Code No: R059210502 **Set No. 4**

II B.Tech I Semester Regular Examinations, November 2007
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) Let p,q and r be the propositions.
P: you have the flee
q: you miss the final examination.
r: you pass the course.
Write the following proposition into statement form.
   i. $P \rightarrow q$
   ii. $7p \rightarrow r$
   iii. $q \rightarrow 7r$
   iv. pVqVr
   v. $(p \rightarrow 7r)\, V\, (q \rightarrow\sim r)$
   vi. $(p \Lambda q)\, V\, (7q \Lambda r)$

   (b) Define converse, contrapositive and inverse of an implication. [12+4]

2. Prove using rules of inference or disprove.

   (a) Duke is a Labrador retriever
   All Labrador retriever like to swin
   Therefore Duke likes to swin.

   (b) All ever numbers that are also greater than
   2 are not prime
   2 is an even number
   2 is prime
   Therefore some even numbers are prime.
   UNIVERSE = numbers.

   (c) If it is hot today or raining today then it is no fun to snow ski today
   It is no fun to snow ski today
   Therefore it is hot today
   UNIVERSE = DAYS. [5+6+5]

3. (a) State and explain the properties of the pigeon hole principle.

   (b) Apply is pigeon hole principle show that of any 14 integere are selected from the set S=$\{1, 2, 3.....25\}$ there are at least two where sum is 26. Also write a statement that generalizes this result.

   (c) Show that if eight people are in a room, at least two of them have birthdays that occur on the same day of the week. [4+8+4]

4. (a) Define Semi group. Verify which of the following are semi groups.
   i. (N, +),
   ii. (Q, -),
   iii. (R, +)
   iv. (Q, o), aob = a - b +ab.
   (b) Prove that in a group G, if a ∈ G, then O(a)= O (a^{-1}). [8+8]

5. (a) In howmany ways can a committee of 5 ladies and 4 gents be chosen from 9 ladies and 15 gents, if gent, A refuses to take part if lady, B is on the committee.
   (b) Howmany 5-card hands have 2 clubs and 3 hearts.
   (c) Howmany 5-card hands consist only of hearts. [16]

6. (a) Solve $a_n = a_{n-1} + a_{n-2}$, $n \geq 2$, given $a_0 = 1$, $a_1 = 1$ using generating functions
   (b) Solve $a_n = 3a_{n-1}, n \geq 1$, using generating functions. [8+8]

7. Derive the
   (a) breadth first tree and
   (b) depth first search spanning trees for the following graph. Figure 7b [8+8]

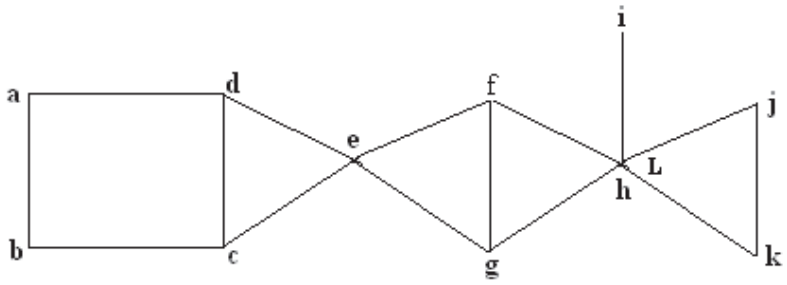

Figure 7b

8. (a) How to determine whether a graph contains Hamiltonian cycle or not using Grin berg theorem.
   (b) Prove or disprove that there is an Hamiltonian cycle in the following graph. Figure 8b [16]

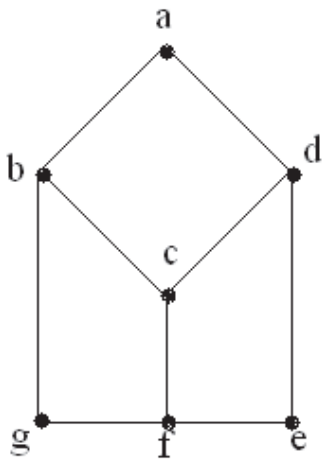

Figure 8b

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