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BACHELOR OF COMPUTER APPLICATIONS (B.C.A.)
SPECIALIZATION IN CYBER SECURITY(CS)
EXAMINATION : DECEMBER - 2022
SEMESTER – I

Sub: Mathematics (BCA –142-18/142-20/BCA-CS-142-20)

Date : 29/12/ 2022

Total Marks : 60

Time: 10.00 am to 12.30 pm

Instructions:

1. All questions are compulsory unless and otherwise stated.
2. Bold figures to the right of every question are the maximum marks for that question.
3. Candidates are advised to attempt questions in order.
4. Answers written illegibly are likely to be marked zero.
5. Use of scientific calculators, Log tables, Mollier Charts is allowed.
6. Draw neat and labeled diagrams wherever necessary.

Q.1. Solve (Any 4)

(8)

1. If $f(x) = \frac{x+3}{2x-1}$ Find: $f(-1)$ & $f\left(\frac{1}{2}\right)$
2. Solve : $6x^2 + x - 12 = 0$
3. Find A^2 for the matrix: $A = \begin{bmatrix} 1 & -2 \\ -3 & -5 \end{bmatrix}$
4. In how many ways a group of 3 persons can be selected from 4 doctors & 5 lawyers?
5. $A = \{1,2,3,4,5\}$, $B = \{4,5,6,7\}$. Find the sets $(A - B)$ & $(B - A)$
6. For a G.P. , $a = 5, r = 2, S_n = 635$, Find n.

Q.2. Solve (Any 3)

(9)

1. If $A = \{10,20,30,40,50,60\}$, $B = \{40,50,60,70\}$ and Universal set $U = \{10,20,30,40,50,60,70,80,90,100\}$, Verify the result: $(A \cup B)' = A' \cap B'$
2. Solve the quadratic equation $10x^2 - x - 3 = 0$ by using formula method.
3. Check whether the function $f(x) = \left(\frac{4x}{3} - 1\right)$ is injective or not?
4. Find A.M., G.M and H.M. for the numbers 49,81.

Q.3. Solve (Any 2)

(8)

1. Find the inverse of the matrix A by using adjoint method, if it exists.

$$A = \begin{bmatrix} 1 & 2 & -3 \\ 0 & 4 & 0 \\ -2 & -5 & -3 \end{bmatrix}$$
2. Find x , if $f(x) = g(x)$ and $f(x) = \sqrt{x} - 3$, $g(x) = 5 - x$.
3. Solve: (i) Find r , ${}^{21}C_r = {}^{21}C_{3r-3}$. (ii) Find ${}^r C_4$ if ${}^{15}C_r = {}^{15}C_{r+1}$

Q.4. Solve (Any 3)**(15)**

1. If $A = \begin{bmatrix} 8 & 4 \\ 10 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & -4 \\ 10 & -8 \end{bmatrix}$, Show that: $A^2 + AB + B^2 = (A + B)^2$
2. The problem in Mathematics is given to three students whose chances of solving it are $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ respectively. If all of them have tried independently, find the probability that atleast one of them could solve the problem.
3. Find the values of $\alpha + \beta$, $\alpha.\beta$, $\alpha - \beta$ and $\frac{1}{\alpha} + \frac{1}{\beta}$ for the quadratic equation :
 $3x^2 - 5x + 2 = 0$.
4. Solve the system of linear equations:
 $2x + 3y + 6z = 5, -3x + 2y + z = -4, x + y + 4z = 4$.

Q.5. Solve. (Solve any 2)**(20)**

1. In how many ways a committee of 4 persons can be formed from 5 ladies and 6 gentlemen so that,
 - (i) Atleast 2 ladies will be there in a committee.
 - (ii) At the most 2 ladies will be there in a committee.
 - (iii) Majority of the ladies will be there in a committee.
2. If $A = \{a, b, c, d, e\}$, $B = \{d, e, f, g, h, i\}$, $C = \{a, d, e, i, j\}$ and Universal set $U = \{a, b, c, d, e, f, g, h, i, j, k\}$,
Verify the following results:
 - (i) $n(A \cup B \cup C) =$
 $n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$
 - (ii) $n(A) + n(B) - n(A \cup B) = n(A \cap B)$
3. Find the nature of the roots of the following quadratic equations:
 - (i) $x^2 + x - 10 = 0$
 - (ii) $9x^2 + 6x + 1 = 0$
 - (iii) $x^2 + 2x + 6 = 0$
 - (iv) $x^2 - 3x - 10 = 0$