ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

EXAMINATION MATERIAL ZUEB - 2022

MATHEMATICS XII

SECTION "B" CONSTRUCTED RESPONSE QUESTION (CRQ'S)

CHAPTER NO 1	FUNCTION AND LIMITS
SUB TOPIC	

EXERCISE 1.6

Q1. Evaluate:

i. $\lim_{x\to 0} \frac{3x^3-2x^2+x}{4x^2+2x}$

ii. $\lim_{x\to 3} \frac{x^2-9}{x-3}$

iii. $\lim_{x\to 1} \frac{x^n-1}{x-1}$ $(n \in N)$

iv. $\lim_{\theta\to 0} \frac{sin\ 0}{tan\ \theta}$

v. $\lim_{x\to 0} \frac{sin4x}{x}$

vi. $\lim_{\theta\to 0} \frac{1-cos\theta}{sin\theta}$

CHAPTER NO 2	THE STRAIGHT LINE
SUB TOPIC	

EXERCISE 2.1

Q2. The vertices A, B, C of a triangle are (2, 1), (5, 2) and (3, 4) respectively. Find the coordinates of the circum-center and also the radius of the circum-circle of the triangle.

Q3. An equilateral triangle has one vertex at the point (3, 4) and another at the point (-2, 3). Find the coordinates of the third vertex.

EXERCISE 2.2

Q4. Obtain the coordinates of the centroid of the triangle whose vertices are (-2, 5), (4, -1) and (5, 4).

Q5. Find the ratio in which y-axis divides the join of (-5, 3) and (8, 6). Also find the coordinates of the point of division.

Q6. In what ratio does the point C (2, 4) divides the join of A (7, 9) and B (-1, 1)?

Q7. A, B and C are three collinear points. A and B are respectively (3, 4) and (7, 7) and AC is equal to 10 units. Find the coordinates of C.

EXERCISE 2.4

Q8. The line through (6, -4) and (-3, -2) is perpendicular to the line through (4, -1) and (x, 3). Find x.

Q9. Using slopes, prove that (6, 5), (-3, 0) and (4, -2) are the vertices of a right triangle.

Q10. Find the measure of the angle form the line through (-3, 1) and (4, 3) to the line through (1, -2) and (6, 7).

CHAPTER NO 3	**THE GENERAL EQUATION OF STRAIGHT LINES**
SUB TOPIC	

EXERCISE 3.1

Q11. Show that the following lines are concurrent. Also find their point of concurrency.

$$x - y = 6, \quad 4y + 22 = 3x \quad and \quad 6x + 5y + 8 = 0$$

Q12. The point P (2, 3) is the foot of the perpendicular dropped from the origin to a straight line. Write the equation of this line.

Q13. Find the values of k for which the two lines $(k-1)x + ky - 5 = 0, kx + (2k-1)y + 7 = 0$ intersect at a point lying on the axis of x.

EXERCISE 3.2

Q14. Find the distance between the following parallel lines $x + y - 2 = 0$ 2x+2y -4=0

Q15. If Δ denotes the area of a triangle and the coordinates of the point A, B, C and D are (6, 3), (-3, 5), (4, -2) and (x, 3x) respectively, so that $\frac{\Delta DBC}{\Delta ABC} = \frac{1}{2}$ find x.

Q16. The area of a triangle is 8 square units; two of its vertices are the point A (1, 2) and B (2, 3), and the third vertex C lies on the line $2x + y - 2 = 0$. Find the coordinates of the vertex C.

Q17. Given that $3x - 2y - 5 = 0, 2x + 3y + 7 = 0$ are the equations of the two sides of a rectangle, and that (-2, 1) is one of its vertices; calculate the area of the rectangle.

Q18. A line whose y-intercept is 1 less than its x-intercept forms with the coordinate axes a triangle of area 6 square units. What is its equation?

