

MATHEMATICS-I(B)  
Pre final Examination -2026  
SET-C

Time:3Hours

Max.Marks:75

SECTION-A

10×2=20

I. Very Short Answer Type Question:

(i) Answer **All** questions.

(ii) Each question carries **TWO** marks.

1. Find the condition for the points  $(a,0)$ ,  $(h,k)$ ,  $(0,b)$  where  $ab \neq 0$ , to be collinear.
2. Find the sum of the squares of the intercepts of the line  $4x-3y=12$
3. Find the ratio in which the XZ-plane divides the line joining  $A(-2,3,4)$  and  $B(1,2,3)$ .
4. Find intercepts of the plane  $4x+3y-2z+2=0$  on the coordinates axes
5. Compute  $\lim_{x \rightarrow 0} \frac{e^{3x}-1}{x}$
6. Compute  $\lim_{x \rightarrow \infty} \frac{2x^2-x+3}{x^2-2x+5}$
7. Find the derivative of  $\cot^n x$
8. Find the derivative of  $5\sin x + e^x \log x$
9. Find the approximate value of  $\sqrt{82}$
10. Find the slope of the tangent  $y=5x^2$  at  $(-1,5)$

SECTION-B

5×4=20

II. Short Answer Type Question:

(i) Answer **Any FIVE** questions.

(ii) Each question carries **FOUR** marks

11. If the distance from P to the points  $(2,3)$  and  $(2,-3)$  are in the ratio 2:3, then find the equation of locus of P.
12. When the axes are rotated through an angle  $\frac{\pi}{4}$  find the transformed equation of  $3x^2 + 10xy + 3y^2 = 9$ .
13. Find equation of the line passing through the points  $(2,3)$  and making non-zero intercepts on the axes of coordinates whose sum is zero
14. Compute  $\lim_{x \rightarrow 0} \frac{\cos(ax) - \cos(bx)}{x^2}$
15. Find the derivative of  $\sqrt{x+1}$  from the first principle.
16. The radius of a sphere is measured as 14 cm. Later it was found that there is an error 0.02cm in measuring the radius. Find the approximate error in surface area of the sphere
17. The total revenue in rupees received from the sale of x units of a produce is given by  $R(x) = 13x^2 + 26x + 15$  Find the marginal revenue when  $x=7$

SECTION-C

5×7=35

III. Long Answer Type Question:

(i) Answer Any FIVE questions.

(ii) Each question carries SEVEN marks

18. If  $Q(h,k)$  is the foot of the perpendicular from  $P(x,y)$  on the straight line  $ax+by+c=0$  then  $(h-x_1):a = (k-y_1):b = -(ax_1+by_1+c):(a^2+b^2)$  and find the foot of the perpendicular from  $(-1,3)$  on the straight line  $5x-y-18=0$

19. Show that the area of the triangle formed by the lines  $ax^2+2hxy+by^2=0$  and line

$$lx+my+n=0 \text{ is } \left| \frac{n^2\sqrt{h^2-ab}}{am^2-2hlm+bl^2} \right|$$

20. Find the condition for the chord  $lx+my=1$  of the circle  $x^2 + y^2 = a^2$  (whose centre is the origin) to subtend a right angle at the origin.

21. Find the angle between two diagonals of a cube The vertices of a triangle are  $A(1,4,2)$   $B(-2,1,2)$   $C(2,3,-4)$ . Find  $\angle A$ ,  $\angle B$ ,  $\angle C$

22. Find the derivatives of the function  $\sin x^x + x^{\sin x}$

23. Find the angle between the curves  $y^2 = 8x$ ,  $4x^2 + y^2 = 32$

24. A wire of length  $l$  is cut into two parts which are bent respectively in the form of a square and a circle. What are the lengths of the pieces of the wire respectively so that the sum of the areas is the least.