

Class test-2

Full Marks: 20

CSE (A Section)

Time: 30 Minutes

Course No.: Math-1213

1. Reduce the equation $x^2 + 12xy - 4y^2 - 6x + 4y + 9 = 0$ to the standard form. Find also the equations of axes. 10
2. What is direction cosine? Find the d.c's of the line which is equally inclined to the axis. 05

Class test-1

Full Marks: 20

CSE (A Section)

Time: 30 Minutes

Course No.: Math-1213

1. What is Invariants? If by the rotation of axis system without changing the origin $ax^2 + 2hxy + by^2$ transforms into the equation $a_1x_1^2 + 2h_1x_1y_1 + b_1y_1^2$ then show that $a + b = a_1 + b_1$ and $ab - h^2 = a_1b_1 - h_1^2$.
2. Find the area of the triangle formed by the lines $6x^2 + xy - y^2 = 0$ and $x + 6y - 19 = 0$.

RAJSHAH UNIVERSITY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

1st Year Even Semester Examination 2017

COURSE NO: Math 1213 COURSE TITLE: Co-ordinate geometry & Ordinary Differential Equation

FULL MARKS: 72

TIME: 3 HRS

- N.B. (i) Answer any SIX questions taking any THREE from each section.
 (ii) Figures in the right margin indicate full marks.
 (iii) Use separate answer script for each section.

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SECTION : A

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- Q.1. (a) If by the rotation of the rectangular co-ordinate axes about the origin, the expression $ax^2 + 2hxy + by^2$ changes to $a'x'^2 + 2h'x'y' + b'y'^2$. Show that $a + b = a' + b'$ and $ab - h^2 = a'b' - h'^2$. 6 6
- (b) Determine the equation of parabola $x^2 - 2xy + y^2 + 2x - 4y + 3 = 0$ after rotating of axes through 45° . 6 6
- Q.2. (a) Prove that the straight lines represented by the equation $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ will be equidistance from the origin if $f^2 - g^2 = bf^2 - ag^2$. 6
- (b) Find the area of the rectangle formed by the lines $9x^2 - 6xy + y^2 + 45x - 15y + 54 = 0$ and $x^2 + 6xy + 9y^2 + 4x + 12y - 5 = 0$. 6
- Q.3. (a) If (l_1, m_1, n_1) and (l_2, m_2, n_2) be the direction cosines of any two lines AB and CD and θ be the angle between them then show that $\cos\theta = l_1l_2 + m_1m_2 + n_1n_2$. 6
- (b) Find the equation of the plane through the points $(1, -2, 2)$, $(-3, 1, -2)$ and perpendicular to the plane $2x + y - z + 6 = 0$. 6
- Q.4. (a) Find the equation of the line perpendicular to both the lines $\frac{x-1}{1} = \frac{y-1}{2} = \frac{z+2}{3}$ and $\frac{x+2}{2} = \frac{y-5}{-1} = \frac{z+3}{2}$ and passing through their intersection point. 7
- (b) Find the angle between the line $2x + 4y - 2z + 3 = 0 = 4x - 2y + 6z + 5$ and the plane $5x - 4y + 3z - 5 = 0$. 5

SECTION : B

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- Q.5. (a) Define linear and non-linear differential equation with example. Find the DE of all circles passing through the origin. 5 1
- (b) Solve the ODE $x^2 dy + y(x+y) dx = 0$. 4 4
- (c) Solve the initial value problem $(2x \cos y + 3x^2 y) dx + (x^3 - x^2 \sin y - y) dy = 0$; $y(0) = 2$. 3 3
- Q.6. (a) What is integrating factor. Solve the ODE by first finding an integrating factor $(2xy^2 + y) dx + (2y^3 - x) dy = 0$. 6 1
- (b) Solve the initial value problem $(x^2 + 1) dy + (4xy - x) dx = 0$ and the initial condition is $y(2) = 1$. 6 6
- Q.7. (a) Solve $(D^2 - 5D + 6)y = e^{3x} + e^{2x} \cos x$. 5 5
- (b) Solve $y = px + p^3$ where $p = \frac{dy}{dx}$. 2 2
- (c) Solve $(D^2 - 4)y = x^2 e^{2x} + \sin 3x$. 5 5
- Q.8. (a) Find the general solution of $\frac{d^2 y}{dx^2} + y = \tan x \sec x$. 7
- (b) A circuit has in series an electromotive force given by $E = 100 \sin(40t)$ V, a resistor of 10Ω and an inductor of $0.5H$. If the initial current is zero, find the current at time $t > 0$. 5