

# Assignment 1

## 2022-June

### Session-06-27-2022-shift-1:16-30

EE24BTECH11049  
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#### MCQ

- 1) Five numbers  $x_1, x_2, x_3, x_4, x_5$  are randomly selected from the numbers  $1, 2, 3, \dots, 18$  and are arranged in the increasing order ( $x_1 < x_2 < x_3 < x_4 < x_5$ ). The probability that  $x_2 = 7$  and  $x_4 = 11$  is:

(2022-Jun-27-S1)

- a)  $\frac{1}{136}$                       b)  $\frac{1}{72}$                       c)  $\frac{1}{68}$                       d)  $\frac{1}{34}$

- 2) Let  $X$  be a random variable having binomial distribution  $\mathbf{B}(7, p)$ . If  $\mathbf{P}(X = 3) = 5\mathbf{P}(X = 4)$ , then the sum of the mean and the variance of  $X$  is:

(2022-Jun-27-S1)

- a)  $\frac{105}{16}$                       b)  $\frac{7}{16}$                       c)  $\frac{77}{36}$                       d)  $\frac{49}{16}$

- 3) The value of

$$\cos\left(\frac{2\pi}{7}\right) + \cos\left(\frac{4\pi}{7}\right) + \cos\left(\frac{6\pi}{7}\right)$$

is equal to;

(2022-Jun-27-S1)

- a)  $-1$                       b)  $-\frac{1}{2}$                       c)  $-\frac{1}{3}$                       d)  $-\frac{1}{4}$

- 4)

$$\sin^{-1}\left(\sin \frac{2\pi}{3}\right) + \cos^{-1}\left(\cos \frac{7\pi}{6}\right) + \tan^{-1}\left(\tan \frac{3\pi}{4}\right)$$

is equal to;

(2022-Jun-27-S1)

a)  $\frac{11\pi}{12}$

b)  $\frac{17\pi}{12}$

c)  $\frac{31\pi}{12}$

d)  $-\frac{3\pi}{4}$

5) The boolean expression  $(\sim (p \wedge q)) \vee q$  is equivalent to:

(2022-Jun-27-S1)

a)  $q \rightarrow (p \wedge q)$

c)  $p \rightarrow (p \rightarrow q)$

b)  $p \rightarrow q$

d)  $p \rightarrow (p \vee q)$

### INTEGER

1) let  $f : \mathbf{R} \mapsto \mathbf{R}$  be a function defined by

$$f(x) = \frac{2e^{2x}}{e^{2x} + e^x} \text{ then } f\left(\frac{1}{100}\right) + f\left(\frac{2}{100}\right) + f\left(\frac{3}{100}\right) + \cdots + f\left(\frac{99}{100}\right)$$

is equal to \_\_\_\_\_

(2022-Jun-27-S1)

2) If the sum of all the roots of the equation

$$e^{2x} - 11e^x - 45e^{-x} + \frac{81}{2} = 0$$

is  $\log_e p$ , then  $p$  is equal to \_\_\_\_\_

(2022-Jun-27-S1)

3) The positive value of the determinant of the matrix  $A$ , whose

$$\text{adj}(\text{adj}(A)) = \begin{pmatrix} 14 & 28 & -14 \\ -14 & 14 & 28 \\ 28 & -14 & 14 \end{pmatrix},$$

is \_\_\_\_\_

(2022-Jun-27-S1)

4) The number of ways, 16 identical cubes, of which 11 are blue and rest are red, can be placed in a row so that between any two red cubes there should be at least 2 blue cubes, is \_\_\_\_\_

(2022-Jun-27-S1)

5) If the coefficient of  $x^{10}$  in the binomial expansion of

$$\left( \frac{\sqrt{x}}{5^{\frac{1}{4}}} + \frac{\sqrt{5}}{x^{\frac{1}{3}}} \right)^{60}$$

is  $5^k l$  where  $l, k \in \mathbf{N}$  and  $l$  is co-prime to 5, then  $k$  is equal to \_\_\_\_\_

(2022-Jun-27-S1)

6)

$$A_1 = \{(x, y) : |x| \leq y^2, |x| + 2y \leq 8\} \text{ and } A_2 = \{(x, y) : |x| + |y| \leq k\}.$$

if  $27\text{Area}(A_1) = 5\text{Area}(A_2)$ , then  $k$  is equal to: \_\_\_\_\_

(2022-Jun-27-S1)

7) If the sum of the first ten terms of the series

$$\frac{1}{5} + \frac{2}{65} + \frac{3}{325} + \frac{4}{1025} + \frac{5}{2501} + \dots \text{ is } \frac{m}{n},$$

where  $m$  and  $n$  are co-prime numbers, then  $m + n$  is equal to \_\_\_\_\_

(2022-Jun-27-S1)

8) A rectangle  $R$  with end points of one of its sides as  $(1, 2)$  and  $(3, 6)$  is inscribed in a circle. If the equation of a diameter of the circle is  $2x - y + 4 = 0$ , then the area of  $R$  is \_\_\_\_\_

(2022-Jun-27-S1)

9) A circle of radius 2 unit passes through the vertex and the focus of the parabola  $y^2 = 2x$  and touches the parabola  $y = \left(x - \frac{1}{4}\right)^2 + \alpha$  where  $\alpha > 0$ . Then  $(4\alpha - 8)^2$  is equal to \_\_\_\_\_

(2022-Jun-27-S1)

10) Let the mirror image of the point  $(a, b, c)$  with respect to the plane  $3x - 4y + 12z + 19 = 0$  be  $(\alpha - 6, \beta, \gamma)$ . if  $a + b + c = 5$ , then  $7\beta - 9\gamma$  is equal to \_\_\_\_\_

(2022-Jun-27-S1)