Code No: R05210502 **R05** **Set No. 2**

II B.Tech I Semester Examinations,November 2010
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
Common to Information Technology, Computer Science And Engineering, Computer Science And Systems Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Distinguish between Hamiltonian cycle and Euler cycle. Give examples.
   (b) Determine whether Hamiltonian cycle present in the graph shown in Figure 4b [16]

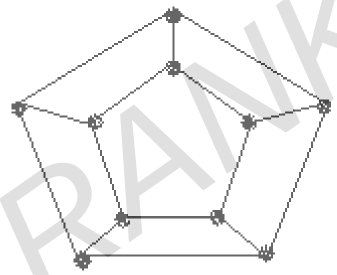

Figure 4b

2. A student is to answer 12 of 15 questions an examination. Howmany choices does the student have
   (a) in all
   (b) if he must answer the first two questions
   (c) if he must answer the first or second but not both
   (d) if he must answer exactly 3 of the first 5 questions
   (e) if he must answer atleast 3 of the first 5 questions. [16]

3. (a) For each of the following functions, determine whether it is one-to one and determine its range
      i. $f : Z \to Z \ f(x) = 2x + 1$
      ii. $f : Q \to Q \ f(x) = 2x + 1$
      iii. $f : Z \to Z \ f(x) = x^3 - x$
      iv. $f : R \to R \ f(x) = e^x$
      v. $f : [0, \Pi] \to R \ f(x) = \sin x$
   (b) Show that the function f: $R \to R$ defined by f(x) = $x^5 - 2x^2 + x$ is an out function. [10+6]

4. (a) State the convers contraposition and unless of each of these implications
    i. If it snows tonight, then i will stay at home
    ii. I go to the beach whenever it is a scummy summer day
    iii. when i stay up late, it is necessary that i sleep until noon.

   (b) Explain the procedure for converting a formula into CNF. [12+4]

5. (a) Find recurrence relation for number of subsets of an n- element set.

   (b) Solve the recurrence relation $a_r - 5a_{r-1} + 6a_{r-2} = 2^r + r$, $r \geq 2$ with the boundary conditions $a_0 = 1$ and $a_1 = 1$, using generating function. [4+12]

6. (a) Define spanning tree. What are its characteristics.

   (b) Derive all possible spanning trees for the graph shown in Figure 1. [6+10]

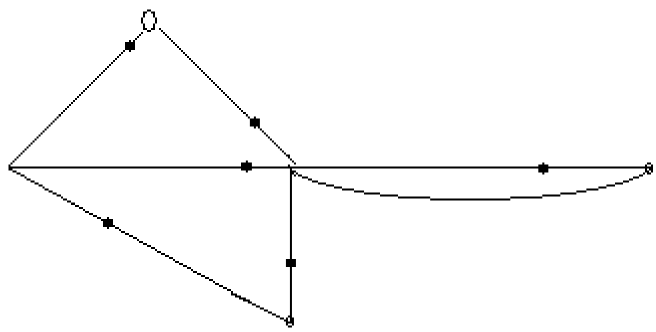

Figure 1

7. (a) Show that the operation o given by aob $= a^b$ is a binary operation on the set of natural numbers N. Is this operation associative and commutative in N?

   (b) If G is the set of all positive rational numbers, then G is an abelian group under the composition defined by o such that aob = (ab)/3 for a, b $\in$ G with usual addition as the operation. Find
    i. the identity of (G,o) and
    ii. inverse of each element of G

   (c) Let G = { -1, 0, 1}. Verify whether G forms a group under
    i. usual addition and
    ii. usual multiplication. [6+6+4]

8. 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 even 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]

⋆⋆⋆⋆⋆

Code No: R05210502 **R05** **Set No. 4**

II B.Tech I Semester Examinations,November 2010
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
Common to Information Technology, Computer Science And Engineering, Computer Science And Systems Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Show that the operation o given by aob = a^b is a binary operation on the set of natural numbers N. Is this operation associative and commutative in N?
   (b) If G is the set of all positive rational numbers, then G is an abelian group under the composition defined by o such that aob = (ab)/3 for a, b ∈ G with usual addition as the operation. Find
      i. the identity of (G,o) and
      ii. inverse of each element of G
   (c) Let G = { -1, 0, 1}. Verify whether G forms a group under
      i. usual addition and
      ii. usual multiplication. [6+6+4]

2. A student is to answer 12 of 15 questions an examination. Howmany choices does the student have
   (a) in all
   (b) if he must answer the first two questions
   (c) if he must answer the first or second but not both
   (d) if he must answer exactly 3 of the first 5 questions
   (e) if he must answer atleast 3 of the first 5 questions. [16]

3. (a) For each of the following functions, determine whether it is one-to one and determine its range
      i. $f : Z \to Z\ f(x) = 2x + 1$
      ii. $f : Q \to Q\ f(x) = 2x + 1$
      iii. $f : Z \to Z\ f(x) = x^3 - x$
      iv. $f : R \to R\ f(x) = e^x$
      v. $f : [0, \Pi] \to R\ \ f(x) = \sin x$
   (b) Show that the function f: $R \to R$ defined by f(x) = $x^5 - 2x^2 + x$ is an out function. [10+6]

4. (a) Define spanning tree. What are its characteristics.

