

## SECTION 'B' (Short-Answer Questions) (30)

**NOTE:** Attempt any Six part questions from this section selecting at least Two part question from each questions All questions carry equal marks

### ANALYTIC GEOMETRY (STRAIGHT LINE) AND VECTOR ALGEBRA

2. i) A is two-third the way from (1,10) and (-8,4) and B is the midpoint of (0,-7) and (6,-11), find the distance  $|\overline{AB}|$ .

OR If the line through (2, 5) and (-3, -2) is perpendicular to the line through (4, -1) and (x, 3). Find x

ii) Determine the equation of the line which passes through the point (-2, -4) and has the sum of its intercepts equal to 3.

OR--Find the ratio in which the point P(0, -1) divides the join of Q(1, 2) and R (2, 5).

iii) The point (2, -5) is a vertex of a square, one of whose sides lies on the line  $x - 2y - 7 = 0$ . Calculate the area of the square.

iv) A particle acted upon by the force  $4\hat{i} + 2\hat{j} - 3\hat{k}$  and  $3\hat{i} + \hat{j} - \hat{k}$  is displaced from the point P(1, 2, 3) to the point Q(5, 4, 1); find the work done on the particle.

OR--Find  $\sin(a, b)$  for the vectors  $\vec{a} = 2\hat{i} + 3\hat{j} + 4\hat{k}$  and  $\vec{b} = \hat{i} + \hat{j} + \hat{k}$ .

### ANALYTIC GEOMETRY (CONIC SECTIONS)

3. i) Find the equation of the circle having (-5, 6) and (3, -4) are the end points of a diameter

OR Find the equation of the circle passing through the points (0,3), (2, -1) and (1, 0).

3. ii) Find the equation of the circle with radius  $\sqrt{a^2 + b^2}$  which passes through the two points (a,0) and (-a,0).

3. iii) Find the equation of tangent and normal to the hyperbola  $x^2 - y^2 = 49$  at (8, 15).

3. iii) (OR) Find p, if the line  $2\sqrt{2}x - 3y = p$  touch the hyperbola  $16x^2 - 36y^2 = 576$

3. iv) Show that the eccentricities  $e_1$  and  $e_2$  of the tow conjugate hyperbolas satisfy the relation  $e_1^2 + e_2^2 = e_1^2 e_2^2$

### CALCULUS

4. i) Evaluate any two of the following:

a)  $\lim_{x \rightarrow 0} \frac{e^{mx} - e^{nx}}{x}$       b)  $\lim_{x \rightarrow \infty} \frac{\sqrt{x^2 + 1}}{x + 1}$       c)  $\lim_{\theta \rightarrow 0} \frac{1 - \cos \theta}{\sin \theta}$

ii) Find the derivative by the first principle at any point x in the Domain D(f) of the function.

$f(x) = \sin x^2$       OR       $f(x) = x^{\frac{2}{3}}$

iii) Find  $\frac{dy}{dx}$  of any Two of the following:

a)  $y = \frac{1}{2} \tan^2 x + \ln \cos x$       b)  $y = (\ln x)^{\sin x}$       c)  $y = \ln \left( \frac{e^x}{1 + e^x} \right)$

iv) Find  $\frac{dy}{dx}$  of any Two of the following:

a)  $x^y \cdot y^x = 5$       b)  $x = a \cos^2 3\theta, y = b \sin^2 3\theta$   
c)  $2x^3 - 3xy + y^3 = 5$

OR --Let  $a, b \in \mathbb{R}$  and  $y = f(x) = a \cos x + b \sin x, \forall x \in \mathbb{R}$ . Show that  $\frac{d^2y}{dx^2} + y = 0$

## SECTION "C" (Detailed Answer Questions)(20)

**NOTE:** Attempt Two questions from this section.

5. Evaluate any Two of the following:

i)  $\int \frac{3x^2 + 1}{(x^3 + x + 6)^{\frac{1}{2}}} dx$       ii)  $\int \sin^3 x dx$

iii)  $\int_0^1 \frac{dx}{\sqrt{4 - x^2}}$       iv)  $\int \frac{1}{25 - 16y^2} dy$

6. a) A line whose y-intercept is 1 less than its x-intercept forms with the co-ordinate axes of triangle of area 6 square units. What is its equation?  
OR Find the measures of the angles of the triangle, the equations of whose sides are  $x + y - 5 = 0, x - y + 1 = 0$  and  $y = 1$

b) Prove that the line  $lx + my + n = 0$  and the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  have just one point in common if  $a^2l^2 + b^2m^2 - n^2 = 0$

7. a) Find the relative maximum or minimum of  $f(x) = \frac{x}{\ln x}$  OR-- $f(x) = 2e^x + e^{-x}$

b) Evaluate any one of the following:

i)  $\int x \sin x dx$       ii)  $\int \frac{x^2 dx}{2 + x^3 - x^6}$       OR       $\int \frac{2x dx}{(1 + x^2)(3 + x^2)}$

نوٹ: سال 2020 میں گیارہویں اور بارہویں جماعت کے امتحانات نہیں ہوئے تھے