

2103000203023003/2111000303023003
EXAMINATION FEBRUARY-MARCH 2024
BACHELOR OF SCIENCE (THIRD SEMESTER)
MATHEMATICS PAPER - VII
MTH-303 : DIFFERENTIAL EQUATIONS

[Time: As Per Schedule]

[Max. Marks: 50]

Instructions:

1. Fill up strictly the following details on your answer book

- a. Name of the Examination : **BACHELOR OF SCIENCE (THIRD SEMESTER)**
- b. Name of the Subject : **MATHEMATICS PAPER - VII MTH-303 : DIFFERENTIAL EQUATIONS**
- c. Subject Code No : **2103000203023003/2111000303023003**

2. Sketch neat and labelled diagram wherever necessary.
3. Figures to the right indicate full marks of the question.
4. All questions are compulsory.
5. Follow usual notations.

Seat No:

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Student's Signature

Q.1 Answer any Five from the following.

10

1. Find the general solution of $x^2y'' + 4xy' + 2y = e^x$.
2. Find the solution of a partial differential equation $\sqrt{p} + \sqrt{q} = 1$.
3. Find the general solution of $x^2y'' + y = 0$.
4. Find Q_1 for the differential equation $\frac{d^2y}{dx^2} - 2\tan xy' + 5y = 0$.
5. Find general integral of $p + q = pq$.
6. Find one independent integral of $xp + yq = z$.
7. Eliminate the arbitrary constants a and b from the relation
$$z = (x^2 + a)(y^2 + b)$$
8. Find one solution y_1 of $xy'' + (2 - x)y' - y = 2 \cos x$.

Q.2 Attempt any two.

10

1. Discuss the method to solve homogeneous linear differential equation with variable coefficients into linear differential equations with constant coefficients by changing the independent variable.
2. Solve: $x^2y'' - 3xy' + 4y = x^2 \log x$

3. Solve: $(x + a)^2 y'' - 4(x + a)y' + 6y = x$.

Q.3 Attempt any two.

10

1. Discuss the method to solve second order linear differential equations by the removal of first derivative.
2. Solve: $y'' - 2 \tan x y' + 5y = 0$.
3. Solve: $y'' - \frac{1}{x} y' + 4x^2 y = x^4$.

Q.4 Answer Any Two from the following.

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1. Form a partial differential equation by eliminating arbitrary constants from $z = ax + by + cz$; a, b and c are arbitrary constants.
2. Form a partial differential equation by eliminating arbitrary function from $z = f(ax + by) + \phi(ax - by)$; Where f and ϕ are arbitrary functions.
3. Solve: $(z^2 - 2yz - y^2)p + (xy + xz)q = xy - xz$.

Q.5 Answer any Two from the following.

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1. Discuss the method to solve the standard form $F(z, p, q) = 0$.
2. Solve: $p^2 + q^2 = x + y$.
3. Solve: $p^2 + q^2 = npq$.
