MATHEMATICS
Class - XI
(Semester - II)

1. **Answer the following questions :** **Full Marks - 40**

(i) Find the term independent of x in the expansion of $\left(2x - \frac{1}{x}\right)^{10}$ **2×2=4**

OR

Find the middle term in the expension of $\left(\frac{x^2}{3} + \frac{3}{x^2}\right)^8$

(ii) If the p^{th} term of an A.P is q and the q^{th} term is p, then find its $(p+q)^{th}$ term.

2. **Answer the following questions :**

(i) If p is the length of the perpendicular from the origin to the straigth line **2×2=4**

$\frac{x}{a} + \frac{y}{b} = 1$, then prove that, $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

(ii) Find the length of the latus - rectum of the parabola

$$y = -2x^2 + 12x - 17$$

OR

The co-ordinates of a point on the ellipse $9x^2 + 16y^2 = 144$ are $\left(2, \frac{3\sqrt{3}}{2}\right)$; find the eccentric angle of the point.

3. **Answer the following questions :** **2×2=4**

(i) What is the probability of obtaining 7 points with the rolling of two dice ?

OR

Three fair coins are tossed once. Find the probability of getting at least one head.

(ii) A and B are two events, not mutually exclusive, connected with a random experiment E. if $P(A) = \frac{1}{4}, P(B) = \frac{2}{5}$ and $P(A \cup B) = \frac{1}{2}$ then find the value of $P(A^c \cup B^c)$.

Group - B

4. Answer the following questions :

(i) By the principle of mathematical induction, prove that, $(2^{2n}-1)$ is always divisible by 3, where $n \in N$. 3

(ii) If the coefficients of the p^{th}, $(p+1)^{th}$ and $(p+2)^{th}$ terms in the expansion of $(1+x)^n$ are in A. P., show that, $n^2-n(4p+1)+4p^2-2=0$ 4

(iii) Find the sum to n terms of the series 4

$$(3^3-2^3)+(5^3-4^3)+(7^3-6^3)+.....$$

OR

Three unequal numbers a, b, c are in A. P. and a, (b - a), (c - a) are in G. P. Prove that, a : b : c = 1 : 3 : 5. 4

5. Answer the following questions :

(i) Find the distance of the point (3, 5) from the line $2x+3y=14$ measured parallel to the line $x-2y=1$. 3

(ii) The equation of in-circle of an equilateral triangle is

$2x^2+2y^2+3x-y-5=0$. Find the area of the tringle. 4

(iii) Find the equation of the parabola whose vertex is (–1, 3) and focus is (3, –1). 4

OR

Show that the difference of the focal distances of any point on the hyperbola $9x^2-16y^2=144$ is equal to the length of its trans verse axis. 4

5. Answer the following questions :

(i) Calculate the mean deviation from the median for the following data, related to heights of 100 children :

Height (inches)	60	61	62	63	64	65	66	67	68
No. of children	2	0	15	29	25	12	10	4	3

3

OR

If the standard deviation of first n even natural numbers is $\sqrt{65}$, find n. 3

(ii) An urn contains 5 black, 6 red and 4 white balls. Five balls are drawn at random from the urn. Find the probability that exactly 2 of the drawn balls are black. 3