



# CAPITAL COLLEGE AND RESEARCH CENTER

Koteshwor, Kathmandu  
First Terminal Examination - 2079  
GRADE XI (SCIENCE)

Subject: Mathematics  
Time : 3:00 hrs.

SET 'B'

F.M. : 75  
P.M. : 30

## Group 'A'

- Which one of the following is the symbolic form of connective in the statement "students are hardworking and happy"?  
a)  $\vee$       b)  $\wedge$       c)  $\Rightarrow$       d)  $\Leftrightarrow$
- Let A, B and C are subsets of universal set U, such that  $A \subseteq B$  then  
a)  $C-B \subseteq C-A$       b)  $C-A \subseteq C-B$   
c)  $\bar{A} \subseteq B$       d)  $\bar{A} \subseteq \bar{B}$
- If  $|2x-1| < 5$ ,  $x \in \mathbb{R}$ , then the possible value of x lies in the interval  
a)  $(-\infty, 3)$       b)  $(-2, 3)$   
c)  $(-\infty, -2) \cup (3, \infty)$       d)  $(3, \infty)$
- What is the determinant of  $A = [-3]$ ?  
a) 3      b) -3      c) 0      d) 1
- One of zero's of the polynomial  $f(x) = x^2 - x - 2$  is  
a) 0      b) 1      c) 2      d) -2
- Which one of the following is not parallel to  $y = 4x - 7$ ?  
a)  $y = 4x - 7$       b)  $4x + y = 10$       c)  $y - 7 = 4(x - 2)$       d)  $x = \frac{y}{4}$
- The sum of slopes of the lines represented by  $x^2 + 2hxy - 6y^2 = 0$  is equal to the product of slopes then h equal to  
a) 4      b) -2      c) -6      d) 8

$$\frac{2h}{b}$$

$$-5$$

$$\begin{aligned} x^2 + x - 2 &= 0 \\ x(x+1) - 2(x+1) &= 0 \\ (x-2)(x+1) &= 0 \\ x &= 2 \end{aligned}$$

$$\begin{aligned} a) \quad y &= 4x - 7 \\ b) \quad 4x + y &= 10 \\ \frac{-4}{-1} &= -4 \end{aligned}$$

$$\begin{aligned} c) \quad y - 7 &= 4(x - 2) \\ 4x - y &= 4 \end{aligned}$$

$$\begin{aligned} y &= m_1 x & y &= m_2 x \\ 4x - y - 7 &= 0 \\ \frac{-4}{-1} &= 4 \\ a &= 1 \\ 2h - 2h &= 0 \end{aligned}$$

$$\frac{2h}{b} = \frac{a}{b}$$

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

$$\frac{1}{0} \times \frac{1}{0} = \left(\frac{1}{0}\right)$$

- 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

$$\begin{aligned} -5 &< 2n-1 < 5 \\ -6 &< 2n < 6 \\ -3 &< 2n < 3 \end{aligned}$$

### Group 'B'

12. a) Define conjunction of two statements [1]

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

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

- 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 [2]

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

- 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  $2x - 3y + 5 = 0$ . [1]

- b) Find the equation of the bisector of the angles between the lines  $3x - 2y =$

and  $6x + 2y + 15 = 0$  which passes through origin.

$$\begin{aligned} -2 &= 0 \\ x+1 &= 0 \\ x+1 &= 0 \\ (2-1) & \end{aligned}$$

$$-\frac{1}{1}$$

$$= 0$$

$$= \frac{q}{b}$$

13. a) Write the conditions for angle between pair of straight line represented by  $ax^2 + 2hxy + by^2 = 0$  to be perpendicular. [1]

20.

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]

2

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]

$\frac{x^2 + 13}{x \cdot 13} = 1$

$\frac{2x-1}{1}$



# Group 'C'

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]

$$|x|, \text{ if } x \geq 0 \quad |x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$$

All the best

