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