R15

Code No: 123BN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, March - 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) Show that $(p \rightarrow r) \wedge (q \rightarrow r)$ and $(p \vee q) \rightarrow r$ are logically equivalent.
b) What are the negations of the statements $\forall x\ (x^2 > x)$ and $\exists x\ (x^2 = 2)$? [7+8]

2.a) Show that the following statements are logically equivalent without using truth table. (P→Q) ∧ (P→R) ↔P→(Q∧R)?
b) Without constructing the truth tables, obtain the principle disjunctive normal form of $(\neg p \rightarrow r) \wedge (q \leftrightarrow r)$ [8+7]

3.a) If R and S are reflexive, symmetric and transitive, show that R∩S is also reflexive, symmetric and transitive.
b) Show that intersection of any two subgroups of a group G is also a sub group of G.[7+8]

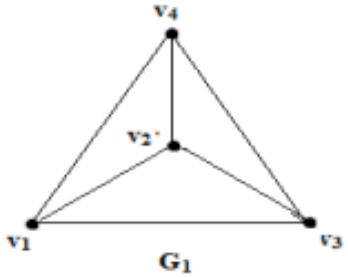
4.a) Let A = {1, 2, 3, 4, 5}, R ={(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (3, 4), (4, 3), (4,4), (5, 5)} and S = {(1, 1), (2, 2), (3, 3), (4, 4), (5, 4), (4, 5), (5, 5)}. Find the smallest-equivalence relation containing R and S and compute the partition of A that it produces.
b) Let L be lattice. Then prove that a∧b = a if and only if a∨b = b. [7+8]

5.a) Explain Multinomial theorem with an example.
b) In how many ways can six boys and four girls be arranged in straight line so that no two girls are sit together. [7+8]

6.a) State and prove the binomial theorem.
b) List the applications of Binomial and Multinomial coefficients. [7+8]

7.a) Solve the recurrence relation $a_n + a_{n-1} - 8\ a_{n-2} - 12\ a_{n-3} = 0$ for n >= 3, given that $a_0 = 1$, $a_1 = 5$, $a_2 = 1$.
b) Discuss different applications of recurrence relations in computer science. [9+6]

8. Define Isomorphism. Establish an isomorphism for the following the graphs. [15]



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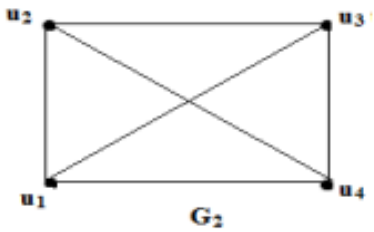

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