(b) Derive all possible spanning trees for the graph shown in Figure 1. [6+10]

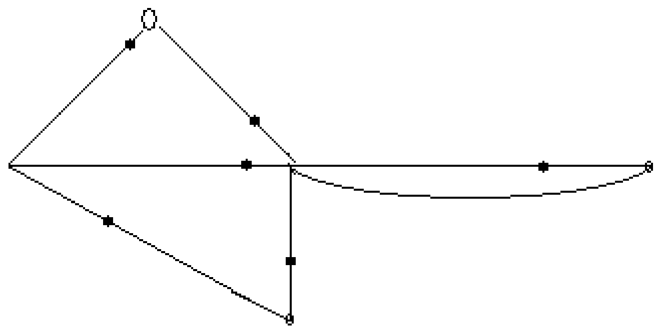

Figure 1

5. 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 even 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]

6. (a) Find recurrence relation for number of subsets of an n- element set.

   (b) Solve the recurrence relation $a_r - 5a_{r-1} + 6a_{r-2} = 2^r + r$, $r \geq 2$ with the boundary conditions $a_0 = 1$ and $a_1 = 1$, using generating function. [4+12]

7. (a) State the convers contraposition and unless of each of these implications

      i. If it snows tonight, then i will stay at home
      ii. I go to the beach whenever it is a scummy summer day
      iii. when i stay up late, it is necessary that i sleep until noon.

   (b) Explain the procedure for converting a formula into CNF. [12+4]

8. (a) Distinguish between Hamiltonian cycle and Euler cycle. Give examples.

   (b) Determine whether Hamiltonian cycle present in the graph shown in Figure 4b [16]

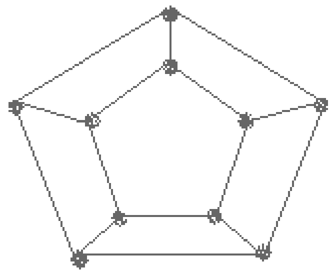

Figure 4b

⋆ ⋆ ⋆ ⋆ ⋆

Code No: R05210502 **R05** **Set No. 1**

II B.Tech I Semester Examinations,November 2010
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
Common to Information Technology, Computer Science And Engineering, Computer Science And Systems Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Find recurrence relation for number of subsets of an n- element set.
   (b) Solve the recurrence relation $a_r - 5a_{r-1} + 6a_{r-2} = 2^r + r$, $r \geq 2$ with the boundary conditions $a_0 = 1$ and $a_1 = 1$, using generating function. [4+12]

2. (a) Distinguish between Hamiltonian cycle and Euler cycle. Give examples.
   (b) Determine whether Hamiltonian cycle present in the graph shown in Figure 4b [16]

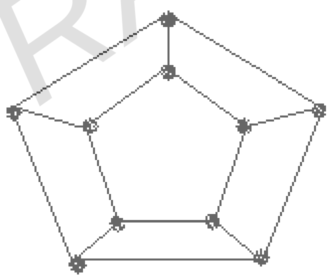

Figure 4b

3. (a) Show that the operation o given by aob = a^b is a binary operation on the set of natural numbers N. Is this operation associative and commutative in N?
   (b) If G is the set of all positive rational numbers, then G is an abelian group under the composition defined by o such that aob = (ab)/3 for a, b $\in$ G with usual addition as the operation. Find
      i. the identity of (G,o) and
      ii. inverse of each element of G
   (c) Let G = { -1, 0, 1}. Verify whether G forms a group under
      i. usual addition and
      ii. usual multiplication. [6+6+4]

4. 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 even 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]

5. A student is to answer 12 of 15 questions an examination. Howmany choices does the student have

(a) in all
(b) if he must answer the first two questions
(c) if he must answer the first or second but not both
(d) if he must answer exactly 3 of the first 5 questions
(e) if he must answer atleast 3 of the first 5 questions. [16]

6. (a) State the convers contraposition and unless of each of these implications
   i. If it snows tonight, then i will stay at home
   ii. I go to the beach whenever it is a scummy summer day
   iii. when i stay up late, it is necessary that i sleep until noon.

