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 arbitary 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 arbitary 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 arbitary 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 $Q = CV\left[1 - e^{-t/RC}\right]$

Find the current flowing into the plate.