TH241777MAJ

Reg. No..

Name...

FYUG PROGRAMME EXAMINATIONS, NOVEMBER 2024

(2024 Admission Regular)

SEMESTER I – MAJOR (BCA)

CP1DSC04B24 – DISCRETE MATHEMATICS

Time: 2 Hours **Maximum Marks: 70**

PART A

I. Answer any 5 questions. Each question carries 2 marks

Q.No:	QUESTIONS	CO	LEVEL
1.	Determine the negation of the proposition "At least 10 inches of rain fell today in Miami." and express this in simple English.	2	Ap
2.	Construct the truth table for the conjunction of two propositions P and Q.	3	Ap
3.	Define finite and infinite set with example.	1	R
4.	Determine the power set of the empty set.	1	Ap
5.	Determine for each of the relations on the set {1,2,3,4}, whether it is reflexive, symmetric or transitive a) {(1 , 1), (1 , 2), (2, 1), (2, 2), (3, 3), (4, 4)} b) {1, 3), (1 , 4), (2, 3), (2, 4), (3 , 1), (3, 4)}	4	Ap
6.	Represent each of these relations on {1, 2, 3 } with a matrix (with the elements of this set listed in increasing order). a) {(1, 1), (1, 2), (1, 3)} b) {(I, 1), (1, 2), (1, 3), (2, 2), (2, 3), (3, 3)}	4	U
7.	Give examples of symmetric and skew-symmetric matrices	5	U
8.	Determine x, y, z and w given that $3\begin{bmatrix} x & y \\ z & w \end{bmatrix} = \begin{bmatrix} x & 5 \\ -1 & 2w \end{bmatrix} + \begin{bmatrix} 6 & x+y \\ z+w & 5 \end{bmatrix}$	5	Ap

(5x2=10)

PART B

II. Answer any 5 questions. Each question carries 6 marks

Q.No:	QUESTIONS	CO	LEVEL
9.	Illustrate the ideas of premise, conclusion, and valid argument with an example.	2	U
10.	Construct a truth table for (p↔ q) ↔ (r ↔s)	3	Ap

11.	Show that the cartesian product $B \times A$ is not equal to the cartesian product $A \times B$,Where $A = \{1,2\}$, $B = \{a, b, c\}$	1	U
12.	Determine whether the function $f(x) = x^2$ from the set of integers to the set of integers is a bijection.	1	Ap
13.	Write the properties of relation. Give example for each property.	4	Ap
14.	Suppose that the relations R_1 and R_2 on a set A are represented by the matrices $M_{R_1} = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$ and $M_{R_2} = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{bmatrix}$ Construct the matrices representing $R_1 \cup R_2$ and $R_1 \cap R_2$	4	Ap
15.	A = $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 2 & 3 & 4 \end{bmatrix}$ B = $\begin{bmatrix} 1 & -2 \\ -1 & 0 \\ 2 & -1 \end{bmatrix}$,Compute AB. Is BA defined, give reason?	5	Ap
16	Express the matrix A as the sum of a symmetric and skew-symmetric matrix where A = $\begin{bmatrix} 4 & 2 & -3 \\ 1 & 3 & -6 \\ -5 & 0 & -7 \end{bmatrix}$	5	U

(5x6=30)

PART C

III. Answer any 3 questions. Each question carries 10 marks.

Q.No:	QUESTIONS	CO	LEVEL
17.	a) Define Hypothetical syllogism rule b)Show that the hypotheses "It is not sunny this afternoon and it is colder than yesterday," "We will go swimming only if it is sunny," "If we do not go swimming, then we will take a canoe trip," and "If we take a canoe trip, then we will be home by sunset" lead to the conclusion "We will be home by sunset."	2	R,U
18.	Show that $\overline{A \cap B} = \bar{A} \cup \bar{B}$	1	U
19.	Show that the relation R = {(a, b) I a ≡ b (mod m)} is an equivalence relation on the set of integers for all positive integer with m > 1	4	U
20.	Show that ¬p→ $(q \rightarrow r)$ and q→ (pvr) are logically equivalent.	3	U
21.	Compute the inverse of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$	6	Ap
22.	Solve the equations $3x + y + 2z = 3$, $2x - 3y - z = -3$ $x + 2y + z = 4$ by method of determinants.	6	Ap

(3x10=30)

CO : Course Outcomes Level : R – Remember, U – Understand, Ap- Apply, An- Analyze, E- Evaluate, C- Create