Unit - V

Q.5 A Define Pendant Vertex with example. **(2)**

Q.5 B Define Hamiltonian graph with example. **(2)**

Q.5 C Every tree with two or more vertices in 2-Chromatic. **(5)**

OR

The maximum number of edges in a simple graph with n vertices is $\frac{n(n-1)}{2}$.

Q.5 D A connected planar gruph with n Vertices and e edges has $e-n+2$ regions. **(7)**

OR

Let Cr be a Simple graph with n Vertices. If C_r has K Components, then the maximum number of edges that Cu can have are. $\frac{(n-k)(n-k+1)}{2}$

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Roll No......................

Total No. of Units : 05

Total No. of Printed Pages : 04

Code No. : BC-01/127

Semester Examination Nov.-Dec. 2024-25

B.C.A. First Semester ATKT (Old Course)

MATHEMATICS

Paper - I

DISCRETE MATHEMATICS

Time : 3 Hrs. **Max.Marks : 80**

Minimum Passing Marks : 32

- Part A and B of each unit are very short answer type questions which are to be answered in one or two sentences [Total Marks 4].
- Question Part C of each unit are short answer type questions, word limit 100-150 [Marks 5].
- Question Part D of each unit are long answer type questions, word limit 300-350 [Marks 7].

Unit - I

Q.1 A Define toutology with example. **(2)**

Q.1 B Define proposition with example. **(2)**

Q.1 C Show that **(5)**

$$\left[(P \wedge r) V (q \wedge \sim r)\right] \Leftrightarrow \left[(\sim P \wedge r) V (\sim q \wedge \sim r)\right]$$

is a Contradiction.

OR

Define logical equivalendce and show that

$$\sim (p \Rightarrow q) \equiv \left[p \wedge (\sim q)\right]$$

Q.1 D Define some algebra of propasition with example. **(7)**

(i) Idemptotent law (ii) Distributive law

(iii) De-morgan's law (iv) Identity law

(v) Complement law

P.T.O.

OR

Define quantifiers and it's types with example.

Unit - II

Q.2 A Define duality with example. **(2)**

Q.2 B Define greatest lower bound. **(2)**

Q.2 C The order relation $\leq$ is partial order relation in a Boolean algebra. **(5)**

OR

Drow the logic cuircuit of the Boolean expression :-

$$f(x)=(x+y).\ (x^1+y^1+z^1).(y^1.z^1)$$

Q.2 D To prove that, for any two elements a,b of a Boolean algebra : **(7)**

(i) $a+b = \text{lub}\{a,b\}$ (ii) $a.b = \text{glb}\{a,b\}$

OR

Draw a circuit for the following Boolean function and replace it by a simpler.

$$F(x,y,z)=x,z+\left[y.(y^1+z).(x^1+x_1\ z^1)\right]$$

Unit - III

Q.3 A Define Boolean polynomial with example. **(2)**

Q.3 B Find complete disjunctive normal form in two variable x_1, x_2 and show that its Value is 1. **(2)**

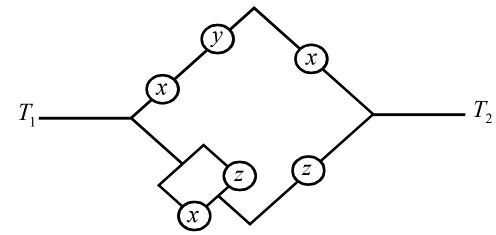
Q.3 C Draw a binomial net for the flow function. **(5)**

$$x^1.y.z+x.y^1.z+x.y.z^1+x^1.y^1.z^1$$

OR

State and prove Bool's expansion theorem.

Q.3 D Simplify the circuit Draw diagram. **(7)**



OR

Write the following functioninto disjunctive normal forms of 3 variables.

(i) x^1+y^1 (ii) xy^1+x^1y (iii) $(x+y)(x^1+z^1)$

Unit - IV

Q.4 A Define inverse function with example. **(2)**

Q.4 B Define Countable set with example. **(2)**

Q.4 C If R^{-1} and S^{-1} are inverse of the relations R and S respectively. then **(5)**

$$(SoR)^{-1}=R^{-1}\ o\ S^{-1}$$

OR

If R and S be equivalence relations in the set X, then Prove that $R\cap S$ is an equivalence relation in X.

Q.4 D Show that the mapping $f:1R\rightarrow 1R,\ f(x)=\frac{1}{x}, x\neq 0$ and $x\in 1R$ is one-one onto, where 1R is the set non-zero real number. **(7)**

OR

If $f:x\rightarrow y$ and A, B are two subsets of x, prove that

(i) $f(A\cup B)=f(A)\cup f(B)$ (ii) $f(A\cap B)\subseteq f(A)\cap f(B)$

P.T.O.