14MCU19

PSG COLLEGE OF ARTS & SCIENCE

(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2018

(Fifth Semester)

Branch **- MATHEMATICS WITH COMPUTER APPLICATIONS**

DISCRETE MATHEMATICS & 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 Draw truth table for p ʌ q and p v q .

2 Show that the statement (p ʌ q) => q is a tautology.

3 Define a'relation and a binary relation.

4 Define a constant function.

5 State modular inequality.

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

7 Define a simple graph.

8 What do you mean by degree of a vertex in a graph?

9 Explain decomposition of a graph.

10 Define a tree.

SECTION - B (25 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a Show that (p ʌ q)A ~ (p v q) is a fallacy or contradiction.

OR

b Explain the method of testing the validity of an argument.

12a A relation R on the Set S of all real numbers is defined as: aRb if and only if l+ab>0. Show that R is not equivalence.

OR

b Show that f : R —» R defined by f(x)=5x' -1 is one-one and onto.

13 a Draw the Hasse diagram of the poset (A,c) where A={a,b}.

OR

b Define a Lattice.

14 a Draw the graph of three-utilities problem.

OR

b Prove that the number of vertices of odd degree in a graph is always even.

15 a Prove that in a connected graph G with exactly 2k odd vertices, there exist k edge-disjoint subgraphs such that they together contain all edges of G and that each is a unicursal graph.

OR

b A graph G with n vertices, n-1 edges, and no circuits is connected. Prove!.

SECTION - C (30 Marks)

Answer any **THREE** Questions

ALL Questions Carry **EQUAL** Marks (3 x 1 0 = 30)

16 Construct the truth table for p => [(p v r)^{A}~ (p <t4>~ r)] and write the truth set.

17 Let A={x:xeR, and -^<x<^} and B={y:yeR, and -1<y<1}. Show that the function f : A —> B such that f(x)=sinx, for all xeA is one-one onto. Also find f

18 Let (L, <) be a lattices, prove that, for every a,b,c,deL,

a) b < c ,ᵀ a A b < a A C
[a v b < a v c

b) a < b abd c < d => t [a ʌ c < b ʌ d'

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

20 Prove that a given connected graph G is an Euler graph if and only if all vertices of G are of even degree.

Z-Z-Z END