<b>Registration No:</b>											
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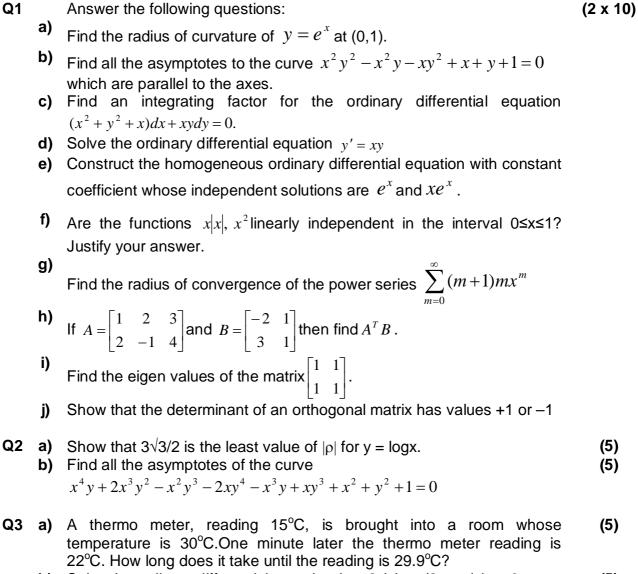
**Total Number of Pages: 2** 

## 1<sup>st</sup> Semester Back Examination 2015-16 MATHEMATICS - I BRANCH: All (Back)

B.TECH BS1101

## Time: 3 Hours Max Marks: 70 Q.CODE: T806

## Answer Question No.1 which is compulsory and any five from the rest. The figures in the right hand margin indicate marks.



**b)** Solve the ordinary differential equation (x + 2y)dx + (2x + y)dy = 0. (5)

**Q4** a) Solve y'' + 4y' + 4y = 0, y(0) = 1 and y'(0) = 1. (5)

**b)** Find the curve through the origin in the xy-plane which satisfies (5) y'' = 2y' and whose normal at the origin has slope -1.

Q5 a) Solve 
$$y'' - 3y' + 2y = 4x^2$$
. (5)

- **b)** Find a power series solution of y' + 2xy = 0 in powers of x. Show the details of your work. (5)
- **Q6** a) Show that  $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \sin x$ .

b)

Solve 
$$y'' + x^2 y = 0$$
 using the substitution  $y = u\sqrt{x}$ ,  $\frac{x^2}{2} = z$ . (5)

(5)

- Q7 a) Solve the given system of linear equation (5) x+2y+z-w=0, 2x+y+3z+w=1, -3x-y+2z+3w=0
  - **b)** Show that the set of all vectors  $(v_1, v_2, v_3)$  in  $R^3$  such that  $2v_1 + 3v_3 = 0$  is a vector space, determine its dimension and a basis. (5)
- **Q8 a)** Find all the eigen values and the eigen vector corresponding to the **(5)** smallest eigen value for the matrix T as given below

$$T = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$$

b) Show that the eigen values of a Hermitian matrix are real. (5)