

Subject : Mathematical Foundations

Day : Friday
Date : 06/06/2014



Time : 02.00 P.M. TO 05.00 P.M.
Max Marks : 80 Total Pages : 2

N.B.:

- 1) Attempt any **FIVE** questions from Section-I and any **TWO** questions from Section-II.
- 2) Both the sections should be written in the **SAME** answer book.
- 3) Figures to the **RIGHT** indicate full marks.

SECTION-I

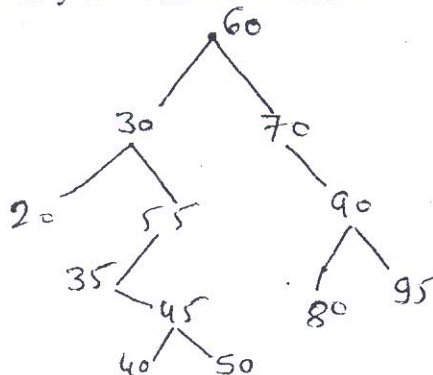
- Q.1** a) Construct the truth table for the following statement $(p \rightarrow \sim q) \vee (\sim r \rightarrow p)$. (05)
 b) If A, B, C are three sets, then prove that $A - (B \cup C) = (A - B) \cap (A - C)$. (05)
- Q.2** a) Prove that for a natural number n, $1 + 3 + 5 + \dots + (2n - 1) = n^2$. (05)
 b) Prove the following identity : (05)
 $(A \cup B) \cap (A \cup B') = A$.
- Q.3** a) Let A and B be any non empty sets. Prove that a function $f : A \rightarrow B$ is invertible if and only if f is both one to one and onto. (05)
 b) Let R be the following equivalence relation on the set $A = \{1, 2, 3, 4, 5, 6\}$. (05)
 $R = \{(1, 1), (1, 5), (2, 2), (2, 3), (2, 6), (3, 2), (3, 3), (3, 6), (5, 5), (4, 4), (5, 1), (6, 2), (6, 3), (6, 6)\}$. Find the equivalence class of elements of A induced by R.

- Q.4** State and prove Prim's algorithm. Use this algorithm to find a minimal spanning tree in the graph shown in figure. (10)



- Q.5** Describe the merge sort algorithm. (10)

- Q.6** Consider the following binary tree and insert ITEM = 33 into the tree. Find the new tree. (10)

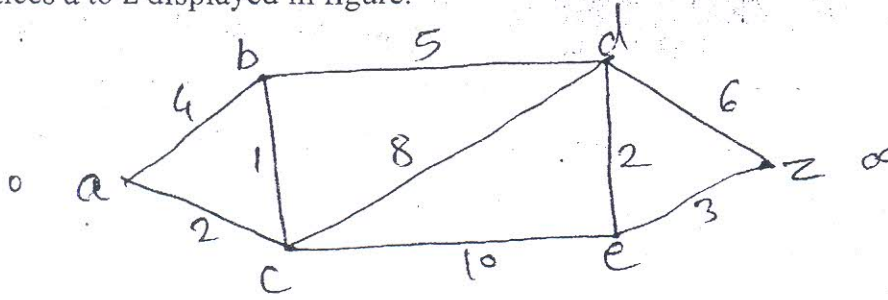


- Q.7** Write short notes on the following: (10)
 i) Quantifiers ii) 2-Tree.

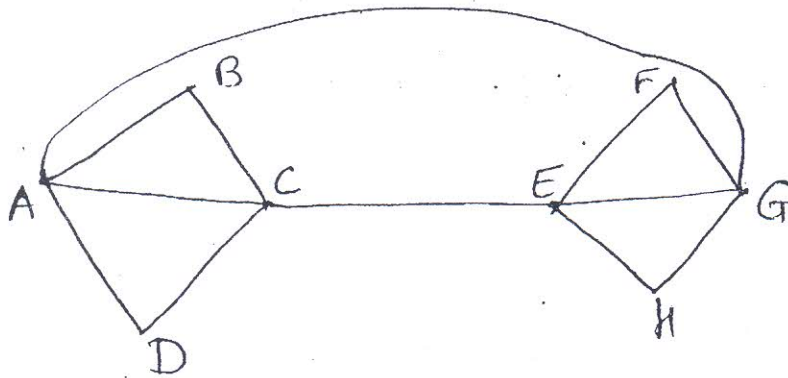
P.T.O.

SECTION-II

Q.8 Use Dijkstra's algorithm to find the length of the shortest path between the (15) vertices a to z displayed in figure.



Q.9 State the Fleury's algorithm. Use this algorithm to construct an Euler circuit for (15) the graph in the following figure.



Q.10 a) Using the laws of proposition, show that (08)

$$\sim(p \vee q) \vee (\sim p \wedge q) \equiv \sim p$$

b) Obtain the principal disjunctive normal form of $\sim p \cup q$. (07)

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Subject : Procedure Oriented Programming

Day : Wednesday
Date : 04/06/2014

S.D.E.

Time : 02.00 P.M. TO 05.00 P.M.
Max Marks : 80 Total Pages : 1

N.B

- 1) Attempt Any **THREE** questions from section-I.
- 2) Attempt Any **TWO** questions from section-II.
- 3) Each question carries **16** marks.

SECTION-I

- Q.1** Distinguish between following:
- a) Actual and Normal argument
 - b) Global and local variable
 - c) '&' operator and '**' operator
 - d) While and Do While
- Q.2**
- a) Explain Recursion in C.
 - b) Explain Switch.. case statements in C.
- Q.3** Explain the following and illustrate it with an example each.
- a) Increment and decrement operator
 - b) Conditional operator
 - c) Bitwise operator
 - d) Assignment operators
- Q.4**
- a) What is mean by function? Explain nested, function in detail with examples.
 - b) List the entire data types in C. What is the size of these data types?
- Q.5**
- a) Explain command line arguments in detail?
 - b) Explain storage classes in C.
- Q.6**
- a) Distinguish between an array of structures and array within a structure. Give an example of each.
 - b) Difference between structure and union

SECTION-II

- Q.7**
- a) Write a C code which will accept n numbers in an array and accept a number and check at what positions the number occurs in an array.
 - b) Write a C code accepts a number and to check given number is perfect number or not.
[Perfect No. = sum of all divisors, ex:- 6 = 1+2+3]
- Q.8**
- a) Write a recursive function to print factorial of a number
 - b) To print the following pattern


```

*
*   *
*   *   *
```
- Q.9** Accept a file name and a word. Search the given word in file and print how many times it occurs.

