VIT

Vellore Institute of Technology

DEPARTMENT OF MATHEMATICS
SCHOOL OF ADVANCED SCIENCES

Fall Semester, 2018 - 2019

Continuous Assessment Test – II, Sep - 2018

Course Code	: MAT 2002	Slot : B2+TB2
Course Name	: Applications of Differential and Difference Equations	Date : 24-09-2018
Class NBR(s)	: VL2018191004478	Max. Marks : 50
Duration	: 90 Minutes	

ANSWER ALL QUESTIONS

(50 marks)

1. (a) Solve by the method of variation of parameters:

$$x^2\frac{d^2y}{dx^2} - 4x\frac{dy}{dx} + 6y = x^4\sec^2 x. \qquad [6]$$

(b) Solve: $(3x+2)^2\frac{d^2y}{dx^2} + 5(3x+2)\frac{dy}{dx} - 3y = x^2 + x + 1.$ [6]

2. Solve by using Laplace transforms $\frac{d^2y}{dt^2} + 9y = f(t)$, $y(0) = 0$, $y'(0) = 4$,

where $f(t) = \begin{cases} 8\sin t, & 0 < t < \pi, \\ 0, & t \ge \pi \end{cases}$ [12]

3. Solve the initial value problem by matrix method:

$$\frac{dx}{dt} = \begin{bmatrix} 6/7 & -15/14 \\ -5/7 & 37/14 \end{bmatrix} x + \begin{bmatrix} e^{2t} \\ e^{-t} \end{bmatrix}, \quad x(0) = \begin{bmatrix} 4 \\ -1 \end{bmatrix}. \qquad [13]$$

4. Determine all the eigen values and corresponding eigen functions of the boundary value problem:

$$4(e^{-x}y')' + (1+\lambda)e^{-x}y = 0, \quad y(0) = y(1) = 0. \qquad [13]$$

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$3x+2 = e^t$

$x = \frac{e^t - 2}{3}$

$(3x+4)^2 = 9x^2+12x+4$

$2e^{5x} - 3e^{6x}$