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

II B.Tech I Semester Examinations,May/June 2012
MATHEMATICAL FOUNDATION 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) Using the digits 1,3,4,5,6,8 and 9 how many 3-digit numbers can be formed
   (b) How many 3-digit numbers can be formed if no digit is repeated?
   (c) How many 3-digit numbers can be formed if 3 and 4 are adjacent to each other?
   (d) How many 3-digit numbers can be formed if 3 and 4 are not adjacent to each other? [4+4+4+4]

2. (a) Show that the set Z of integers is a group w.r.t usual addition.
   (b) Prove that every homomorphic image of an abelian group is abelian. [8+8]

3. (a) Write a brief note about the basic rules for constructing Hamiltonian cycles.
   (b) Using Grinberg theorem find the Hamiltonian cycle in the following graph. Figure 1. [16]

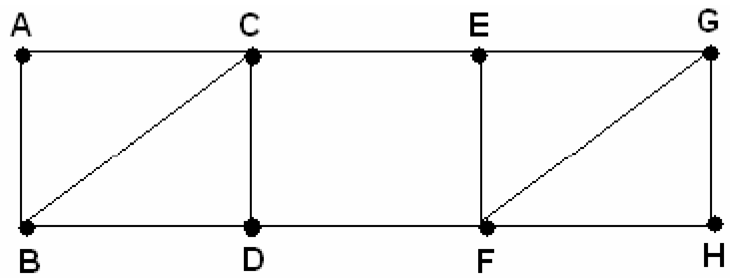

Figure 1

4. (a) Derive all six possible spanning trees from the graph, given Figure 2.

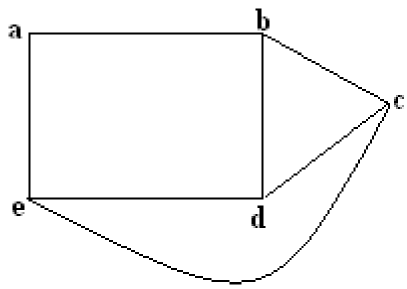

Figure 2

   (b) State and prove Euler's formula for a connected planar graph. [8+8]

5. (a) Explain using examples the rules of Inference
   (b) Using rules of logic show that $((PVq) \times not\ p) \rightarrow q$ is a tautology. [6+10]

6. (a) Compute the truth table of the function
   $f = (x \wedge z) \vee (\rceil y \vee (\rceil y \wedge z)) \vee ((x \wedge \rceil y) \wedge \rceil z$
   (b) Define tautology, contradiction and contingency of formula. [10+6]

7. (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]

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

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

II B.Tech I Semester Examinations,May/June 2012
MATHEMATICAL FOUNDATION 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

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1. (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]

2. (a) Show that the set Z of integers is a group w.r.t usual addition.
   (b) Prove that every homomorphic image of an abelian group is abelian. [8+8]

3. (a) Derive all six possible spanning trees from the graph, given Figure 3.

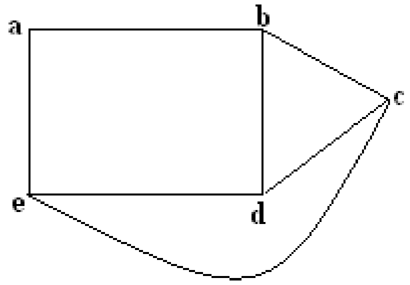

Figure 3

   (b) State and prove Euler's formula for a connected planar graph. [8+8]

4. (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]

5. (a) Compute the truth table of the function
   $f = (x \wedge z) \vee (\rceil y \vee (\rceil y \wedge z)) \vee ((x \wedge \rceil y) \wedge \rceil z$
   (b) Define tautology, contradiction and contingency of formula. [10+6]

6. (a) Explain using examples the rules of Inference
   (b) Using rules of logic show that ((PVq) $\times$ *not p*) $\rightarrow q$ is a tautology. [6+10]

7. (a) Using the digits 1,3,4,5,6,8 and 9 how many 3-digit numbers can be formed
   (b) How many 3-digit numbers can be formed if no digit is repeated?
   (c) How many 3-digit numbers can be formed if 3 and 4 are adjacent to each other?
   (d) How many 3-digit numbers can be formed if 3 and 4 are not adjacent to each other? [4+4+4+4]

8. (a) Write a brief note about the basic rules for constructing Hamiltonian cycles.
   (b) Using Grinberg theorem find the Hamiltonian cycle in the following graph. Figure 4. [16]

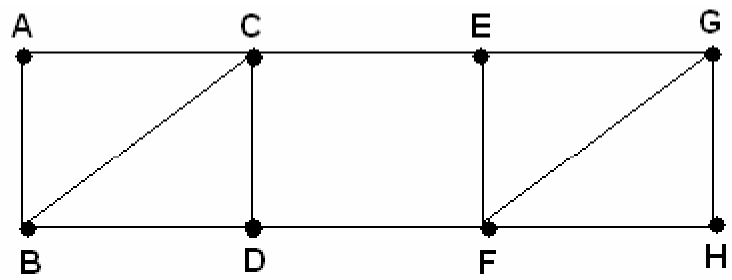

Figure 4

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

II B.Tech I Semester Examinations,May/June 2012
MATHEMATICAL FOUNDATION 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) Write a brief note about the basic rules for constructing Hamiltonian cycles.
   (b) Using Grinberg theorem find the Hamiltonian cycle in the following graph. Figure 5. [16]

