Code No: 133BC

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSE, IT)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Represent the proposition "If you have the flee then you miss the final examination" into symbolic form and also it negation.   [2]
 b) Provide a proof by direct method of the following statement, "If x is odd then x^2 is odd".   [3]
 c) Differentiate partial ordering and total ordering relations.   [2]
 d) Define lattice and write its properties.   [3]
 e) Find out how many 5-digit numbers greater than 30,000 can be formed from the digits 1,2,3,4 and 5.   [2]
 f) In how many ways can we draw a heart or queen from a pack of cards.   [3]
 g) Define recurrence relation and explain recurrence relation for towers of Hanoi.
                                                                                                                                  [2]
 h) Solve recurrence relation $a_n - 4a_{n-1} + 4a_{n-2} = 0$, $a_0 = 0$, $a_1 = 1$.   [3]
 i) Define complete graph and wheel graph.   [2]
 j) Define planar graph and write conditions for testing planarity of the graph .[3]

PART-B

(50 Marks)

2.a) State and explain the rules that can generate a well formed formula.
 b) Show that R $\rightarrow$ S can be derived from premises, P $\rightarrow$ (Q $\rightarrow$ S), (~R $\vee$ P) and Q.
                                                                                                                                  [5+5]

OR

3.a) Define PDNF and find PDNF for (~P $\leftrightarrow$ R) $\wedge$ (Q $\leftrightarrow$ P).
 b) Prove or disprove the validity of the following arguments using the rules of inference, All men are fallible, All kings are men, Therefore, all kings are fallible.
                                                                                                                                  [5+5]

4.a) If a, b are any two elements of a group (G, .) which commute, show that a^{-1} and b commute, b^{-1} and a commute, a^{-1} and b^{-1} commute.
 b) Let A= {1,2,3,4,6,8,12,24}, show that the relation 'divides' is partial ordering on A and draw Hasse diagram.   [5+5]

OR

5.a) Let G = {-1, 0, 1}, verify whether G forms a group under usual addition.
 b) Show that the sets of even numbers and odd numbers are both recursive.   [5+5]

6.a) Find the number of integers between 1 and 250 which are divisible by any of the integers 2,3,5 or 7 and hence find the number of integers between 1, 250 which are not divisible by 2, 3, 5 or 7.

b) State and prove binomial theorem. [5+5]

OR

7.a) The letters of the word VICTORY are rearranged in all possible ways and the words thus obtained are arranged as in a dictionary, what is the rank of the given word?

b) Use multinomial theorem to expand $(x_1+x_2+x_3+x_4)^4$. [5+5]

8.a) Solve the recurrence relation $a_n - 5a_{n-1} + 6a_{n-2} = (n+1)^2$, $a_0=0$, $a_1=1$.

b) Solve the recurrence relation $a_n - 7a_{n-1} + 10a_{n-2} = 4^n$, $a_0=0$, $a_1=1$. [5+5]

OR

9.a) Explain Fibonacci relation with suitable examples and also solve it.

b) Solve $a_n - 7a_{n-1} + 10a_{n-2} = 0$, $a_0=10$, $a_1=41$ using generating functions. [5+5]

10.a) In any planar graph, show that $|V|-|E|+|R|=2$.

b) Prove that complete graph of 5 vertices is non planar. [5+5]

OR

11.a) Write an algorithm for breadth-first search spanning tree.

b) Write Kruskal's Algorithm and explain it with an example. [5+5]

---ooOoo---