Mathematics (Subjective)   (For All Sessions)   (GROUP-I)   Time: 2:30 hours

SECTION-I

2. Write short answers of any eight parts from the following: (8x2=16)

i. Name the properties used in equations: (a): $100 + 0 = 100$ (b): $1000 \times 1 = 1000$

ii. Separate into real and imaginary parts, if $Z = \frac{i}{1+i}$

iii. Differentiate between Equal and Equivalent sets, with example.

iv. Write the set: $\{x \mid x \in N \wedge 4 < x < 12\}$, in descriptive and tabular forms:

v. Define semi-group.

vi. Find values of x if $\begin{vmatrix} 3 & 1 & x \\ -1 & 3 & 4 \\ x & 1 & 0 \end{vmatrix} = -30$

vii. If the matrices A and B are symmetric and $AB = BA$, show that AB is symmetric.

viii. If $A = \begin{bmatrix} i & 1+i \\ 1 & -i \end{bmatrix}$, find $A + (\bar{A})^t$

ix. Solve: $x(x+7) = (2x-1)(x+4)$ by factorization.

x. If ω is a cube root of unity, form an equation whose roots are $Z\omega$ and $Z\omega^2$

xi. Find two consecutive numbers, whose product is 132.

xii. Find the three cube roots of -8

3. Write short answers of any eight parts from the following: (8x2=16)

i. Without finding constants write $\frac{x^2 - 10 + 13}{(x-1)(x^2 - 5x + 6)}$ into partial fractions.

ii. Find vulgar fraction equivalent to recurring decimal 0.7

iii. Find the nth term of sequence $\left(\frac{4}{3}\right)^2, \left(\frac{7}{3}\right)^2, \left(\frac{10}{3}\right)^2, \ldots$

iv. Calculate geometric means between 4 and 16.

v. If $y = \frac{2x}{3} + \frac{4x^2}{9} + \frac{8x^3}{27} + \cdots$ and if $0 < x < 3/2$, then show that $x = \frac{3y}{2(1+y)}$

vi. Find 12th term of H.P: $\frac{1}{3}, \frac{2}{9}, \frac{1}{6}, \ldots$

vii. Find the term involving x^{-2} in the expansion of $\left(x - \frac{2}{x^2}\right)^{13}$

viii. How many words can be formed from PLANE using all letters when no letter is to be repeated.

ix. Write formula for ^nP_r and ^nC_r

x. A die is thrown. Find the probability that dots on top are prime numbers.

xi. Expand $(1-x)^{1/2}$ up to 4 terms by binomial theorem.

xii. If x is so small that its square and higher powers be neglected, then show that: $\frac{\sqrt{1+2x}}{\sqrt{1-x}} \approx 1 + \frac{3x}{2}$

4. Write short answers of any nine parts from the following: (9x2=18)

i. Define the word "Trigonometry"

ii. Find $\tan\theta$ and $\cot\theta$ for $\theta = \frac{19\pi}{3}$

iii. Show that $\sin^2\left(\frac{\pi}{6}\right) + \sin^2\left(\frac{\pi}{3}\right) + \tan^2\left(\frac{\pi}{4}\right) = 2$

iv. Find the value of $\cos\left(\frac{\pi}{12}\right)$

v. Prove that $Sin(180^0 + \alpha) Sin(90^0 - \alpha) = -Sin\,\alpha\,Cos\,\alpha$.

vi. Define the principal tangent function.

vii. Prove that $Sin(\alpha + \beta)Sin(\alpha - \beta) = cos^2\beta - cos^2\alpha$.

viii. Define the period of a Trigonometry function

ix. Solve the right triangle ABC in which: $r = 90^0$, $b = 68.4$, $c = 96.2$

x. Solve the triangle ABC if $\beta = 60^0$, $r = 15^0$, $b = \sqrt{6}$

xi. Find the area of triangle ABC for $b = 21.6$, $c = 30.2$, $\alpha = 52^0 40'$

xii. Define the trigonometric equation.

xiii. Find the solution of $Cosec\,\theta = 2$ which lie in the interval $[0, 2\pi]$

SECTION-II

Note Attempt any three questions. Each question carries equal marks: (10x3=30)

5. (a) Find the matrix A if: $\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix} A = \begin{bmatrix} 0 & -3 & 8 \\ 3 & 3 & -7 \end{bmatrix}$

(b) For what values of "m" the roots of the equation $x^2 - 2(1+3m)x + 7(3+2m) = 0$ be equal?

6. (a) Resolve into partial fractions $\frac{x^2}{(x-2)(x-1)^2}$

(b) Find the values of n and r when $^{n-1}C_{r-1} : {}^nC_r : {}^{n+1}C_{r+1} = 3 : 6 : 11$

7. (a) Sum the series up to n terms $2 + (2+5) + (2+5+8) + \cdots$

(b) Use binomial theorem to show that: $1 + \frac{1}{4} + \frac{1.3}{4.8} + \frac{1.3.5}{4.8.12} + \cdots = \sqrt{2}$

8. (a) Prove that $\frac{\tan\theta + Sec\theta - 1}{\tan\theta - sec\theta + 1} = \tan\theta + sec\theta$

(b) Prove that $cos20^0 + cos100^0 + cos140^0 = 0$

9. (a) The measures of sides of a triangular plot are 413,214 and 375 meters. Find the measure of corner angles of the plot.