Code No: RT21052 **R13** SET - 1

II B. Tech I Semester Supplementary Examinations, June - 2015
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE AND ENGINEERING
(Com. to CSE, IT, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART-A

1. a) What is a Well Formed Formula? What are rules of the Well Formed Formulas? Explain
   b) Explain in brief about Greatest common divisor with an example?
   c) Draw the Hasse diagram for the poset $(P(S), \supseteq)$, where S={1,2,3,4}
   d) Prove that if G is a non trivial tree then G contains at least 2 vertices of degree 1 ?
   e) In how many ways can we chose a black square and white square on an 8 X 8 chessboard?
   f) Explain in brief about Recurrence relation? (4M+3M+4M+4M+4M+3M)

PART-B

2. a) Prove or disprove the validity of the following arguments using the rules of inference.
   i) All men are fallible ii) All kings are men iii) Therefore, all kings are fallible
   b) Show that the following statements is a tautology.
   $(\sim P \wedge (P \rightarrow Q)) \rightarrow \sim Q$ (8M+8M)

3. a) Explain the theorem of principle of inclusion and exclusion for three variables with an example?
   b) Explain in brief about Properties of integers? (8M+8M)

4. a) How many relations are there on a set with `n' elements? If a set A has `m' elements and a set B has `n' elements, how many relations are there from A to B? If a set A = {1, 2}, determine all relations from A to A.
   b) Draw the Hasse diagram of $(P(S), \leq)$, where P(S) is power set of the set S={a,b,c}? (8M+8M)

5. a) Prove that a connected plane graph with 7 vertices and degree(V) = 4 for each vertex V of G must have 8 regions of degree 3 and one region of degree 4.?
   b) How many vertices will the graph contain 6 edges and all vertices of degree 3? (8M+8M)

6. a) Eight people enter an elevator at the first floor. The elevator discharges a passenger on each successive floor until it empties on The fifth floor. How Many different ways can this happen?
   b) 15 males and 10 females are members are seated in a round table meeting. How many ways they can seated if all the females seated together? (8M+8M)

7. a) Solve the recurrence relation un+2-un+1-12un=10, u1=13, u0=0.
   b) Solve the recurrence relation un+2+4un+1+3un=5(-2)n,u0=1,u1=0 using gen-erating function. (8M+8M)
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PART-A

1. a) Find the truth table for the propositional formula $(P \leftrightarrow \sim Q) \leftrightarrow (Q \rightarrow P)$?
   b) Explain in brief about principle of inclusion with an example?
   c) Draw the Hasse diagram of $(P(S), \geq)$, where P(S) is power set of the set S = {a, b, c}?
   d) Discuss graph coloring problem with required examples. ?
   e) Find the sum of all 4 digit numbers that can be obtained by using the digits 2, 3, 5 and 7 (without repetition)?
   f) Find the generating function of n^2-2? (4M+3M+4M+4M+4M+3M)

PART-B

2. a) Construct the truth table for the following statement $(\sim P \leftrightarrow \sim Q) \leftrightarrow (Q \leftrightarrow R)$?
   b) Show that the following statements are logically equivalent without using truth table. $(P \rightarrow Q) \wedge (P \rightarrow R) \leftrightarrow P \rightarrow (Q \wedge R)$? (8M+8M)

3. a) Explain in brief about Fermats theorem?
   b) Explain in brief about Division theorem? (8M+8M)

4. a) Draw the Hasse diagram for the poset $(P(S), \subseteq)$, where S={1,2,3,4}
   b) Let X = {1, 2, 3, 4, 5, 6, 7} and R= {(x,y)/ x-y is divisible by 3} in X. show that R is an Equivalence Relation.? (8M+8M)

5. a) State the kruskal's algorithm for Finding Minimal Spanning Tree? Explain it with an Example?
   b) Describe an algorithm to decide whether a graph is bipartite? (8M+8M)

6. a) Compute the number of 10-digit numbers which contain only the digits 1,2 and 3 with the digit 2 appearing in each number twice?
   b) Let G be a group of order P , where P is a prime. Find all subgroups of G.? (8M+8M)

