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EXAMINATION : JUNE / JULY- 2022
SEMESTER - I
Sub: Mathematics (BCA – 142-20/BCA-CS-142-20)

Date : 01 / 07 / 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. Find the image of following functions $f(x) = 2x^2 - 3x + 4$
find $f(1)$, $f(0)$, $f(-1)$, $f(-2)$
2. Are the following sets equal ?

$$A = \{x \mid x \text{ is a positive integer, } 1 \leq x \leq 5\}$$

$$B = \{1, 2, 3, 4, 5\}$$

$$C = \{x \mid x \text{ is a root of the equation } x^2 - 3x + 2 = 0\}$$
3. If $T_n = 3n^2 + 4n + 7$, find T_4 , T_9 and T_{13}
4. In how many ways can letters of the word MOBILE be arranged?
5. Three coins are tossed simultaneously. State the sample space.
6. Conversion of number 56 into OCTAL number system .

Q.2. Solve (Any 3) (9)

1. Find the number of terms in the A.P. 101, 104, 107, ..., 182.
2. From a pack of 52 playing cards, a hand of 5 cards is drawn. Find in how many ways such a hand can be drawn.
3. Find x if
$$\begin{vmatrix} x & 4 & -4 \\ 3 & -2 & 1 \\ -2 & -4 & 1 \end{vmatrix} = 0$$
4. A purse contains 4 silver coins and 5 copper coins. Another purse contains 3 silver and 4 copper coins. A purse is selected at random and a coin is drawn at random. What is the probability that it is a copper coin ?

Q.3. Solve (Any 2) (8)

1. Given a universal set $X = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$
Obtain the complement of the following sets using universal X (above)
 - (a) $A = \{1, 3, 5, 7, 9\}$
 - (b) $B = \{2, 4, 6, 8\}$
 - (c) $C = \{1, 3, 9\}$
 - (d) $D = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

2. If the sum of the first n terms of a sequence is $3n^2 + 4n$, show that it is an A.P. Find the first term and the common difference.
3. Find the value of a, b, c, d from following equations

$$\begin{bmatrix} 2a + b & a - 2b \\ 5c - d & 4c + 3d \end{bmatrix} = \begin{bmatrix} 4 & -3 \\ 11 & 24 \end{bmatrix}$$

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

1. Functions f and g are given by the following
 $f = \{ (1, 2), (2, 3), (3, 4), (4, 5), (5, 6), (6, 7) \}$
 $g = \{ (2, 4), (3, 6), (4, 8), (5, 10), (6, 12), (7, 14) \}$
 Find the function between F to G . Draw the graph.
2. Find three numbers in A.P. such that their sum is 15 and their product is 105.
3. How many seven-person committees can be formed each containing three female members from an available set of 20 female and four male members from an available set of 30 males?
4. Test whether the following equations are consistent.
 $2x + 3y + 4 = 0, x + 2y + 3 = 0, 3x + 4y + 5 = 0$
 If they are consistent solve them.

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

1. Suppose that 100 students at a college take at least one of the languages French, German and Russian. 65 students study French, 45 study German and 42 study Russian. Also 20 students study French and German, 25 students study French and Russian, 15 students study German and Russian. Find the number of students who study (i) all the three languages, (ii) exactly one language
2. Solve the following system of equations by matrix method

$$x + y + z = 6$$

$$2x - y + z = 3$$

$$-x - y + z = 0$$

3. Two unbiased dice are thrown in air. Find the probability in each of the following events.
 - (i) score is a perfect square
 - (ii) score is a multiple of five
 - (iii) score is at most five
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