Code No: R5210502 **R5**

II B.Tech I Semester(R05) Supplementary Examinations, May/June 2010
MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE
(Common to Computer Science & Engineering, Information Technology and Computer Science & Systems Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Compute the truth table of the further
$f = (x\Lambda z)\,\nu\,(7yV\,(7y\Lambda z))\,V\,((x\Lambda 7y)\,\Lambda 7z)$
(b) Define tautology, contradiction and contingency of formula. [10+6]

2. (a) Let P(x) denote the statement. "x is a professional athlete" and let Q(x)denote the statement" "x plays soccer". The domain is the let of all people. Write each of the following proposition in English.
i. $\forall x\,(P\,(x) \rightarrow Q\,(x))$
ii. $\exists x\,(P\,(x)\,\Lambda Q\,(x))$
iii. $\forall x\,(P\,(x)\,VQ\,(x))$
(b) Write the negation of each of the above propositions, both in symbols and in words. [6+10]

3. (a) Let A,B,C $\subseteq R^2$ where A = { (x,y) / y = 2x + 1}, B = { (x,y) / y = 3x} and C = { (x,y) / x - y = 7} . Determine each of the following:
i. $A \cap B$
ii. $\overline{B \cap C}$
iii. $\bar{A} \cup \bar{C}$
iv. $\bar{B} \cup \bar{C}$
(b) State and explain the applications of the pigon hole principle. [12+4]

4. (a) If a, b are any two elements of a group (G, .) which commute show that
i. a^{-1} and b commute,
ii. b^{-1} and a commute and
iii. a^{-1} and b^{-1} commute.
(b) Let S be a non-empty set and o be an operation on S defined by aob=a for a, b $\in$ S. Determine whether o is commutative and associative in S. [12+4]

5. (a) How many possible telephone numbers are there when there are seven digits, the first two are between 2 and 9 inclusive, the third digit between 1 and 9 inclusive, and each of the remaining may be between 0 and 9 inclusive
(b) How many ways are there to pick a man and a woman who are not married from 30 married couples?
(c) How many ways are there to select 2 cards without replacement, form a deck of 52 such that at least one of the cards drawn is an ace? [6+6+8]

6. (a) Solve $a_n - 4a_{n-1} + 4a_{n-2} = (n+1)^2$ given $a_0 = 0$, $a_1 = 1$.
(b) Solve $a_n + 3a_{n-1} + 3a_{n-2} + a_{n-3} = 0$ for n>2 with initial conditions $a_0 = 1, a_1 = -2$ and $a_3 = 1$. [8+8]

7. (a) Explain about the adjacency matrix representation of graphs. Illustrate with an example.
(b) What are the advantages of adjacency matrix representation.
(c) Explain the algorithm for breadth first search traversal of a graph. [5+3+8]

8. (a) Howmany different Hamiltonian cycles are there in K_n, a complete graph with n vertices.
(b) What is the chromatic number of
i. a cycle with add number of vertices
ii. a tree
iii. a complete graph with vertices. [16]

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