

ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD.

(Department of Mathematics)

WARNING

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Course: Mathematics-III (1309)
Level: Intermediate

Semester: Spring, 2026
Total Marks: 100
Pass Marks: 40

Note: Attempt all questions and each question carries equal marks.

Assignment No. 1
(Unit 1-5)

Question No.1 **[20]**

- (a) Find δy and dy if $y = \sin \sqrt{x^2 + 1}$ and when x changes from $\frac{\pi}{3}$ to π .
- (b) Integrate $\int e^{-3x} \cos 3x \, dx$

Question No.2 **[20]**

- (a) Evaluate $\int_1^4 \left(\cos x - \frac{3}{x^5} \right) dx$
- (b) Evaluate $\int_0^4 f(t) dt$; $f(t) = \begin{cases} 2t & \text{if } t > 1 \\ 1 - 3t^2 & \text{if } t \leq 1 \end{cases}$

Question No.3 **[20]**

- (a) The line "L" has gradient 3 and cuts x-axis at 4, find equation of "L".
- (b) Given that $A(1,2)$, $B(2,-3)$, $C(6,1)$ show that $|AB| = |AC|$

Question No.4 **[20]**

- (a) Prove that $A(0,9)$, $B(4,7)$, $C(6,6)$ are collinear points.
- (b) Find equation of line segment passing through $(1,3)$ and perpendicular to $2x + 3y + 7 = 0$.

Question No.5 **[20]**

- (a) Graph feasible region formed due to:
 $2x + 3y \leq 7$; $x + y \geq 5$; $x + 2y \leq 3$.
- (b) Maximize the function defined by $f(x, y) = 3x + 5y$ subject to constraints:
 $5x + 12y \geq 5$; $2x + 3y \leq 7$; $x \geq 0$; $y \geq 0$.

Total Marks: 100
Pass Marks: 40

Assignment No. 2
(Unit: 6-9)

Note: Attempt all questions and each question carries equal marks.

Question No.1 [20]

- (a) Find an equation of the circle which passes through $A(5, -2)$, $B(1, 3)$ and have centre at $5x - 3y - 6 = 0$.
- (b) Find focus, vertex and directrix of the parabola $(y - 1)^2 = -9(x - 7)$.

Question No.2 [20]

- (a) Find foci, vertices and directrices of the ellipse $\frac{(y-5)^2}{11} + \frac{(x+2)^2}{7} = 1$.
- (b) Given foci are $(\pm 3\sqrt{3}, 0)$ and vertex is $(5, 0)$, find equations of asymptotes of hyperbola.

Question No.3 [20]

- (a) Find an equation of conic referred to the new axes obtained by rotation of axes about origin and given angle:
 $5x^2 + 2y^2 - 7xy - 9 = 0$ and $\theta = \tan^{-1} 3$.
- (b) Identify the conic $x^2 + y^2 + 2xy + 2\sqrt{2}x - 2\sqrt{2}y + 2 = 0$.

Question No.4 [20]

- (a) Find fourth vertex of parallelogram $ABCD$ where $A(3, 5)$, $B(-2, 7)$ and $C(1, 5)$.
- (b) Given that $A(3, 7)$, $B(-7, 6)$ and $C(-11, 5)$. Find $7\overrightarrow{CB} - 5\overrightarrow{AC}$.

Question No.5 [20]

- (a) Check whether the points $A(-3, 5, 2)$, $B(0, 5, 6)$, $C(2, 5, 7)$ and $D(1, 0, 1)$ are coplanar or not.
- (b) A force F of magnitude 9m in the direction opposite that of $2i - 6j + 7k$ acts at $A(-2, 1, 3)$, find its moment about the point $(3, -1, 2)$.