



COEP Technological University

A Unitary Public University of Government of Maharashtra

(MA-20001) Ordinary Differential Equations and Multivariate Calculus

Program : S.Y.B.Tech. Sem. I

Academic Year : 2023-24

Examination : Re-Test 1

Maximum Marks : 20

Date : 4/11/2023

Time : 8 am - 9 am

Branch:

Student MIS Number :

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Name and Signature of the Invigilator: _____

Q.1	Q.2	Q.3	Q.4	Total	Signature

Attempt All the Questions.

Question [I](5 marks)

- (1) A solution that can be obtained from general solution is called a solution. [CO1][1]
- (2) Write the order and degree of the differential equation $y = \sqrt{(y')^3 + y''}$.
Order = Degree = [CO1][1]
- (3) Find the linear differential equation whose linearly independent solutions are 1 , e^x , xe^x . [CO3][3]

Detailed Answer:

Question [II](5 marks)

- (1) Show that the family of curves $\frac{x^2}{c^2} + \frac{y^2}{c^2 - 1} = 1$ is self-orthogonal. [CO2][2]

Detailed Answer:

(2) Reduce the differential equation $y'' + (1 + \frac{1}{y})(y')^2 = 0$ to first order and solve.

[CO2][2]

Detailed Answer:

(3) Fill in the blank. The general solution of $y'' + 2y' + y = 0$ is

[CO2][1]

Question [III](5 marks)

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

[CO3][3]

Detailed Answer:

- (2) If $\frac{\frac{\partial P}{\partial y} - \frac{\partial Q}{\partial x}}{Q}$ is a function of x alone, say $\phi(x)$ then show that the integrating factor of non-exact differential equation $P(x, y) dx + Q(x, y) dy = 0$ is $e^{\int \phi(x) dx}$. [CO4][2]
- Detailed Answer:

[1.5]

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Question [IV](5 marks)

[CO3][2]

- (1) Solve $(D^4 - 3D^2 - 4)y = 0$.

Detailed Answer:

- (2) Determine the current $i(t)$ in a series circuit with two 9-volt batteries, $\frac{1}{4}$ henry inductance, and 8 ohms of resistance, assuming the initial current is zero. Further find steady rate current. [CO5][3]

Detailed Answer:

ROUGH WORK (Will Not Be Assessed)