MODEL TEST PAPER-V

Time: 3 hours **Maximum Marks: 100**

General Instructions:

(i) All questions are compulsory.

(ii) This questions paper contains 29 questions.

(iii) Questions nos. 1-4 in section A are very short answer type questions carrying 1 mark each

(iv) Question nos. 5 -12 in section B are short answer type questions carrying 2 marks each

(v) Questions non. 13 -23 in section C are long answer-I type questions carrying 4 marks each

(vi) Question 24 -29 in section D are long answer –II type questions carrying 6 marks each.

SECTION A

1. Define Modulus function
2. If $\tan\alpha = \frac{x}{x+1}$ and $\tan\beta = \frac{1}{2x+1}$, then find the value of $\alpha + \beta$.
3. Evaluate

   $$\lim_{x\to 0} \frac{\sin x^{o}}{x}$$

4. If the latus rectum of an ellipse is one half of its minor axis, then what will be its eccentricity?

SECTION B

5. For sets A, B and C using properties of sets, prove that

   A – (B – C) = (A – B) $\cup$ (A $\cap$ C)

6. Find the modulus of $\frac{1+i}{1-i}-\frac{1-i}{1+i}$.

7. Find the 4th term from the end in the expansion $\left(\frac{3}{x^2}-\frac{x^3}{6}\right)^7$

8. Solve 1 + 6 + 11 + 16 ….. + x = 148.
9. Find the ratio in which the line joining the points (1, 2, 3) and (–3, 4, –5) is divided by xy plane.
10. If the letters of word “ ALGORITHM” are arranged in random in a row. What is the probability that the letters “GOR” must remain together as a unit?
11. Differentiate $\tan\sqrt{x}$ wrt . ‘x’.
12. Find that equation of the line passing through (–3, 5) and perpendicular to the line through (2, 5) and (–3, 6)

SECTION C

13. Find the domain and range of

    f(x) = $\frac{1}{\sqrt{x-[x]}}$

14. Prove that $\left|\sqrt{\frac{1-\sin x}{1+\sin x}}+\sqrt{\frac{1+\sin x}{1-\sin x}}\right|=\frac{-2}{\cos x}$ where $\frac{\pi}{2}<x<\pi$.
15. Prove that $2.7^n + 3.5^n - 5$ is divisible by 24 for all n $\in$ N.
16. In the expansion of $(1 + x)^n$ the binomial coefficients of three consecutive terms are respectively 220, 495 and 792. Find the value of n.

17. In a plane, there are 37 straight lines of which 13 pass through the point A and 11 pass through the point B. Besides no three lines pass through one point, no line passes through both points A and B and no two are parallel. Find the number of prints of intersection of the straight lines.

18. Differentiate by first principle, $\sqrt{ax+b}$

OR

Evaluate $\lim\limits_{x\to 0} \dfrac{\tan 2x - \sin 2x}{x^3}$

19. Calculate the mean deviation from the median

Class	0-6	6-12	12-18	18-24	24-30
Frequency	8	10	12	9	5

20. Find the equation of the circle passing through the points (5, –8), (2, –9), (2, 1)

21. Find the equation of the hyperbola whose directrix is 2x+ y = 1, Focus (1, 2) and eccentricity $\sqrt{3}$.

22. If z_1, z_2 are complex number such that $\dfrac{2z_1}{3z_2}$ is purely imaginary number, then find $\left|\dfrac{z_1 - z_2}{z_1 + z_2}\right|$.

23. Insert 4 geometric means between 576 and 18.

SECTION D

24. In a survey of 100 students, the number of students studying the various languages were found to be : English only 18, English but not Hindi 23, English and German 8, English 26, German 48, German and Hindi 8, no language 24. Find the number of students who were studying (i) Hindi (ii) English and Hindi (iii) English, Hindi and German.

25. Exhibit graphically the solution set of the linear in equations $x + y \leq 5$, $4x + y \geq 4$, $x + 5y \geq 5$, $x \leq 4$, $y \leq 3$.

26. Find the sum of n terms of the series

$1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2) + \ldots\ldots\ldots\ldots$.

27. Calculate the mean and standard deviation for the given distribution

Age :	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of person	3	51	122	141	130	51	2

28. Using the words "necessary and sufficient" rewrite the statement.

"The integer n is odd if and only if n^2 is odd." Also check whether the statement is true.

29. Solve for x: $\sin 2x - \sin 4x + \sin 6x = 0$

OR

In a ΔABC, prove that

$(b^2 - c^2) \cot A + (c^2 - a^2) \cot B + (a^2 - b^2) \cot c = 0$