

"Section-B"

Marks: 50

Q.2. Attempt any ten (10) of the following parts. All parts carry equal marks.

(i) Express in the standard form $a + ib$: $\frac{1-2i}{2+i} + \frac{4-i}{3+2i}$

(ii) If $A = \begin{bmatrix} x+2 & 3 & 4 \\ 2 & x+3 & 4 \\ 2 & 3 & x+4 \end{bmatrix} = 0$, then find x .

(iii) Find a unit vector perpendicular to both $\vec{a} = i + j + 2k$ and $\vec{b} = -2i + j - 3k$.

(iv) Find the 15th term of the arithmetic sequence 2, 5, 8,

(v) Find the sum of n terms of the series whose n th term is $2^{n-1} + 8n^3 - 6n^2$.

(vi) Verify that the triple product of $i - j$, $j - k$ and $k - i$ is zero.

(vii) One integer is chosen at random from the numbers 1, 2, 3,, 50.
What is the probability that the chosen number is divisible by 6 or 8?

(viii) Find the constant term in the expansion of $\left(2\sqrt{x} - \frac{3}{x\sqrt{x}}\right)^{23}$.

(ix) If $f(x) = \frac{x-4}{x-3}$, then find the domain and range of f .

(x) Prove that : $\frac{\sin \theta}{\sec 4\theta} + \frac{\cos \theta}{\operatorname{cosec} 4\theta} = \sin 5\theta$

(xi) Solve the linear inequality : $x - 5 > 0$

(xii) Find the area of inscribed circle of the triangle with measures of the sides 55m, 25m and 70m.

(xiii) Factorize: $P(z) = z^2 + 4$

"Section-C"

Marks: 30

Note: - Attempt any three (3) questions. All questions carry equal marks.

Q.3. (a) Find an infinite geometric series whose sum is 6 and such that each term is four times the sum of all the terms that follow it.

(b) Draw the graph of $y = 2 \sin x$ in the interval $0 \leq x \leq 2\pi$

Q.4. (a) Find 'n' when ${}^{2n}C_3 : {}^nC_2 = 36 : 3$ 317

(b) Find the coefficient of x^n in $\left(\frac{1+x}{1-x}\right)^2$ - 361

Q.5. (a) If $\sin \alpha = -\frac{4}{5}$ and $\cos \beta = -\frac{12}{13}$, α in quadrant III, and β in quadrant II, then find $\cos(\alpha + \beta)$.

(b) Find the rank of $A = \begin{bmatrix} 4 & 5 & 6 \\ 1 & 2 & 3 \\ 7 & 8 & 9 \end{bmatrix}$

Q.6. (a) Find area of the ΔABC in which $b = 14$, $c = 12$, $\alpha = 82^\circ$

(b) Find the unit vector having the same direction as the $\vec{V} = 3i - 4j$