

30/5/24



DOON UNIVERSITY, DEHRADUN
End Semester Examination, II Semester, 2024
 Academic Year 2023-24 (Even Semester)
 School of Physical Sciences Department of Mathematics
 Programme: BSc Mathematics
 Course Code with Title: MAC 152: Differential Equations.

Time Allowed 2 Hours

Maximum Marks: 50

All questions are compulsory.

SECTION: A [5x3=15M]

- Q1. Solve $(D^2 + 6D + 9)y = 0$
 Q2. Solve $(D^2 - 3D + 2)y = e^x$
 Q3. Find particular integral of $(D^2 + 2D + 1)y = x$
 Q4. Find the complementary function of $(D^2 - 2D + 1)y = \cos 3x$
 Q5. Solve the initial-valued problem $y'' - 4y' + 4y = 0$, $y(0) = 3$, $y'(0) = 1$

SECTION: B [3x5=15M]

- Q6. Solve $(D^2 + 2D + 1)y = \frac{e^{-x}}{x^2}$
 Q7. Discuss exponential decay model. Draw the compartment diagram and form the differential equation, give its solution.
 Q8. Apply the method of variation of parameter to solve
 $(D^2 + a^2)y = \operatorname{cosec} ax$

OR

Solve $(D^3 - 2D + 4)y = e^x \cos x$

SECTION: C [2x20=20M]

Q9. Solve $(x^2 D^2 + 4xD + 2)y = x^2 \sin(\log x)$

OR

Solve $(D^2 - 5D + 6)y = x \cos 2x$

- Q10. Find general solution of $(1 - x^2)y'' - 2xy' + 3y = 0$ if $y = x$ is a solution of it.