

Code No: 53022

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year I Semester Examinations, December-2014

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

(Common to CSE, IT)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) If $p, q,$ and r are any three statements, then using the truth table prove that,
 $(p \wedge q) \vee r = (p \vee r) \wedge (q \vee r)$
- b) Obtain the PDNF and PCNF for the following statement formula:
 $(P \wedge Q) \vee (P \wedge R) \vee (Q \wedge R)$
2. Show that $(\exists x)(p(x) \rightarrow Q(x)) \wedge (\exists x)(Q(x) \rightarrow R(x)) \rightarrow (\exists x)(P(x) \rightarrow R(x))$ using rules of inference.
- 3.a) Draw the Hasse Diagram of $\{P(A), \}$. Where A is any set what are the greatest and least elements? Explain how to find LUB and GLB using Hasse Diagram.
- b) Let $R = \{(b, c), (b, e), (c, e), (d, a), (c, b), (e, c)\}$ be a relation on the set $A = \{a, b, c, d, e\}$. Find the transitive closure of the relation R .
4. Given the algebraic system $\langle N, + \rangle$ and $\langle Z_4, +_4 \rangle$, where N is the set of natural numbers and $+$ is the addition operation on N and Z_4 denote the set of equivalence classes generated as $Z_4 = \{[0], [1], [2], [3]\}$ AND $+_4$ define an operation on Z_4 given by $[i] +_4 [j] = [(i+j) \pmod{4}]$ for all $i, j = 0, 1, 2, 3$. Show that there exists a homomorphism from $\langle N, + \rangle$ to $\langle Z_4, +_4 \rangle$.
- 5.a) How many permutations can be made with letters of the word ENGINEERING ?
- b) In how many ways can four students be selected out of twelve students, if
- two particular students are not included at all?
 - two particular students are included?
- 6.a) Solve the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 0$ where $a_0 = 10$ and $a_1 = 41$.
- b) Find a generating function for the recurrence relation $c_n = 3c_{n-1} - 2c_{n-2}$ for $n \geq 2$ given $c_1 = 5, c_2 = 3$.
7. Explain prim's and krushkal's algorithm with a suitable example.
8. Explain the following with suitable examples:
- Hamiltonian Graph
 - Hamiltonian Circuit
 - Hamiltonian Path.