





8. Which one of the following expression doesn't representing indeterminate form

a)  $\frac{0}{0}$

b)  $0 \times \infty$

c)  $\frac{\infty}{0}$

d)  $1^\infty$

9. Value of  $\lim_{x \rightarrow 0} \frac{1}{x}$  is

a) 0

b) 1

c) -1

d) doesn't exist

10.  $\lim_{x \rightarrow \infty} x \sin \frac{1}{x}$  is

a) 1

b) -1

c) 0

d) can not be said

11. Given function  $f(x) = \frac{|x|}{x}$ , then  $f(x)$  is discontinuous at  $x = 0$  because

a) limit doesn't exist

b) limiting values infinity

c) limit exist but not equal to functional value

d) Functional value is infinity

### Group 'B'

12. a) Define conjunction of two statements

[1]

b) Let  $p$  and  $q$  be any two statement, prove that:

$$\sim (p \vee q) \equiv (\sim p \wedge \sim q)$$

[3]

c) Find the truth value of statement "If  $2 \times 3 = 6$  or  $2 + 3 = 6$  then  $5 < 0$ "

[1]

13. a) If  $A$ ,  $B$  and  $C$  are subsets of universal set  $U$  then prove that

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

[2]

b) For any two real numbers  $x$  and  $y$  show that  $|x+y| \leq |x| + |y|$

[3]

14. a) Find the distance from the point  $(-2, -3)$  to the line  $2x - 3y + 5 = 0$ .

[2]

b) Find the equation of the bisector of the angles between the lines  $3x - 2y = 5$  and  $6x + 2y + 15 = 0$  which contains the origin.

[3]



13. a) ✓ Write the conditions for angle between pair of straight line represented by  $ax^2 + 2hxy + by^2 = 0$  to be perpendicular. [1]
- b) ✓ If  $p$  and  $p'$  be the length of the perpendicular from the origin upon the straight line whose equation are  $x \sec\theta + y \operatorname{cosec}\theta = a$  and  $x \cos\theta - y \sin\theta = a \cos 2\theta$ , prove that  $4p^2 + p'^2 = a^2$ . [4]
16. a) ✓ If  $\alpha$  &  $\beta$  are the roots of  $px^2 + qx + r = 0$ , prove that  $\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} + \sqrt{\frac{q}{p}} = 0$ . [3]
- b) ✓ If the equation  $x^2 + (k+2)x + 2k = 0$  has equal roots, find value of 'k'? [2]
17. a) ✓ Define symmetric matrix. [1]
- b) ✓ If  $A = \begin{pmatrix} 2 & 4 & 3 \\ 2 & 3 & 4 \\ 5 & 2 & 6 \end{pmatrix}$
- i) Find  $A^T$  [1]
- ii) Show that the sum of given matrix and its transpose is a symmetric matrix. [1]
- c) ✓ If  $A = \begin{pmatrix} 4 & x+2 \\ 2x-1 & 0 \end{pmatrix}$  and  $A = A^T$ , find the value of  $x$ . [2]
18. ✓ Find the limiting values of  $\lim_{y \rightarrow 0} \frac{(x+y) \sec(x+y) - x \sec x}{y}$  [5]
19. a) ✓ What do mean by indeterminate form. Give Example. [1]
- b) ✓ Do the function  $f(x) = \frac{x-1}{x+2}$  define for the value  $x = -2$ ? [1]
- c) ✓ Evaluate:  $\lim_{x \rightarrow 0} \frac{e^{2x} - 1}{x \cdot 2^{x+1}}$  [3]



20. ✓ a) Function  $f(x)$  is defined by

$$f(x) = \begin{cases} x^2 - 1 & \text{for } x < 2 \\ 2x & \text{for } x = 2 \\ x + 1 & \text{for } x > 2 \end{cases}$$

i) Is the function continuous at  $x = 2$ ?

ii) If not how can you make it continuous at  $x = 2$ .

[4]

b) ✓ Evaluate:  $\lim_{x \rightarrow 2} \frac{x - \sqrt{8 - x^2}}{\sqrt{x^2 + 12} - 4}$

21. a) ✓ Find the equation to the pair of straight line joining the origin to the intersection of the straight line  $y = mx + c$  and the curve  $x^2 + y^2 = a^2$ , prove that they are right angled if  $2c^2 = a^2(1 + m^2)$ .

[4]

b) ✓ Solve the inequality  $|2x - 1| \geq 3$  and draw its graph.

[4]

22. a) ✓ The sum of the roots of the equation  $\frac{1}{x+a} + \frac{1}{x+b} = \frac{1}{c}$  is zero. Prove that the product of the roots is  $-\frac{1}{2}(a^2 + b^2)$ .

b) ✓ Find the Coordinates of the points which is equidistant from the four points O, A, B & C where O is origin A, B & C are the points on the x, y, z axis respectively at a distances a, b, & c from the origin.

[4]