AR16

CODE: 16BS1001 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I Semester Supplementary Examinations, November-2018

ENGINEERING MATHEMATICS – I
(Common to all Branches)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Solve $(1+x^2)\frac{dy}{dx}+2xy=2x(1+x^2); y(0)=1$ 7M
   b) If 30% of a radioactive substance disappears in 10 days, how long it will take for 90% of it disappear 7M

(OR)

2. a) Solve$(xysinxy+cosxy)ydx+(xysinxy-cosxy)xdy=0$ 7M
   b) Find the orthogonal trajectories of the family of curves $r=a(sec\theta+tan\theta)$ 7M

UNIT-II

3. a) Solve $(D^2-6D+9)y=3e^{3x}+7e^{-2x}-aloga$ where a is constant 7M
   b) Solve $(D^2-1)y=e^{-x}sin(e^{-x})+\cos(e^{-x})$ by using variation of parameters 7M

(OR)

4. Solve $(D^2+4D+3)y=cos3x-3x^3$ 14M

UNIT-III

5 a) If $u=f\left(\frac{x}{y},\frac{y}{z},\frac{z}{x}\right)$ $then\ x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial x}+z\frac{\partial u}{\partial x}=0$ 7M
  b) Find the extreme values of $f(x,y)=2(x^2-y^2)-x^4+y^4$ 7M

(OR)

6. a) If $u=rcos\theta, v=r\ sin\theta, w=z, then\ j\left(\frac{u,v,w}{r,\theta,z}\right)$ 7M
   b) Show that $u=\frac{x}{y}, v=\frac{x+y}{x-y}$ are functionally dependent and find the relation 7M

UNIT-IV

7. a) Evaluate $\iint xy\ dx\ dy$ over the positive quadrant of the circle$x^2+y^2=a^2$ 7M
   b) Evaluate$\int_0^{\frac{\pi}{2}}\int_0^{cos\theta} r\sqrt{a^2-r^2}\ dr\ d\theta$ 7M

(OR)

8. a) Evaluate $\int_0^a\int_x^a(x^2+y^2)dx\ dy$ by change of order of integration 7M
   b) Evaluate $\iiint 45\ x^3y\ dxdydz$ where V is the region bounded by x= y = z = 0 and 4x+2y+z =8 7M

UNIT-V

9. a) Prove that $r^n\bar{r}$ is solenoidal if n =-3 7M
   b) If $\bar{f}=y\bar{\imath}+z\bar{\jmath}+x\bar{k}$. Find the circulation of $\bar{f}$ around the curve c, where c is the circle $x^2+y^2=1$, z = 0 7M

(OR)

10. Verify the Gauss divergence theorem for $\bar{F}=(x^2-yz)\bar{\imath}+(y^2-zx)\bar{\jmath}+(z^2-xy)\,\bar{k}$ taken over the cube$0\le x\le 1;\ 0\le y\le 1; 0\le z\le 1$ 14M

AR13

CODE: 13BS1001 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
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I B.Tech I Semester Supplementary Examinations, November-2018

ENGINEERING MATHEMATICS - I
(Common to All Branches)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Find the Integrating factor of $\frac{dy}{dx}=\frac{x^3+y^3}{xy^2}$
   b) Write the condition for exactness of the DE M(x,y) dx + N(x,y) dy = 0.
   c) Find the Particular integral of the DE $(D-1)^2\,y=e^x$
   d) Solve the DE $\frac{d^2y}{dx^2}+5\frac{dy}{dx}+4y=0$.
   e) Write the generalized mean value theorem for one variable.
   f) If $f(x)=Tan^{-1}x \quad f(0)=0$ then what is the value of $f^1(0)$?
   g) Write the formula for the surface area of revolution of y=y(x) about x-axis from x_1 to x_2.
   h) What substitutions are to be made from Cartesian coordinates to change to polar coordinates in double integral .
   i) Find $\nabla\cdot\mathbf{R}$ if $\bar{R}=xi+yj+zk$.
   j) State Green's Theorem in a plane.

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a Solve the 1st order DE $\left(x^3y^2+x\right)dy+\left(x^2y^3-y\right)dx=0$. **6M**
   b Find the orthogonal trajectories of $y^2=4ax$. **6M**

(OR)

3. a Solve the 1st order DE $\left(x^3y^2+x\right)dy+\left(x^2y^3-y\right)dx=0$. **6M**
   b Find the orthogonal trajectories of confocal conics $\frac{x^2}{a^2}+\frac{y^2}{a^2+\lambda}=l,\lambda$ being parameter. **6M**

UNIT-II

4 Solve : $(D^2+5D+6)\,y=e^{-2x}\,Sec^2\,x\,(1+2\tan x)$. **12M**

(OR)

5. a Solve the second order DE $\frac{d^2y}{dx^2}+2\frac{dy}{dx}+y=Cosx$. **6M**

b Solve : $(D^2+3D+2)\,y=e^x$ **6M**

UNIT-III

6. a Expand e^x in ascending powers of x by Maclaurin's series. **6M**

b Find the dimensions of the rectangular box, open at the top of maximum capacity, whose surface area is 432 sq. cm. **6M**

(OR)

7. a Expand $f(x,y)=Sinxy$ in powers of $(x-1)$ and $\left(y-\frac{\pi}{2}\right)$ upto second degree terms. **6M**

b Find the dimensions of the rectangular box, open at the top of maximum capacity whose surface is 432 sq.cm **6M**

UNIT-IV

8. a Find the complete length of the Cardioid $r=a(1+\cos\theta)$ **6M**

b Change the order of integration and write the integral **6M**

$$\int_0^a \int_{x^2/a}^{2a-x} f(x,y)\,dy\,dx$$

(OR)

9. a Find the volume formed by the curves $y=x^2$ and y = x revolving about y axis. **6M**

b Change the order of integration and evaluate $\int_0^4 \int_y^4 \frac{x\,dy\,dx}{x^2+y^2}$. **6M**

UNIT-V

10. Verify Green's theorem for $\int_c [(3x-8y^2)\,dx+(4y-6xy)\,dy]$ where C is the boundary of the region bounded by $x=0$, $y=0\,and\,x+y=1$ **12M**

(OR)

11. a Find curl F at (1,-1,1) where $F = xy^2i + 2x^2yzj-3yz^2k$. **6M**

b Find grad f, where $f = x^3+y^3+z^3-3xyz$ **6M**

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