VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

2^{nd} Semester B.Tech Mid-Semester Examination: 2016

Sub: Mathematics-II (All Branches)

Full Marks: 20 Time: 02.00 Hours

Answer any **Four** questions including question **no. 1** which is compulsory.

1 Answer the following questions.

(i) What do you mean by the singular solution of a differential equation? Give an example.

(ii) Find the Wronskian of two solutions of the differential equation $y'' - 2y' + y = 0$.

(iii) Find the characteristic equation of Euler-Cauchy differential equation.

(iv) Find the radius of convergence of the power series $\sum_{m=0}^{\infty} \frac{(-1)^m}{k^m} x^{2m}$.

(v) Find the power series solution of $y' = -2xy$.

2 Solve the following differential equations:

(a) $2xyy' + (x-1)y^2 = x^2e^x$

(b) $(2\cos y + 4x^2)dx = x\sin y dy$.

3 Solve:

(a) $y'' + (1+y^{-1})y'^{\,2} = 0$.

(b) $8y'' - 6y' + y = 6\cos hx$.

4 (a) Use the method of undetermined coefficients to solve: $3y'' + 10y' + 3y = 9x + 5\cos x$.

(b) Solve the following differential equation by converting it to a system

$$y''' + 2y'' - y' - 2y = 0.$$

5 Solve:

(a) $x^3y''' - 3x^2y'' + 6xy' - 6y = x^4 \ln x$

(b) $(D^2 - 25)y = 0; y(-2) = y(2) = \cos h10$.

6 Find the power series solution of the following differential equations:

(a) $(1-x^2)y'' - 2xy' + 2y = 0$

(b) $xy' - 3y = k$ $(k = constant)$

XXX