14MCU19

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2019
(Fifth Semester)

Branch - **MATHEMATICS WITH COMPUTER APPLICATIONS**

DISCRETE MATHEMATICS AND GRAPH THEORY

Time : Three Hours   Maximum : 75 Marks

SECTION-A (20 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (1 0 x 2 = 20)

1 Write the following conditional sentences in if.. .then form :
(i) A racer wins the race only if he runs fast.
(ii) Roses are vegetables if carrots are flowers.

2 Define negation of a biconditional statement.

3 Let A = {1, 2, 3}, B = {a, b. c} and C = {x, y, z} and let Rj = {(1, a), (2, c), (3, a), (3, c)} and R_2 = {(b, x), (b, z), (c, y)}. Find Rj O R_2

4 Define equal functions.

5 Define a complemented lattice.

6 Prove that an isomorphism between two lattices preserves the ordering relation.

7 Define a pendent vertex.

8 State the properties of two isomorphic graphs.

9 Define fusion of vertices.

10 State Cayley' s theorem.

SECTION - B (25 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a Establish ~ (p ∧ q) <=> (~ pv ~ q) as a tautology.

OR

b State any five fundamental rules of conclusion.

12 a Show that the relation <, defined on the set of positive integers, is a partial order relation.

OR

b If R is a set of real numbers, show that the function f : R —> R defined by f(x) = - sinx, is neither one-one nor onto.

13 a Draw the Hasse diagrams of D_8 and D_5o-

OR

b Prove that every finite lattice L is bounded.

14 a Represent nine members seating problem through a graph and find the number of ways to arrange them such that every number has different neighbours at each sitting.

OR

b Prove that if a graph has exactly two vertices of odd degree, there must be a path joining two vertices.

15 a Prove that a graph is a tree if and only if it is minimally connected.

OR

b Draw all 16 trees of four labeled vertices.

<u>SECTION - C (30 Marks)</u>

Answer any **THREE** Questions

ALL Questions Carry **EQUAL** Marks (3x10 = 30)

16 Explain, three basic logical operations, in detail with suitable examples and their truth tables.

17 Let R be the set of all real numbers and C be the set of all complex numbers. Prove that f : C -» R defined by f(z) = |z| for all zee is neither one-one nor onto.

18 Show that N x N is a modular lattice, where N is a lattice under < relation.

19 Prove that a simple graph with n vertices and k components can have atmost (n - k) (n - k + 1) / 2 edges.

20 Prove that a tree with n vertices has n -1 edges.

Z-Z-Z END