

Code: 13BS1001**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****I B.Tech I Semester Supplementary Examinations, April-2014****Engineering Mathematics - I
(Common to all Branches)****Time: 3 hours****Max Marks: 70****PART-A****Answer all Questions****[10X1=10M]**

- 1) a) Solve $x \frac{dy}{dx} + \cot y = 0$
- b) State Newton's law of Cooling
- c) Find Particular integral of $[(D + 2)(D - 1)^2]y = e^{2x}$
- d) Write Wronskian condition for linear independence and linear dependence of solutions.
- e) Write Chain rule for $\frac{du}{dt}$.
- f) Write Mc Laurent's expansion for $f(x, y)$.
- g) Solve $\int_0^1 \int_0^1 (x^2 + y^2) dx dy$
- h) Write the Jacobian to change Cartesian co-ordinates (x,y,z) to spherical polar co-ordinates (r,θ,φ).
- i) Evaluate div F at the point (1,2,3) given $F = [x^3y + y^3z + z^3x - x^2y^2z^2]$
- j) Define Solenoidal.

Part-B**Answer one question from each unit**

[5X12=60M]

Unit-I2. a) Form a differential equation of all circles of radius a and Centre (h, K)

b) Solve $(x^2y - 2xy^2)dx - (x^3 - 3x^2y)dy = 0$

[6M+6M]

(OR)

3. a) Solve $\left(\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}}\right)\frac{dx}{dy} = 1$

b) Find the orthogonal trajectories of family of confocal conics

$$\frac{x^2}{a^2} + \frac{y^2}{b^2 + \lambda} = 1, \text{ where } \lambda \text{ is parameter.}$$

[6M+6M]

Unit-II

4. a) Solve $(D^4 - 1)y = e^x \cos x$

b) Solve $(D^4 + 2D^2 + 1)y = x^2 \cos x$

[6M+6M]

(OR)

5. a) Solve $\frac{d^2y}{dx^2} - 4y = x \sinh x$

b) Using method of variation of parameters Solve $\frac{d^2y}{dx^2} + 4y = \tan 2x$

[6M+6M]

Unit-III

6. a) If $u = x^2 - y^2$; $v = 2xy$ and $x = r \cos \theta$; $y = r \sin \theta$ find $\frac{\partial(u,v)}{\partial(r,\theta)}$

b) If $u = x \log xy$ where $x^3 + y^3 + 3xy = 1$ find $\frac{du}{dx}$

[6M+6M]

(OR)

7. Expand $f(x, y) = \tan^{-1}\left(\frac{y}{x}\right)$ in powers of $(x - 1)$ and $(y - 1)$ upto third terms. Hence compute $f(1.1, 0.9)$ approximately.

[12M]

Unit-IV

8.a) Evaluate $\int \int xy(x + y) dx dy$ over the area between $y = x^2$ and $y = x$.

b) Evaluate $\int_0^1 \int_{x^2}^1 x dy dx$ by changing the order of integration.

[6M+6M]

(OR)

9. Find the volume of the Sphere $x^2 + y^2 + z^2 = a^2$

[12M]

Unit-V

10. a) Prove that $\nabla^2[f(r)] = f''(r) + \frac{2}{r}f'(r)$

b) Find the unit vector normal to the surface $x^3 + y^3 + 3xyz = 3$ at the Point $(1, 2, -1)$.

[6M+6M]

(OR)

11. Verify Stokes theorem for $F = (x^2 + y^2)I - 2xyJ$ taken around the rectangle bounded by the lines $x = \pm a, y = 0, y = b$.

[12M]