   (b) Explain the procedure for converting a formula into CNF. [12+4]

7. (a) Define spanning tree. What are its characteristics.
   (b) Derive all possible spanning trees for the graph shown in Figure 1. [6+10]

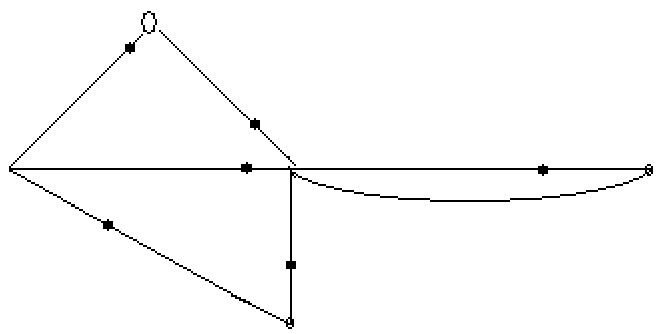

Figure 1

8. (a) For each of the following functions, determine whether it is one-to one and determine its range
   i. $f : Z \to Z \ f(x) = 2x + 1$
   ii. $f : Q \to Q \ f(x) = 2x + 1$
   iii. $f : Z \to Z \ f(x) = x^3 - x$
   iv. $f : R \to R \ f(x) = e^x$
   v. $f : [0, \Pi] \to R \ \ f(x) = \sin x$

   (b) Show that the function f: $R \to R$ defined by f(x) = $x^5 - 2x^2 + x$ is an out function. [10+6]

⋆⋆⋆⋆⋆

Code No: R05210502 **R05** **Set No. 3**

II B.Tech I Semester Examinations,November 2010
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
Common to Information Technology, Computer Science And Engineering, Computer Science And Systems Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Define spanning tree. What are its characteristics.
   (b) Derive all possible spanning trees for the graph shown in Figure 1. [6+10]

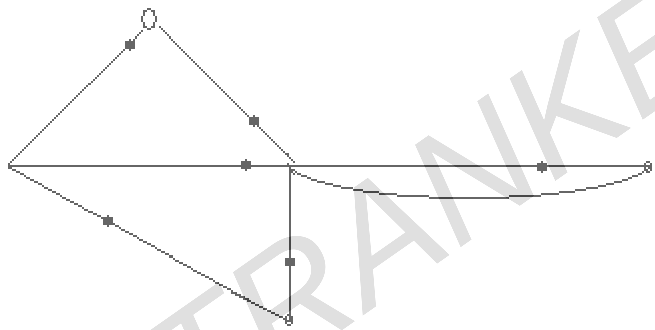

Figure 1

2. (a) For each of the following functions, determine whether it is one-to one and determine its range
      i. $f : Z \to Z\ f(x) = 2x + 1$
      ii. $f : Q \to Q\ f(x) = 2x + 1$
      iii. $f : Z \to Z\ f(x) = x^3 - x$
      iv. $f : R \to R\ f(x) = e^x$
      v. $f : [0, \Pi] \to R\ \ f(x) = \sin x$
   (b) Show that the function f: $R \to R$ defined by f(x) = $x^5 - 2x^2 + x$ is an out function. [10+6]

3. (a) Show that the operation o given by aob = a^b is a binary operation on the set of natural numbers N. Is this operation associative and commutative in N?
   (b) If G is the set of all positive rational numbers, then G is an abelian group under the composition defined by o such that aob = (ab)/3 for a, b ∈ G with usual addition as the operation. Find
      i. the identity of (G,o) and
      ii. inverse of each element of G
   (c) Let G = { -1, 0, 1}. Verify whether G forms a group under

i. usual addition and

ii. usual multiplication. [6+6+4]

4. (a) Distinguish between Hamiltonian cycle and Euler cycle. Give examples.

   (b) Determine whether Hamiltonian cycle present in the graph shown in Figure 4b

[16]

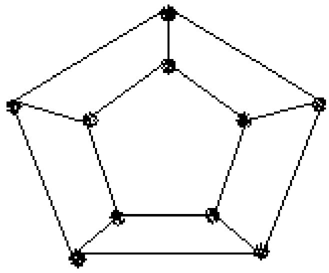

Figure 4b

5. (a) Find recurrence relation for number of subsets of an n- element set.

   (b) Solve the recurrence relation $a_r - 5a_{r-1} + 6a_{r-2} = 2^r + r$, $r \geq 2$ with the boundary conditions $a_0 = 1$ and $a_1 = 1$, using generating function.

[4+12]

6. 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 even 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]

7. A student is to answer 12 of 15 questions an examination. Howmany choices does the student have

   (a) in all

   (b) if he must answer the first two questions

(c) if he must answer the first or second but not both

(d) if he must answer exactly 3 of the first 5 questions

(e) if he must answer atleast 3 of the first 5 questions. [16]

8. (a) State the convers contraposition and unless of each of these implications

   i. If it snows tonight, then i will stay at home

   ii. I go to the beach whenever it is a scummy summer day

   iii. when i stay up late, it is necessary that i sleep until noon.

   (b) Explain the procedure for converting a formula into CNF. [12+4]

⋆⋆⋆⋆⋆