

TEST PAPER - 2
Mathematics - XII

TERM - II

Max Marks : 40

Time : 2 hr

GENERAL INSTRUCTIONS

1. This question paper contains three parts A, B & C, each part is compulsory.
2. Part - A comprises of 6 questions of 2 marks each.
3. Part - B comprises of 4 questions of 3 marks each.
4. Part - C comprises of 4 questions of 4 marks each.

PART - A

- Q. 1. Evaluate : $\int \tan^4 x \, dx$
- Q. 2. Show that the curves, $x^2 = 2y^2 \log y$ is the solution of the differential equation $(x^2 + y^2)y_1 = xy$
- Q. 3. If \vec{a} , \vec{b} , \vec{c} are three vectors such that $|\vec{a}| = 3$, $|\vec{b}| = 4$, $|\vec{c}| = 5$ and each one of them is perpendicular to the sum of the two other, find $|\vec{a} + \vec{b} + \vec{c}|$.
- Q. 4. If the points $(1, 1, p)$ and $(-3, 0, 1)$ be equidistant from the plane $\vec{r} \cdot (3\vec{i} + 4\vec{j} - 12\vec{k}) + 13 = 0$, then find the value of p .
- Q. 5. A coin is biased so that the head is 3 times as likely to occur as tail. If the coin is tossed twice, find the probability distribution of number of tails.
- Q. 6. Consider the experiment of tossing a coin. If the coin shows head, toss it again but if it shows tail, then throw a die. Find the conditional probability of the event that 'the die shows a number greater than 4' given that 'there is at least one tail'.

PART - B

- Q. 7. Find the particular solution of the differential equation: $(x - y)(dx + dy) = dx - dy$; $x = 0, y = -1$

OR

Show that the differential equation $x^2 \frac{dy}{dx} - xy = 1 + \cos\left(\frac{y}{x}\right)$ is non-homogenous, then solve it.

- Q. 8. Evaluate : $\int \left\{ \frac{\sin^{-1}\sqrt{x} - \cos^{-1}\sqrt{x}}{\sin^{-1}\sqrt{x} + \cos^{-1}\sqrt{x}} \right\} dx$

- Q. 9. Let $\vec{\alpha} = 3\vec{i} - \vec{j}$, $\vec{\beta} = 2\vec{i} + \vec{j} - 3\vec{k}$, then express $\vec{\beta}$ in the form of $\vec{\beta} = \vec{\beta}_1 + \vec{\beta}_2$ where $\vec{\beta}_1$ is parallel to $\vec{\alpha}$ and $\vec{\beta}_2$ is perpendicular to $\vec{\alpha}$.

- Q. 10. Find the distance between the lines : $\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$; $\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$

OR

Find the equation of plane which contains the line of intersection of the planes $x + 2y + 3z = 4$ and $2x + y - z + 5 = 0$ and whose x -intercept is twice its z -intercept.

PART - C

- Q. 11. Evaluate : $\int_0^{\pi/2} \log(\sin x) \, dx$

OR

Evaluate : $\int_0^1 \cot^{-1}(1 - x + x^2) \, dx$

- Q. 12. Find the area bounded by the lines : $2x + y = 4$, $3x - 2y = 6$ & $x - 3y + 5 = 0$.

- Q. 13. Show that the lines $\frac{x+3}{-3} = \frac{y-1}{1} = \frac{z-5}{5}$; $\frac{x+1}{-1} = \frac{y-2}{2} = \frac{z-5}{5}$ are coplanar, also find the equation of plane containing both the lines.

- Q. 14. A man is known to speak truth 3 out of 4 times. He throws a die. Based on the above information answer the following: (i) Find the probability that the man will report that it is a six
(ii) If the man reports that it is a six, then find the probability that it is actually a six.
