

VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA.,  
Even Mid Semester Examination for session 2023-24  
B.TECH(All Branches) 2nd Semester.

Mathematics-II.

Time-90 Minutes

Full Mark-30

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  $R = 6 \text{ Ohm}$ , an inductance  $L = 2 \text{ Henry}$  and supplied with an elector motive force of  $f = 8\sin 2t$ . [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  $66^\circ F$  and at time  $t = 2$ , temperature reduces to  $63^\circ F$ . If temperature of the surrounding is  $32^\circ F$  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