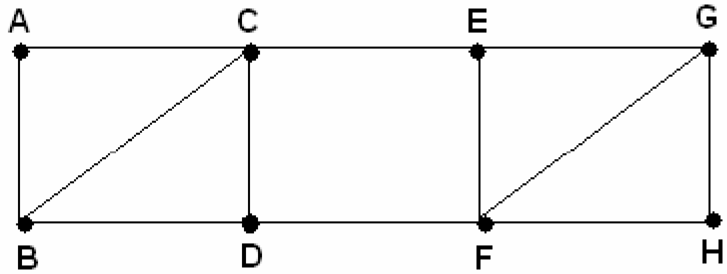

Figure 5

2. (a) Explain using examples the rules of Inference
   (b) Using rules of logic show that ((PVq) $\times$ *not p*) $\rightarrow q$ is a tautology. [6+10]

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

4. (a) Using the digits 1,3,4,5,6,8 and 9 how many 3-digit numbers can be formed
   (b) How many 3-digit numbers can be formed if no digit is repeated?
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   (d) How many 3-digit numbers can be formed if 3 and 4 are not adjacent to each other? [4+4+4+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) Compute the truth table of the function
$f = (x \wedge z) \vee (\neg y \vee (\neg y \wedge z)) \vee ((x \wedge \neg y) \wedge \neg z$

(b) Define tautology, contradiction and contingency of formula. [10+6]

7. (a) Show that the set Z of integers is a group w.r.t usual addition.

(b) Prove that every homomorphic image of an abelian group is abelian. [8+8]

8. (a) Derive all six possible spanning trees from the graph, given Figure 6.

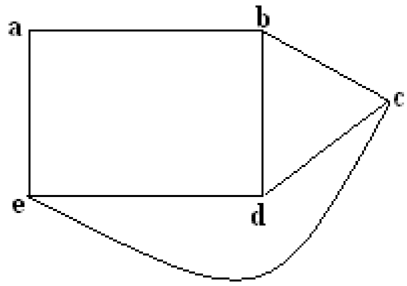

Figure 6

(b) State and prove Euler's formula for a connected planar graph. [8+8]

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

II B.Tech I Semester Examinations,May/June 2012
MATHEMATICAL FOUNDATION 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

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1. (a) Derive all six possible spanning trees from the graph, given Figure 7.

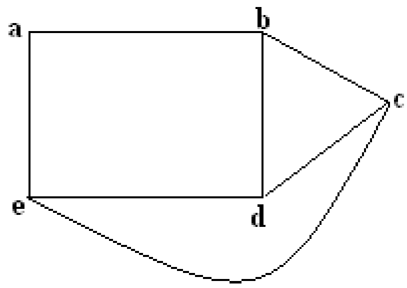

Figure 7

   (b) State and prove Euler's formula for a connected planar graph. [8+8]

2. (a) Show that the set Z of integers is a group w.r.t usual addition.
   (b) Prove that every homomorphic image of an abelian group is abelian. [8+8]

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) 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]

5. (a) Explain using examples the rules of Inference
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6. (a) Compute the truth table of the function
$f = (x \wedge z) \vee (\neg y \vee (\neg y \wedge z)) \vee ((x \wedge \neg y) \wedge \neg z$

(b) Define tautology, contradiction and contingency of formula. [10+6]

7. (a) Write a brief note about the basic rules for constructing Hamiltonian cycles.

(b) Using Grinberg theorem find the Hamiltonian cycle in the following graph. Figure 8. [16]

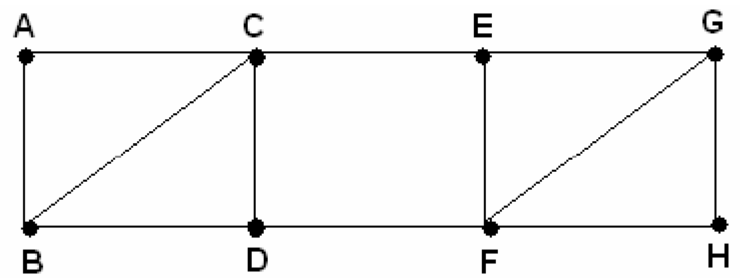

Figure 8

8. (a) Using the digits 1,3,4,5,6,8 and 9 how many 3-digit numbers can be formed

(b) How many 3-digit numbers can be formed if no digit is repeated?

(c) How many 3-digit numbers can be formed if 3 and 4 are adjacent to each other?

(d) How many 3-digit numbers can be formed if 3 and 4 are not adjacent to each other? [4+4+4+4]

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