Roll No. 418241031

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CBA-255-T

M.C.A. First Semester

(End Semester)

Examination Dec., 2018

COMPUTER SCIENCE AND APPLICATIONS

Paper - CSA-CC-125

(Discrete Mathematics)

Time : Three Hours] [Maximum Marks : 60

Note :– Attempt all sections A, B and C. Follow the instructions given in each section.

[P. T. O.

Section-A

(Objective Type Questions) 10×1=10

Note :– Attempt all question and in each question select the correct option.

1. (i) Range of a function is:

(a) The maximal set of numbers for which function is defined

(b) The maximal set of numbers which a function can take values

(c) It is set of natural number for which a function is defined

(d) None of the mentioned

(ii) In which of the following sets $A–B$ is equal to $B – A$

(a) $A = \{1,2,3\}, B = \{2,3,4\}$

(b) $A = \{1,2,3\}, B = \{1,2,3,4\}$

(c) $A = \{1,2,3\}, B = \{2,3,1\}$

(d) $A = \{1,2,3,4,5,6\}, B = \{2,3,4,5,1\}$

(iii) The set of all real numbers under the usual multiplication operation is not a group since

(a) multiplication is not a binary operation

(b) multiplication is not associative

(c) identity element does not exist

(d) zero has no inverse

(iv) The sum of the entries in the fourth row of Pascal's triangle is

(a) 8

(b) 4

(c) 10

(d) 16

(v) A polygon with 7 sides can be triangulated into

(a) 7

(b) 14

(c) 5

(d) 10

(vi) Hasse diagram are drawn

(a) Partially ordered sets

(b) Lattices

(c) Boolean algebra

(d) None of these

(vii) Let P:I am in Bangalore., Q: I loved cricket.; then $q \rightarrow p$(q implies p) is:

(a) If I am in Bangalore then I love cricket

(b) I am not in Bangalore

(c) I Love cricket

(d) If I love cricket then I am in Banglore

(viii) A compound proposition that is neither a tautology nor a contradiction is called

(a) Condition

(b) Inference

(c) Contingency

(d) Equivalence

(ix) In any undirected graph the sum of degrees of all the nodes

(a) Must be even

(b) Are twice the number of edges

(c) Must be odd

(d) Need not be even

(x) A graph with n verticles will definitely have a parallel edge or self loop if the total number of edges are

(a) greater than n–1

(b) less than n (n–1)

(c) greater than n(n–1)/2

(d) less than $(n^3)/2$

Section 'B'

(Short Answer Type Questions) 4×5=20

Note :– Attempt all four questions. Each question carries five marks.

1. Define Relation, Function and Recursive function with suitable example.

2. Define Group and prove that the Set $S = \{1, -1, i, -i\}$ is a group under the operation multiplication.

3. Consider the set A = {1,2,3, ...400}. Find the number of integers in set A which are neither divisible by 3 nor by 7.

4. Define lattice and bounded lattice. Give the properties of lattice.

5. Establish the equivalence :

$(p \Rightarrow q) \wedge (r \Rightarrow q) \equiv (p \Rightarrow q) \Rightarrow q$

6. Define Graph, Bipartite Graph, Euler path and Hamiltonian path.

Section 'C'

(Long Answer Type Questions) 3×10=30

Note :– Attempt any three questions. Each question carries ten marks.

1. Describe the method of mathematical induction. Show that $1^3 + 2^3 + ... + n^3 = (1+2+.....+n)^2$ using mathematical induction for $n \geq 1$.

2. What is recurrence relation? What you understand by solving recurrence relation? Solve the following recurrence relation.

$g(n) = g(n-1) + 2n-1$

$g(0) = 0.$

3. State and verify Absorption Laws. Reduce the following Boolean expression using K–Map: F (U, V, W,Z) = {(0,1,2,4,5,14,15}

4. Write notes on the following:

(a) Tautology and Contradiction

(b) First Order Predicate

(c) Quantifiers

(d) Inference theory

5. What are Binary Tree and Binary search Tree? Write code for in order, pre-order and post-order traversal of binary tree. Explain with an example the binary tree in order, pre-order and post-order.