SECTION – A  ( 10 x 1 = 10 Marks )

1) Find the sum to infinity of the G.P 6, 1.2, 0.24, ........

2) Write the component statements of the compound statement
   "The roof is red and the wall is white."

3) If P = {1,2}, find  P x P x P.

4) Find the multiplicative inverse of  4 – 3i in  a + ib  form.

5) One card is drawn from a pack of 52 cards. Find the probability of the card drawn
   is either black or king?

6) Evaluate  \[ \lim_{x \to 0} \frac{\sin 3x}{x} \].

7) Write the contrapositive of the statement "If a triangle is equilateral, it is isosceles."

8) Write the negation of the statement "Water is liquid and steam is gas."

9) A and B are two mutually exclusive events. If  P(A) = \frac{1}{4} , and  P(B) = \frac{2}{5} , find
   \[ P(A \cup B) \].

10) Differentiate  x \sin x.
SECTION – B (12 x 4 = 48 Marks)

11) Find the domain and range of the function
\[ f(x) = \frac{x^2 - 9}{x - 3}. \]

12) Prove that \[ \frac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x} = \cot x. \]

13) By using principle of Mathematical Induction prove that for all \( n \in \mathbb{N} \),
\[ 1 + 2.3 + 3.4 + \ldots + n(n+1) = \frac{n(n+1)(n+2)}{3}. \]

OR

By using principle of Mathematical Induction prove that for all \( n \in \mathbb{N} \),
\[ \frac{1}{3.5} + \frac{1}{5.7} + \frac{1}{7.9} + \ldots + \frac{1}{(2n+1)(2n+3)} = \frac{n}{3(2n+3)}. \]

14) The sum of first three terms of a G.P is 16 and the sum of the next three terms is 128. Determine the first term, common ratio and the sum to \( n \) terms of the G.P.

OR

In an A.P if \( m^{th} \) term is \( n \) and the \( n^{th} \) term is \( m \), where \( m \neq n \), find the \( p^{th} \) term?

15) Prove that \[ \cos^2 2x - \cos^2 6x = \sin 4x \cdot \sin 8x. \]

16) Find the equation of the hyperbola whose foci are \((0, \pm 12)\) and the length of the latus rectum is 36.

OR

Find the equation of the ellipse whose major axis on the X axis and passes through the points \((4, 3)\) and \((6, 2)\).

17) In \( \triangle ABC \) prove that \[ a(b \cos C - c \cos B) = b^2 - c^2. \]
18) Find the square root of $\sqrt{5-12i}$

OR

Solve the quadratic equation $2x^2 + \sqrt{15} \, ix - i = 0$

19) Out of 9 outstanding students in a college, there are 4 boys and 5 girls. A team of 4 students is to be selected for a quiz programme. Find the probability that two are boys and two are girls?

20) Find the ratio in which Q divides PR, if P(3, 2, -4), Q(5, 4, -6) and R(9, 8, -10) are collinear.

21) Evaluate $\lim_{x \to 0} \frac{\sin 4x}{\sin 2x}$

22) How many different words can be formed with or without meaning using the letters of the word HARYANA?

(i) How many of these begin with H and end with N?

SECTION – C (7 x 6 = 42 Marks)

23) In any $\triangle ABC$ prove that $\frac{a+b}{c} = \frac{\cos \left( \frac{A-B}{2} \right)}{\sin \left( \frac{C}{2} \right)}$.

OR

Find the general solution of $\sin x + \sin 3x + \sin 5x = 0$.

24) In a group of 500 students 285 play football, 195 play hockey, 115 play basketball, 45 play football and basketball, 70 play football and hockey, 50 play hockey and basketball and 50 do not play any of the three games.

(i) How many play all three games?

(ii) How many play exactly one of the three games?

25) Solve the following system of linear inequations graphically.

$x + y \leq 5$; \quad $4x + y \geq 4$; \quad $x + 5y \geq 5$; \quad $x \leq 4$, \quad $y \leq 3$. 


26) Find the sum to \( n \) terms of the series \( 5 + 11 + 19 + 29 + \ldots \ldots \).

27(i) \( P (a, b) \) is the midpoint of a line segment between the axes. Show that the equation of the line is \( \frac{x}{a} + \frac{y}{b} = 2 \).

(ii) Find the equation of a line perpendicular to the line \( x - 2y + 3 = 0 \) and passing through the point \( (1, -2) \).

28) The coefficients of the \((r-1)\)th, \(r\)th and \((r+1)\)th terms in the expansion of \((x+1)^n\) are in the ratio \(1 : 3 : 5\). Find \(n\) and \(r\).

OR

Show that the middle term in the expansion of \((1 + x)^n\) is \(\frac{1.3.5\ldots(2n-1)}{n!} 2^r x^r\).

29) Calculate the mean and standard deviation of the following distributions.

<table>
<thead>
<tr>
<th>classes</th>
<th>20-30</th>
<th>30-40</th>
<th>40-50</th>
<th>50-60</th>
<th>60-70</th>
<th>70-80</th>
</tr>
</thead>
<tbody>
<tr>
<td>frequency</td>
<td>30</td>
<td>23</td>
<td>20</td>
<td>14</td>
<td>10</td>
<td>3</td>
</tr>
</tbody>
</table>

***************