



**VIT<sup>®</sup>**  
**Vellore Institute of Technology**  
(Deemed to be University under section 3 of UGC Act, 1956)

**SCHOOL OF ADVANCED SCIENCES**  
**DEPARTMENT OF MATHEMATICS**  
**WINTER SEMESTER – 2019-20**  
**MAT 2002 – Applications of Differential and Difference Equations**  
**SLOT – D2**  
**DIGITAL ASSIGNMENT**

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Instructions

- 1) Last Date of Submission : **28<sup>th</sup> February 2020**
  - 2) Mention the Register Number, Name, Slot Details, Course Code and Course Title in the First Page of the Assignment. Also mention the Register Number and Name in every page of the document.
  - 3) Answer ALL the Questions.
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- 1) Solve the following equations by method of undetermined coefficients.
  - a)  $3y'' + 5y' - 2y = 14e^{x/3}$
  - b)  $y''' + 4y'' - y' - 4y = 18e^{-x}$
- 2) Solve the following equations by method of variation of parameters.
  - a)  $y'' + 4y' + 4y = e^{-2x} \sin x$
  - b)  $y''' - 6y'' + 12y' - 8y = \frac{e^{2x}}{x}$
- 3) Find the general solution of the following equations.
  - a)  $x^3y''' + 8x^2y'' + 5xy' - 5y = 42x^2$
  - b)  $(3x + 1)^2y'' + (3x + 1)y' + y = 6x$
- 4) Using Laplace transform, Solve
$$x'' + 2x' + 5x = f(t), \text{ where } f(t) = \begin{cases} t, & 0 \leq t \leq \pi \\ 0, & t \geq \pi \end{cases}$$
and subject to the initial conditions  $x(0) = 0$ , and  $x'(0) = 3$
- 5) Show that the differential equation  $y'' + \lambda y = 0$ ,  $y'(0) = 0$ ,  $y'(5) = 0$  represents a Sturm Liouville boundary value problem. Find the Eigen values, and the corresponding Eigen functions.

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