

Nov-Dec-2010
S.E. (OMP)

Total No. of Questions—12] Sem-II [Total No. of Printed Pages—8+2

[3862]-220

S.E. (COMP)(Second Semester) EXAMINATION, 2010

(Common to Elect., Instru. & I.T.)

ENGINEERING MATHEMATICS—III

(2008 PATTERN)

Time : Three Hours

Maximum Marks : 100

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

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

(iii) Figures to the right indicate full marks.

(iv) Neat diagrams must be drawn wherever necessary.

(v) Use of non-programmable electronic pocket calculator is allowed.

(vi) Assume suitable data, if necessary.

SECTION I

1. (a) Solve any three :

(i) $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$

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



[12]

P.T.O.

(iii) $y'' - 6y' + 9y = \frac{e^{3x}}{x^2}$ (By Variation of Parameters)

(iv) $(x^2D^2 - xD + 1)y = x \log x$

(v) $\frac{d^2y}{dx^2} + \frac{dy}{dx} = \frac{1}{1 + e^x}$

- (b) An uncharged condenser of capacity C charged by applying an e.m.f. of value $E \sin \frac{t}{\sqrt{LC}}$ through the leads of inductance L and of negligible resistance. The charge Q on the plate of condenser satisfies the differential equation :

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

Prove that the charge at any time t is given by

$$Q = \frac{EC}{2} \left[\sin \frac{t}{\sqrt{LC}} - \frac{t}{\sqrt{LC}} \cos \frac{t}{\sqrt{LC}} \right]. \quad [5]$$

Or

2. (a) Solve any three : [12]

(i) $\frac{d^3y}{dx^3} + 4\frac{dy}{dx} = \sin 2x$

(ii) $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = e^{ex}$

