S.E. comp, sem -I
Nov - Dec 2012, 2008 pattern

Total No. of Questions—12] [Total No. of Printed Pages—8+3

Seat No.	

[4262]-210

S.E. (Electrical/Instru./Comp./I.T.) (Second Semester)

EXAMINATION, 2012

ENGINEERING MATHEMATICS-III

(2008 PATTERN)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) In Section I : attempt Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**. In Section II : attempt Q. No. **7** *or* Q. No. **8**, Q. No. **9** *or* Q. No. **10**, Q. No. **11** *or* Q. No. **12**.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of electronic pocket calculator is allowed.

(*vi*) Assume suitable data, if necessary.

SECTION I

1. (*a*) Solve any *three* of the following : [12]

(*i*) $(D^2 - 4D + 4)\, y = e^{2x} + 3^x + 5.$

P.T.O.

(*ii*) $(D^2 - 1)\, y = e^x\,(1 + x^2 + \sin x)$

(*iii*) $(D^2 + 4)\, y = \operatorname{cosec} 2x$ (by method of variation of parameters)

(*iv*) $x^3y'' + 3x^2y' + xy = \sin(\log x)$

(*b*) Solve : [5]

$$\frac{dx}{dt} - wy = a\cos pt$$

$$\frac{dy}{dt} + wx = a\sin pt$$

Or

2. (*a*) Solve any *three* of the following : [12]

(*i*) $y'' - y' - 2y = 2\log x + 1/x + 1/x^2$

(*ii*) $(D^3 + 8)y = x^4 + 2x + 1$

(*iii*) $(3x + 2)^2\, y'' + 3(3x + 2)\, y' - 36y = 9x^2 + 12x + 4$

(*iv*) $\dfrac{x^2dx}{y^3} = \dfrac{y^2dy}{x^3} = \dfrac{dz}{z}$

(*b*) An uncharged condenser of capacity 'C' is charged by applying an e.m.f. of value : [5]

$$E\sin\left(\frac{t}{\sqrt{LC}}\right)$$

through leads of inductance 'L' and negligible resistance 'R'. The charge Q on the plate of condenser satisfies the differential

equation

$$\frac{d^2Q}{dt^2} + \frac{Q}{LC} = \frac{E}{L} \sin \frac{t}{\sqrt{LC}}.$$

Show that charge at any time 't' is :

$$Q = \frac{EC}{2}\left\{\frac{\sin t}{\sqrt{LC}} - \frac{t}{\sqrt{LC}}\frac{\cos t}{\sqrt{LC}}\right\}$$

3. (*a*) If

$$v = 3x^2 y - y^3,$$

find its harmonic conjugate 'u'. Hence find $f(z)$. [6]

(*b*) Evaluate :

$$\oint_c \frac{e^z\, dz}{(z+1)^2 (z-2)}$$

where 'c' is the circle $|z - 1/2| = 3$. [5]

(*c*) Find the transformation, which sends the points –1, 0, 1 from Z-plane into the points 0, i, $3i$ of W-plane. [5]

Or

4. (*a*) Show that an analytic function with constant modulus is constant. [5]