

FACULTY OF INFORMATICS

B.E. 2/4 (IT) I – Semester (Main.) Examination, December 2013

Subject: **Discrete Mathematics**

Time: 3 Hours

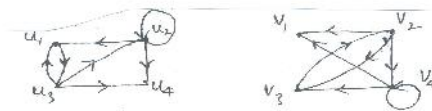
Max.Marks : 75

Note: Answer all questions from Part – A. Answer any five questions from Part – B.**PART – A** (25 Marks)

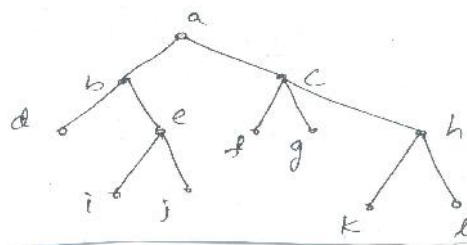
1. What is the value of quotient 'q' and the remainder 'r' when $a = 58^{237}$ and $d = 58^{168}$ using division algorithm. 2
2. Construct the truth table for $(p \leftrightarrow q) \oplus (\neg p \leftrightarrow \neg r)$. 3
3. Write the recursive algorithm for Fibonacci numbers. 2
4. How many different strings can be made by reordering the letters of the word 'VICTORY'? 3
5. Find the solutions to the recurrence relation with the initial conditions $a_0 = 2$, $a_1 = 5$, $a_n = 6a_{n-1} - 11a_{n-2}$. 3
6. Find the number of positive integers not exceeding 100 that are not divisible by 5 or by 7. 2
7. Define isolated vertex, pendent vertex, and pseudo graph. 3
8. Define colouring of a graph. What do you mean by chromatic number of a graph? 2
9. Find the minterm that equals '1' if $x_1 = x_3 = 0$ and $x_2 = x_4 = x_5 = 1$ and equal '0' otherwise. 2
10. Draw the K-maps for (a) $xy + \bar{x}y$ (b) $x\bar{y} + \bar{x}y$ (c) $x\bar{y} + \bar{x}y + \bar{x}\bar{y}$ 3

PART – B (50 Marks)

- 11.(a) Use rule of inference to show that the hypothesis "Randy works hard", "If Randy works hard, then he is dull boy", and "If Randy is a dull boy, then he will not get job" imply the conclusion "Randy will not get the job". 6
- (b) Check for tautology $[(pvq) \wedge (p \rightarrow r) \wedge (q \rightarrow r)] \rightarrow r$ 4
- 12.(a) Use mathematical induction to show that $\bigcap_{j=1}^n A_j = \overline{\bigcup_{j=1}^n \bar{A}_j}$ 5
- (b) How many ways are there to select 12 countries in the United Nations to serve on a council if 3 are selected from a block of 45, 4 are selected from a block of 57, and the others are selected from the remaining 69 countries? 5
- 13.(a) Find the recurrence relations for the number of ways to climb 'n' steps if the person climbing the steps can take one step or 2 steps at a time. 5
- (b) There are 345 students at a college who have taken a course in calculus, 212 who have taken a course in discrete mathematics, and 188 who have taken courses in both calculus and discrete mathematics. How many students have taken a course in either calculus or discrete mathematics? 5
- 14.(a) Define Hasse diagram. Draw the Hasse diagram representing the partial ordering $\{(a,b) / a \text{ divides } b\}$ on $\{1,2,3,4,6,8,12\}$. 5
- (b) Determine whether the given pair of directed graphs are isomorphic. 5



- 15.(a) Describe prim's algorithm, with an example. 5
- (b) Minimize the function $f = \sum_m (0,5,10,15) + \sum_d (1,7,11,13)$ where \sum_d denotes don't care minterms using map techniques. 5
- 16.(a) Show that K_n has a Hamilton circuit when ever $n \geq 3$. 5
- (b) Discuss the depth first search algorithm for spanning trees. 5
- 17.(a) Find the solution of the recurrence relation $a_n = 5a_{n-1} - 6a_{n-2} + 7^n$ 5
- (b) Define inorder traversal in an ordered rooted tree. 5



Give the inorder traversal of the above tree.
