



F.E. sem - II
Nov - Dec 2012
2008 course

[4261] - 107

F.E. (Semester - II) Examination, 2012
ENGINEERING MATHEMATICS - II
(2008 Pattern)

Time : 3 Hours

Max. Marks : 100

- Instructions:** 1) Answer **three** questions from **Section I** and **three** questions from **Section II**.
- 2) Answers to the **two** Sections should be written in **separate** answer books.
- 3) Black figures to the **right** indicate **full** marks.
- 4) **Use** of electronic pocket calculator is **allowed**.
- 5) Assume suitable data, **if necessary**.

SECTION - I

1. A) Form a differential equation whose general solution is $y = Ae^{-2x} + Be^{3x}$ where A and B are arbitrary constants. 6

B) Solve **any two**. 10

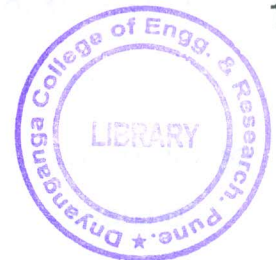
i) $y(x^2y + e^x) dx - e^x dy = 0$

ii) $\frac{dy}{dx} - y \tan x = y^4 \sec x$

iii) $\frac{dy}{dx} = \frac{x + 2y - 3}{3x + 6y - 1}$

OR

2. A) Form a differential equation whose general solution is $y = c_1x + \frac{c_2}{x}$ where c_1 and c_2 are arbitrary constants. 6



P.T.O.

B) Solve **any two**.

10

i) $(x^4 + y^4) dx - (xy^3) dy = 0$

ii) $\cos x \frac{dy}{dx} + y = \sin x$

iii) $(x^2y + y^4) dx + (2x^3 + 4xy^3) dy = 0.$

3. Solve **any three** :

18

a) A body at temperature 100°C is placed in a room whose temperature is 20°C and cools down to 60°C in 5 minutes. Find its temperature after 8 minutes.

b) A voltage Ee^{-at} is applied at $t = 0$ to a circuit containing inductance L and

resistance R . Show that current at any time t is $\frac{E}{R - aL} (e^{-at} - e^{-\frac{R}{L}t})$.

c) A bullet is fired into sand tank, its retardation is proportional to square root of

its velocity ($K\sqrt{V}$). Show that the bullet will come to rest in time $\frac{2\sqrt{V}}{K}$, where

V is initial velocity.

d) Find orthogonal trajectories of family of parabola $y^2 = 4ax$, where a is arbitrary constant.

OR

4. Solve **any three** :

18

a) The charge Q on the plate of a condenser of capacity 'C' charged through a resistance R by a steady voltage V satisfy the differential equation

$$R \frac{dQ}{dt} + \frac{Q}{C} = V$$

If $Q = 0$ at $t = 0$, show that $Q = CV \left[1 - e^{-\frac{t}{RC}} \right]$

Find the current flowing into the plate.

