

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)

DEPARTMENT OF BUSINESS AND TECHNOLOGY MANAGEMENT

Mid-Semester Examination

Course No. : Math 4101

Course Title : Mathematics I

Winter Semester, A. Y. 2022-2023

Time : 1.5 hours

Full Marks : 75

Answer **all 3 (three)** questions. All questions carry equal marks. Marks of each question and corresponding CO and PO are written in the right margin with brackets.

- | | | |
|-------|--|-------------------|
| 1. a) | Solve the following inequality and show the results on the real axis $\frac{3}{ 2x-1 } \geq 4$. | 5 (CO1)
(PO1) |
| b) | Solve the following Non-linear inequality and show the results on the real axis.
$x^2 - x - 12 < 0$. | 7 (CO1)
(PO1) |
| c) | In a class of 25 students, 12 students have taken economics, 8 have taken economics but not politics. Find the number of students who have taken economics and politics and those who have taken politics but not economics. | 13 (CO1)
(PO1) |
| 2. a) | Reduce the equation $2x^2 - 10xy + 2y^2 + 11x - 5y + 2 = 0$ to one containing only the terms of 2 nd degree. | 10 (CO2)
(PO2) |
| b) | Determine the equation of the curve, $x^2 - 2xy + y^2 + 2x - 4y + 3 = 0$, after rotating the axis through 45°. | 7 (CO2)
(PO2) |
| c) | If the pair of Straight lines $x^2 - 2pxy - y^2 = 0$ and $x^2 - 2qxy - y^2 = 0$ be such that each pair bisects the angle between the other pair, then prove that, $p - q = 0$ and $pq = -1$ | 8 (CO2)
(PO2) |
| 3. | Does $x^2 + 6xy + 9y^2 + 4x + 12y - 5 = 0$ represent a pair of straight lines? If yes, find and sketch them. Also find the angle between them. | 25 (CO2)
(PO2) |