Code No. 6026

FACULTY OF ENGINEERING

B.E. 2/4 (CSE) I – Semester (Main) Examination, November 2013

Subject : Discrete Structures

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. Construct truth table for the compound statement. 2

   $q \leftrightarrow (\neg p \vee \neg q)$; where p,q are the primitive statement

2. Negate and simplify the compound statement : $P \rightarrow (\neg q \wedge r)$. 3

3. Determine all of the elements in $\{n+(1/n) \mid n \in \{1,2,3,5,7\}\}$. 3

4. Let A, B $\in R^2$ where A = {(x, y)/y = 2x + 1}, B = {(x, y)/y = 3x}. Determine A $\cap$ B. 2

5. Write and explain the properties of Binary Relation. 3

6. If |A| = n $\geq$ 1. How many different relations on A are irreflexive? How many are neither reflexive nor irreflexive. 3

7. Find the general solution for the recurrence relation. 2

   $3a_{n+1} - 4a_n = 0$, $n \geq 1$, $a_1 = 5$.

8. Define algebraic system. Write its properties. 3

9. What is subgroup homomorphism? Give its equation. 2

10. What is chromatic number? Find the chromatic number for the following graph (G). 2

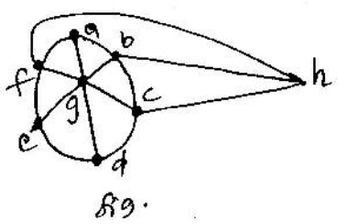


Fig.

PART – B (50 Marks)

11.a) Establish the validity for the following arguments. 5

$P \rightarrow (q \rightarrow r)$
$P \vee S$
$t \rightarrow q$
$\neg s$
$\therefore \neg r \rightarrow \neg t$

b) Prove $\overline{A \Delta B} = (\overline{AUB}) \cap (\overline{A \cap B})$, where A, B are finite sets. 5

..2

12.a) Let $f, g : R \to R$, where $g(x) = 1 - x + x^2$ and $f(x) = ax + b$. If (gof) $(x) = 9x^2 - 9x + 3$, determine a, b. 5

b) Determine the number of positive interms n, $1 \leq n \leq 2000$, that are not divisible by 2,3,5 or 7. 5

13.a) Determine the sequence generated by the following generating function : $f(x) = x^4 / (1 - x)$. 4

b) Find the co-efficient of x^{50} in $(x^7 + x^8 + x^9 + ...)^6$. 6

14. Solve the recurrence relation :

$a_n^2 - 2_{an-1} = 0 \quad n \geq 1, \quad a_0 = 2$ (Let $a = \log_2 an, n \geq 0$). 10

15.a) Prove that $(Q+, \star)$ where $\star$ is binary operator defined by $a \star b = a\,b/5$ is a group. 5

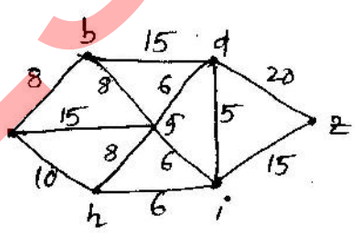
b) List and explain the applications of group codes with suitable example. 5

16.a) Find the dual for the following planar graph. 5

fig.

b) Let G be a cycle on n vertices. Prove that G is self complementary iff n = 5. 5

17. Write the Kruskals algorithm. Apply this algorithm for finding the minimal cost spanning tree for the following graph. 10



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