

**Bharati Vidyapeeth's  
Institute of Computer Applications and Management  
A-4, Paschim Vihar, New Delhi-63.**

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**MCA – 1<sup>st</sup> Semester  
First Internal Discrete Maths (MCA-105)**

*Note: Answer all Questions*

*Max. Marks: 45*

*Max. Time: 02 Hrs.*

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**Q1**

3\*5=15

1. What is the number of ways to assign the numbers (1 to 20) to the 25 rooms of 5 BY 5 grid having 15 rooms empty?
2. If 20 persons are selected for presenting in cultural programme, then how many persons are selected so that they are able to present their programme on same day of the week
3. In any lattice L show that  $(x \wedge y) \vee (y \wedge z) \vee (z \wedge x) \leq (x \vee y) \wedge ((y \vee z) \wedge (z \vee x))$
4. Use Kmap to simplify  $E = xyz' + xy'z' + x'y'z + x'y'z'$
5. Show that  $K_{3,3}$  is non-planar

**Q2. (Attempt any 3 parts)**

1. A). Prove by mathematical Induction that  $3^n$  is a multiple of 5  
b) Consider a group of 191 students, 10 are taking French, german and Sanskrit. 36 are taking French and german, 20 are taking French and Sanskrit, 18 are taking german and Sanskrit, 65 are taking French, 76 are taking german and 63 are taking Sanskrit. Then tell how many students are taking French or German and also tell how many are taking none

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2. A) Show that R is non-equivalence relation, R is relation on the set of real numbers such that  $xRy$  iff  $x$  and  $y$  are real and differ by less than 1, that is  $|x-y| < 1$ .  
b) (Using the following true statements, locate the treasure hidden in the estate)  
If the house is next to the lake, then the treasure is not in the kitchen.  
If the tree in front yard is mango tree, then the treasure is in the kitchen  
The house is next to lake  
The tree in front yard is mango tree or treasure is placed behind the mirror in the wall of a bed room

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- 3) Let  $R = \{(a,b), (b,c), (d,c), (d,a), (a,d), (d,d)\}$  be a relation on set  $A = \{a,b,c,d\}$  Find the reflexive closure, symmetric closure and transitive closure using warshal's algorithm

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4)

- a) Given that  $(A \cup C)$  belongs to  $(B \cup C)$  and  $(A \cup C')$  belongs to  $(B \cup C')$ , prove that  $A$  belongs to  $B$
- b) Examine whether graph is weakly, unilaterally or strongly connected

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**Q3.(Attempt any 3 parts)**

- 1) Give an example of a graph which contains
- an Eulerian circuit that is also a Hamiltonian circuit.
  - an Eulerian circuit and a Hamiltonian circuit that are distinct.
  - an Eulerian circuit, but not a Hamiltonian circuit
  - a Hamiltonian circuit, but not an Eulerian circuit
  - Neither an Eulerian circuit, nor a Hamiltonian circuit

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- 2) Find the shortest distance between A and H

- 3) a) Examine whether the following pairs is isomorphic or not

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- b) Examine whether they are lattice or not

- 4) Let  $(L, \leq)$  be a lattice and  $a, b, c \in L$ . If  $a \leq b \leq c$  then show that
- $a \vee b = b \wedge c$
  - $(a \wedge b) \vee (b \wedge c) = (a \vee b) \wedge (a \vee c)$

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