VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA,.

Even Mid Semester Examination for session 2023-24

B.TECH(All Branches) 2nd Semester.

Mathematics-II.

Full Mark-30 Time-90 Minutes

Answer All Questions.

The figure on the right hand margin indicates marks. *Symbols carry usual meaning.*

1. **Answer the following questions.** [2× 3]
   (i) Check whether the equation $(3x^2e^y + 1 + y^{-1})dx + (x^3e^y - xy^{-2})dy = 0$ is exact. CO1
   (ii) Solve the given differential equation $x^2y'' - 3xy' + 4y = 0$. CO2
   (iii) Find a second order homogeneous equation whose general solution is $y = c_1e^x + c_2e^{-x}$. CO3

2. (a) Find quantity of current passing through a circuit, containing a resistor $R = 6\ Ohm$, an inductance $L = 2\ Henry$ and supplied with an elector motive force of $f = 8sin2t$. [4] CO1
   (b) Solve the given differential equation $y' + 4xy = -xy^3$. [4] CO1

   OR

   (c) Let the temperature of a room at $t = 0$ is $66°F$ and at time $t = 2$, temperature reduces to $63°F$. If temperature of the surrounding is $32°F$ then find temperature at time $t = 10$. [4] CO1
   (d) Solve the given differential equation $(2xy + x^2)dy - (3y^2 + 2xy)dx = 0$. [4] CO1

3. (a) Solve the boundary value problem $y'' + 2y' + 2y = 0,\ y(0) = 1,\ y(\frac{\pi}{2}) = 0$. [4] CO2
   (b) Find a power series(with center 0) solution of $y' - y = 0$. [4] CO2

   OR

   (c) Solve the initial value problem $x^2y'' - 2xy' + 2y = 0,\ y(1) = 1.5, y'(1) = 1$. [4] CO2
   (d) Solve the differential equation $y'' + y = sec\ x$. [4] CO2

4. (a) Find General solution of $y'' + 4y = sin\ 3x$ by applying undetermined coefficient method. [4] CO3
   (b) Find General solution of $y'' - 4y' + 4y = e^{2x}/x$ by applying variation of parameter method. [4]CO3

   OR

   (c) Find General solution of $y'' + y = sec\ x$ by applying variation of parameter method. [4] CO3
   (d) Find General solution of $y'' + 2y' + y = e^{-x}$ by applying undetermined coefficient method. [4] CO3