

TEST PAPER -1  
Mathematics - XII  
TERM-II

Time : 2 hr

Max Marks : 40

**PART - A : (2 - Marks)**

- Q. 1. Evaluate :  $\int \frac{dx}{1 + \tan x}$
- Q. 2. Show that the curves,  $y = ae^{3x} + be^{-2x}$  is the solution of the differential equation  $y_2 - y_1 - 6y = 0$
- Q. 3. Find the value of  $\lambda$  so that the scalar product of the vector  $i + j + k$  with the unit vector along the sum of vectors  $2i + 4j - 5k$  &  $\lambda i + 2j + 3k$  is equal to one.
- Q. 4. Find the distance of the point  $P(6, 5, 9)$  and the plane determined by the points  $A(3, -1, 2)$ ,  $B(5, 2, 4)$  and  $C(-1, -1, 6)$ .
- Q. 5. Two numbers are selected at random (without replacement) from the first six positive integers. Find the distribution for the larger of the two numbers obtained.
- Q. 6. Probability of solving specific problem independently by  $A$  &  $B$  are  $\frac{1}{2}$  and  $\frac{1}{3}$  respectively. If both try to solve the problem independently, find the probability that  
(i) the problem is solved (ii) exactly one of them solves the problem.

**PART - B: (3 - Marks)**

- Q. 7. Solve the initial value problem:  $\frac{dy}{dx} + y \cot x = 2x + x^2 \cot x$ ;  $y\left(\frac{\pi}{2}\right) = 0$ .

**OR**

Solve the differential equation  $\sqrt{1 + x^2 + y^2 + x^2 y^2} + xy \frac{dy}{dx} = 0$ .

- Q. 8. Evaluate :  $\int \frac{1 - x^2}{x(1 - 2x)} dx$

- Q. 9. Let  $\vec{a} = i + 4j + 2k$ ,  $\vec{b} = 3i - 2j + 7k$ ,  $\vec{c} = 2i - j + 4k$ . Find a vector  $\vec{d}$  which is perpendicular to both  $\vec{a}$  and  $\vec{b}$ , &  $\vec{c} \cdot \vec{d} = 15$ .

- Q. 10. Find the shortest distance between the lines:

$$\vec{r} = i + 2j - 4k + \lambda(2i + 3j + 6k); \vec{r} = 3i + 3j - 5k + \mu(2i + 3j + 6k).$$

**OR**

Find the equation of the plane passing through the point  $(0, 7, -7)$  and containing the line

$$\vec{r} = -i + 3j - 2k + \lambda(-3i + 2j + k).$$

**PART - C: (4 - Marks)**

- Q. 11. Evaluate :  $-\int_{-1}^{3/2} |x \cdot \sin(\pi x)| dx$

- Q. 12. Using integration find the area of region  $\{(x, y) : 0 \leq y \leq x^2 + 1, 0 \leq y \leq x + 1, 0 \leq x \leq 2\}$

**OR**

Using integration, find the area of the region enclosed by the line  $x + y = 2$  and the parabola  $y^2 = x$

- Q. 13. Find the distance of the point  $(-1, -5, -10)$  from the point of intersection of the plane

$$\vec{r} \cdot (i - j + k) = 5 \text{ and the line } \vec{r} = 2i - j + 2k + \lambda(3i + 4j + 2k).$$

- Q. 14. A person has undertaken a construction job. The probabilities are 0.65 that there will be strike, 0.80 that the construction job will be completed on time if there is no strike, and 0.32 that the construction job will be completed on time if there is a strike.

Based on the above information answer the following:

(i) Find the probability that the job is completed on time.

(ii) If the construction job is completed on time, then find the probability that there is a strike.

\*\*\*\*\*