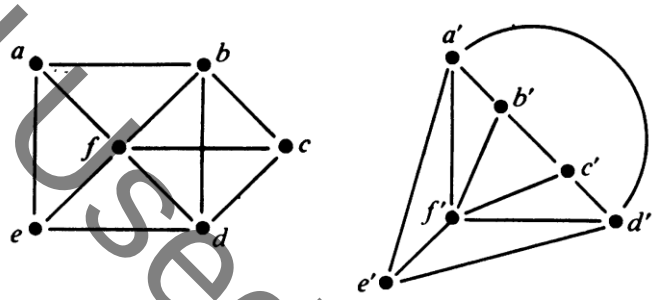
b) A survey of 500 television viewers of a sports channel produced the following information 285 watch cricket, 195 watch hockey, 115 watch football, 45 watch cricket and football, 70 watch cricket and hockey, 50 watch hockey and football and 50 do not watch any of the three kinds of games.
i) How many viewers in the survey watch all three kinds of games?
ii) How many viewers watch only cricket. [8+7]

7.a) Solve the recurrence relation $a_n-6a_{n-1}+12a_{n-2}-8a_{n-3}=0$ for $n\geq 3$.

b) Solve the recurrence relation $a_n - 3a_{n-1} + 2a_{n-2} = 0$, $n\geq 2$, $a_1=5$ and $a_2=3$. [7+8]

8.a) Distinguish In-degree and Out- degree of vertex. Explain with an example.

b) Define isomorphism. Check whether the following graphs shown in figure are isomorphic or not. [6+9]



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