CHAPTER NO 4	DIFFERENTIABILITY
SUB TOPIC	

Q19. Find the derivative by the first principle at any point x in the domain D (*f*) of the function *f* in the following cases.

i. $f(x) = 3x^2 - x, \quad D(f) = \mathbb{R};$

ii. $f(x) = sin^2 x, \quad D(f) = \mathbb{R};$

Q20. Find $\frac{dy}{dx}$ of any of the following:

(i) $x = \sin t^3 + \cos t^3, \quad y = \sin t + 2\cos^{-1} t$

(ii) $y = \frac{3x^2-1}{3x^2} + \ln\sqrt{1+x^2} + \tan^{-1} x$

(iii) $e^x \ln y = \sin^{-1} y$

(iv) $\sqrt{a^2 - x^2} + a\sin^{-1}(\frac{x}{a})$

(v) $x^y . y^x = 1$

(vi) $\sqrt{x^2 + y^2} = \ln(x^2 - y^2)$

CHAPTER NO 5	APPLICATION OF DIFFERENTIAL CALCULUS
SUB TOPIC	

EXERCISE 5.3

Q20. Determine the extreme values of the function $f : \mathbb{R} \to \mathbb{R}$, in the following:

i. $f(x) = \frac{x}{\ln x}$

CHAPTER NO 6	ANTI-DERIVATIVES
SUB TOPIC	

EXERCISE 6.10

Q21. Find the area, above the x-axis, under the following curves, between the given ordinates:

i. $y = 3x^4 - 2x^3 + 1, \quad x = 1, \quad x = 2$

ii. $x^2 + y^2 = 25, \quad a = 3, \quad b = 4$

iii. $y = tan^2 x \quad a = \frac{\pi}{6}, \quad b = \frac{\pi}{4}$

EXERCISE 6.11

Q22. Solve the following differential equations

i. $\frac{dy}{dx} = 3cos\ 2x\ , y\left(\frac{\pi}{4}\right) = -1$

ii. $x^2\frac{dy}{dx} = x^4y^2 + y^2$

iii. $\frac{dy}{dx} = xy^3$, y = 1 when x = 0

iv. $\frac{dr}{ds} = \frac{\sqrt{r^2-1}\sqrt{2s+3}}{r}$

v. $\frac{dw}{dz} = \sqrt{wz - 2w - 3z + 6}$ w=12, when z = 6

CHAPTER NO 7	**CIRCLE**
SUB TOPIC	

EXERCISE 7.2

Q23. Prove that the curves $3x^2 - y^2 = 12\ and\ x^2 + 3y^2 - 24 = 0$ intersect at right angle at the point $(\sqrt{6}, \sqrt{6})$.

Q24. Find the equation to the circle with center at the point (1, -1) and touching the straight line $5x + 12y = 7$.

Q25. Find the length of the tangent from (8, 5) to the circles of radius 3 units with center (1, 2).

Q26. Find the values of r such that the line $x = 2y + 4$, should be a tangent to the circles $x^2 + y^2 = r^2$

CHAPTER NO 8	**PARABOLA, ELLIPSE AND HYPERBOLA**
SUB TOPIC	

EXERCISE 8.4

Q27. Find the equation of tangent and normal at the point (3, 6) to the parabola $y^2 = 12x$

Q28. Find the equation of the tangent and normal to $49x^2 + 64y^2 = 64 \times 49$ at the point $(8\ cos\alpha, 7sin\alpha)$.

Q29. Find k, if the line $\sqrt{2}x - 3y = k$ touches the hyperbola $16x^2 - 36y^2 = 576$.

Q30. Show that the eccentricities $e_1\ and\ e_2$ of the two conjugate hyperbolas satisfy the relation.

$$e_1^2 + e_2^2 = e_1^2 + e_2^2$$

CHAPTER NO 9 VECTORS	
SUB TOPIC	

EXERCISE 9.5

Q31. Find u. v and sin (u, v) where u and v are the vectors.

i. $u = 2i - 6j + 3k,\ \ v = i + 2j - 2k,$

ii. $u = 6i + 2j - 3k,\ \ v = -i + 8j + 4k,$

EXERCISE 9.6

Q32. Find the volume of the parallelopiped whose three adjacent edges are represented by the vectors:

$$a = 2i - 3j + 4k\ ,\quad b = i + 2j - k\ ,\quad c = 3i - j + 2k$$

Q33. Simplify:

i. $[a,\ 2b - 3c,\ -2a + b + c]$

ii. $[-a - b - c\ ,\ 2b + 3c\ ,\ -4a + c]$

Q34. Find the constant a such that the following sets of vectors are coplanar:

$$i + 2j + k,\quad aj - k,\quad -2i + j$$

EXERCISE 9.7

Q35. A particle is acted on by constant forces $4i + j - 3k$ and $3i + j - k$, and is displaced from the point $i + 2j + 3k$ to the point $5i + 4j + k$. Find the work done by the forces.