173841

15123

Reg. No. [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

I Semester B.C.A. Degree Examination, August - 2021

COMPUTER SCIENCE

Discrete Mathematics

(CBCS Scheme)

Time : 3 Hours **Maximum Marks : 100**

Instructions to Candidates :

Answer **all** Sections.

SECTION - A

I. Answer any <u>TEN</u> of the following. Each question carries 2 marks. **(10×2=20)**

1) If $A=\{2,3,4,5\}$ and $B=\{0,1,2,3\}$ find $A\cap B$.

2) Define an Equivalence Relation?

3) Construct truth table for $\sim p \to q$.

4) Define a Scalar Matrix with an example.

5) If $A=\begin{bmatrix} 3 & 2 \\ -1 & 4 \end{bmatrix}$ and $B=\begin{bmatrix} 3 & 5 \\ -2 & 4 \end{bmatrix}$ find $2A+3B$.

6) State Caley - Hamilton Theorem.

7) If $\log_2 64 = x$, then find x.

8) Find 'n' if $n_{c_{30}} = n_{c_5}$.

9) Define a group.

10) If $\vec{a}=2i+3j-4k$, $\vec{b}=3i-4j-5k$ find $\left|\vec{a}+\vec{b}\right|$.

11) Find the distance between the points $A(2,-3)$ and $B(4,5)$.

12) Find the equation of the line whose y - intercept is -2 and slope is $\frac{3}{2}$.

[P.T.O.

SECTION - B

II. Answer any **SIX** of the following. Each question carries 5 marks. **(6×5=30)**

13) If $A=\{1,4\}, B=\{2,3,6\}$ and $C=\{2,3,7\}$ then verify that $A\times(B-C)=(A\times B)-(A\times C)$.

14) Show that $f:R\rightarrow R$ is defined by $f(x)=4x+5$ is both one - one and onto.

15) Prove that $[p\wedge(q\vee r)]\leftrightarrow[(p\wedge q)\vee(p\wedge r)]$ is a tautology.

16) Prove that $\sim(p\leftrightarrow q)\equiv\sim[(p\rightarrow q)\wedge(q\rightarrow p)]$.

17) Write the Converse, Inverse and Contrapositive of "If two integers are equal then their squares are equal".

18) Find the inverse of the matrix $\begin{bmatrix}3 & -3 & 4\\ 2 & -3 & 4\\ 0 & -1 & 1\end{bmatrix}$.

19) Solve the equations by using Cramer's rule $3x-y+2z=13$, $2x+y-z=3$; $x+3y-5z=-8$.

20) Verify the Caley - Hamilton Theorem for the matrix $A=\begin{bmatrix}2 & 4\\ 7 & 3\end{bmatrix}$.

SECTION - C

III. Answer any **SIX** of the following. Each question carries 5 marks. **(6×5=30)**

21) If $\log\left(\frac{a-b}{5}\right)=\frac{1}{2}(\log a+\log b)$, Show that $a^2+b^2=27ab$.

22) In how many ways the letters of the word "EVALUATE" be arranged so that all vowels are together.

23) If $2n_{c_3}:n_{c_3}=11:1$ find 'n'.

24) Show that the set of all cubeth roots of unity form a group under multiplication.

25) Show that $H=\{0,2,4\}$ is a subgroup of the group $(G,+6)$ where $G=\{0,1,2,3,4,5\}$.

26) If $\vec{a}=2i+j+4k$, $\vec{b}=3i-j+2k$ and $\vec{c}=3i+j+4k$ find $\vec{a}.\left(\vec{b}\times\vec{c}\right)$.

27) Using vector method find the area of the triangle whose vertices are $A(1,2,3)$, $B(2,5,1)$ and $C(-1,1,2)$.

28) Find the value of m if $\vec{a} = mi - 3j + 4k$, $\vec{b} = i + 3j + k$ and $\vec{c} = 2i + j + k$ are coplanar.

SECTION - D

IV. Answer any **FOUR** of the following. Each question carries **5** marks. **(4×5=20)**

29) Prove that the points $(4,-4)$, $(8,2)$, $(14,-2)$ and $(10,-8)$ are the vertices of a square.

30) Find the ratio in which the X-axis divides the line - segment joining the points $(7,-3)$ and $(5,2)$.

31) Find the equation of the locus of point which moves such that it is equidistant from the points $(1,2)$ and $(-2,3)$.

32) Find the equation of the perpendicular bisector of the line joining the points $A(3,-2)$ and $B(4,1)$.

33) Find the value of k if the lines

i) $3x + 2y + 1 = 0$ and $kx + 2y - 1 = 0$ are parallel.

ii) $5x - 4y + 8 = 0$ and $4x + ky + 3 = 0$ are perpendicular.

34) Find the equation of the straight line which passes through the point of intersection of the lines $3x + y - 10 = 0$ and $x + 7y - 10 = 0$ and parallel to the line $4x - 3y + 1 = 0$.