Sr. Inter Mathematics IIA Model Paper

Time: 3 Hours **Max. Marks: 75**

Section – A

I. **Very Short Answer Questions. Answer all Questions. Each Question carries 'Two' marks**

10 × 2 = 20 M

1. Find the multiplicative inverse of 7 + 24i.

2. Find the square root of 3 + 4i.

3. If the point P denotes complex number z = x + iy in the Argand plane and if $\frac{z-i}{z-1}$ is a purely imaginary number then find the locus of P.

4. Form quadratic equation whose roots are: $\frac{p-q}{p+q}, -\left(\frac{p+q}{p-q}\right)(p \neq \pm q)$

5. Find the algebraic equation whose roots are 3 times the roots of $x^3 + 2x^2 - 4x + 1 = 0$.

6. Find the number of 5-digit numbers that can be formed using the digits, 0, 1, 2, 3, 4, 5 if each digit can be used any number of times.

7. If ${}^9C_3 + {}^9C_5 = {}^{10}C_r$ find 'r'.

8. Find the term independent of x in the expansion of $\left(\frac{x^{\frac{1}{2}}}{3} - \frac{4}{x^2}\right)^{10}$

9. Find the mean deviation about the mean for the following data 3, 6, 10, 4, 9, 10.

10. A Poisson variable satisfies P(X = 1) = P(X = 2), find P(X = 5).

Section – B

II. Short Answer Questions. Answer any 'Five' Questions. Each Question carries 'Four' marks.

5 × 4 = 20 M

11. If $x + iy = \frac{1}{1 + \cos\theta + i\sin\theta}$ then prove that $4x^2 - 1 = 0$.

12. If x is real, prove that $\frac{x}{x^2 - 5x + 9}$ lies between $\frac{-1}{11}$ and 1.

13. Find the number of 4 letter words that can be formed using the letters of the word MIXTURE which

i) Contain the letter X

ii) Do not contain the letter X

14. Find the number of ways of selecting 11 members cricket team from 7 batsman, 6 bowlers and 2 wicket keepers so that the team contains 2 wicket keepers and at least 4 bowlers.

15. Divide $\frac{x^2}{(x-1)(x-2)}$ into partial fractions

16. A, B, C are three horses in a race. The probability of A to win the race is twice that of B, and probability of B is twice that of C. What are the probabilities of A, B and C to win the race?

17. A Bag contains 12 two rupee coins, 7 one rupee coins, 4 half rupee coins, if three coins are selected at random then, find probability that

i) The sum of three coins is maximum ii) Each coin is of different value

Section – C

III. Long Answer Questions. Answer any 'Five' Questions. Each Question carries 'Seven' marks.

5 × 7 = 35 M

18. Prove that $\left(\frac{1+\sin\frac{\pi}{8}+i\cos\frac{\pi}{8}}{1+\sin\frac{\pi}{8}-i\cos\frac{\pi}{8}}\right)^{\frac{8}{3}} = -1$

19. Solve $6x^4 - 35x^3 + 62x^2 - 35x + 6 = 0$.

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

21. If $x = \frac{1}{5} + \frac{1.3}{5.10} + \frac{1.3.5}{5.10.15} + ...\infty$, then find $3x^2 + 6x$.

22. Calculate the variance and standard deviation of the following continuous frequency distribution

Class interval	Frequency
30 - 40	3
40 - 50	7
50 - 60	12
60 - 70	15
70 - 80	8
80 - 90	3
90 - 100	2

23. State and prove Addition theorem on probability.

24. The range of random variable X is {0, 1, 2}, given that $P(X = 0) = 3c^3$, $P(X = 1) = 4c - 10c^2$, $P(X=2) = 5c - 1$.

i) Find the value of c ii) $P(X < 1)$, $P(1 < X \leq 2)$ and $P(0 < X \leq 3)$.