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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)**B.Tech I Year I Semester (R16) Regular Examinations December 2016****ENGINEERING MATHEMATICS - I**

(Common to CE, EEE, ME, ECE &amp; CSE)

(For Students admitted in 2016 only)

Time: **3 hours**Max. Marks: **60**(Answer all Five Units **5 X 12 = 60** Marks)**UNIT-I**

- Q.1** a. Solve  $(1 - x^2) \frac{dy}{dx} + xy = ax$ . 7M  
 b. Solve  $(1 - x^2) \frac{dy}{dx} + 2xy = x\sqrt{1 - x^2}$  5M

**OR**

- Q.2** a. Solve  $(D^2 - 4D + 4)y = 8e^{2x} \sin 2x$  5M  
 b. Solve  $(D^2 + a^2)y = \sec ax$  by method of variation of parameters 7M

**UNIT-II**

- Q.3** Using Maclaurin's series expand  **$\tan x$**  upto the fifth power of  $x$  and hence find series for  $\log \sec x$ . 12M

**OR**

- Q.4** a. Find a shortest and longest distance from the point  $(1, 2, -1)$  to the sphere  $x^2 + y^2 + z^2 = 24$  7M  
 b. Find the radius of curvature at any point on the curve  $y = c \cosh\left(\frac{x}{c}\right)$  5M

**UNIT-III**

- Q.5** a. Evaluate  $\int_0^1 \int_0^{x^2} e^{y/x} dy dx$  6M  
 b. Evaluate  $\int_{-c}^c \int_{-b}^b \int_{-a}^a (x^2 + y^2 + z^2) dx dy dz$  6M

**OR**

- Q.6** Evaluate the integral by changing the order of integration  $\int_0^1 \int_{x^2}^{2-x} xy dy dx$  12M

**UNIT-IV**

- Q.7** a. Find the Laplace transforms of  $\sin at$  and  $\cos at$  7M  
 b. Find the Laplace transform of  $3 \cos 3t \cdot \cos 4t$  5M

**OR**

- Q.8** a. Using Laplace transform, evaluate  $\int_0^{\infty} \frac{\cos at - \cos bt}{t} dt$ . 6M  
 b. Applying Laplace transform, show that  $\int_0^{\infty} t^2 e^{-4t} \sin 2t dt = \frac{11}{500}$  6M

**UNIT-V**

- Q.9** a. Find  $L^{-1}\left\{\frac{2s-5}{4s^2+25} + \frac{4s-18}{9-s^2}\right\}$  by using linear property. 5M
- b. Find  $L^{-1}\left\{\frac{3s-2}{s^2-4s+20}\right\}$  by using first shifting theorem 7M

**OR**

- Q.10** a. State and Prove Convolution theorem 8M
- b. Evaluate  $L^{-1}\left\{\frac{1}{(s+1)(s+2)}\right\}$  by using Convolution theorem 4M

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