Code No. 2030

FACULTY OF INFORMATICS

B.E. 2/4 (IT) I – Semester (Suppl.) Examinations, May 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 are the contrapositive, the opposite of the conditional statement "If the triangle is equiangular, then it is equilateral". 3
2. Define converse with an example _____ . 2
3. Define Tautology with an example. 2
4. State Demorgan law ; write truth table for any one law _____ . 3
5. Define the universal quantifier with an example. 2
6. What is the difference between the quantification $\exists x \forall y\, P(x, y)$ and $\forall y \exists x\ P(x, y)$. Where P(x, y) is a predicate? 3
7. Disprove the statement that "every positive integer is the sum of atmost two squares and a cube of non-negative integers. 3
8. Explain what is means for a function to be 0(1). 2
9. Define partially ordered set. 3
10. Define Euler circuit and Euler path. 2

PART – B (50 Marks)

11.a) Construct truth table for the following $(P \rightarrow Q) \vee (\sim P \rightarrow R)$. 4

b) Show that the following statement are logically equivalent without using truth table.
$(P \rightarrow R) \wedge (Q \rightarrow R) \Leftrightarrow (P \vee Q) \rightarrow R$. 6

12.a) Explain rules of inference using examples. 6

b) Use truth table to verify the associative law $(P \vee Q) \vee r = P \vee (q \vee r)$ 4

13.a) Prove by the principle of mathematical induction for 'n' a +ve integer
$1^2 + 2^2 + 3^2 + ... + n^2 = \frac{n(n+1)(2n+1)}{6}$ 5

b) Show that $f(x)=x^2 + 2x + 1$ is $0(x^2)$. 5

..2

14.a) For each of the following functions, determine whether it is one-to-one and determine its range. 4

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) $f : R \rightarrow R$; $f(x) = e^x$

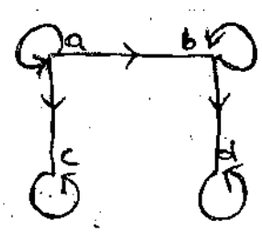
b) Find the number of +ve integers between 1000 and 9999, inclusive are not divisible by 5 or 7? 6

15.a) Solve $a_{n+2} + 49_{n+1} + 3a_n = 5(-2)^n$ with $a_0 = 1$, $a_1 = 0$. 5

b) Determine the co-efficient of x^4 and x^5 in $(a+bx+cx^2)^{10}$. 5

16.a) Show that the relation R on a Set A is symmetric iff $R = R^{-1}$, where R^{-1} is the inverse relation. 5

b) Is the relation given in directed graph shown is a partial order? 5



17. What do you mean by a spanning tree? Explain BFS method for finding a spanning tree with an example. 10

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