7. a) Find a particular solution for recurrence relation using the method of determined coefficients an- 7 an-1+12an-2=n.2^n
   b) Solve an=an-1 + n where a0 =2 by substitution? (8M+8M)
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Code No: RT21052 **R13** SET - 3

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PART-A

1. a) What is the compound statement that is true when exactly two of the three statements P , Q and R are true ?
   b) Explain in brief about principle of exclusion with an example?
   c) Prove that $A - (B \cap C) = (A-B) \cup (A-C)$?
   d) Define and explain planar graphs with examples?
   e) Show that the identity element in a group is unique?
   f) Find the generating function of (n-1)2? (4M+3M+4M+4M+4M+3M)

PART-B

2. a) Determine the truth value of each of the following statements
   i) 6 + 2 = 7 and 4 + 4 = 8. ii) four is even. iii) 4 + 3 = 7 and 6 + 2 = 8.
   b) Write each of the following statements in symbolic form
   i) Anil & Sunil are rich. ii) Neither Ramu nor Raju is poor.
   iii) It is not true that Ravi & Raju are both rich. (8M+8M)

3. a) Explain in brief about Eulers Theorem with Example?
   b) Explain in brief about Least common multiple with Example? (8M+8M)

4. a) Let A = {1, 2, 3, 4}and P ={{1, 2,3},{4}} be a partition of A. Find the equivalence relation determined by P. ?
   b) If A, B, C are three sets such that $A \subseteq B$. show that $(A \times C) \subseteq (B \times C)$? (8M+8M)

5. a) Write the rules for constructing Hamiltonian paths and cycles?
   b) Write the difference between Hamiltonian graphs and Euler graphs? (8M+8M)

6. a) Consider the group G = {1,2,4,7,8,11,13,14} under multiplication Modulo 15.Construct the multiplication table of G and verify whether G is cycle or not?
   b) Prove that H = {0,2,4,}forms a sub group of < Z6 ,+6>? (8M+8M)

7. a) Solve the difference equation un-2un-1 2=(5).2 ?
   b) Find a particular solution for recurrence relation using the method of determined coefficients an- 5 an-1=3^n ? (8M+8M)
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PART-A

1. a) Using predicate logic, prove the validity of the following argument "Everyhusband argues with his wife.`X' is A husband. Therefore,`X'argues With his wife".?
   b) Explain in brief about modular arithmetic?
   c) If A = {1,2,3}, B={4,5}.Find A X B and B X A ?
   d) How many edges does a graph have if it has vertices of degree 4,3,3,2,2?Draw such a graph?
   e) State the binomial theorem?
   f) Solve the an - 6an-1+8 an-2 = n .4 where a0 =8 and a 1=22? (4M+3M+4M+4M+4M+4M+3M)

PART-B

2. a) Obtain the PCNF of the following formula (~P→R) ∧ (Q→P)
   i) Using Truth Table. ii) Without using Truth Table.
   b) What is the negation of the statement " 2 is even and -3 is negative?" (8M+8M)

3. a) Explain in brief about Euclidean algorithm?
   b) Explain in brief about testing the prime numbers? (8M+8M)

4. a) A function f(Z X Z)→ Z is defined by f(x,y)=4x=5y.Prove that f is not one-to-one, but on to?
   b) Let f(x): x2 -3x+2. Find f(x2) and f(x+3)? (8M+8M)

5. a) Prove that isomorphism is an equivalence relation on diagraphs?
   b) How many equivalence classes are there for loop-free diagraphs with three vertices? (8M+8M)

6. a) One type of automobile license plate number in Masachusetts consists of one letter and Five digits. Compute the number of such license plate numbers possible.?
   b) Find the number of positive integers less than are equal to 2076 and divisible by 3 or 4? (8M+8M)

7. a) Define recurrence relation? Show that the sequence {an} is a solution of re-currence relation an=-3an-1 +4an-2 if an =1 ?
   b) What is solution of the recurrence relation an = an-1+2 an-2 with a0 =2 and a1 =7? (8M+8M)
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