AR13 SET 01

Code: 13BS1001

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I Semester Supplementary Examinations, March 2015
ENGINEERING MATHEMATICS – I
(Common to All Branches)

Time: 3 hours **Max Marks:70**

PART –A

Answer all questions **[10 x 1=10M]**

1 (a) Form the differential equation from y= acos2x by eliminating the arbitrary constant.
(b) Solve y dx + x dy = 0.
(c) Evaluate $\frac{1}{(D-1)}(e^x)$.
(d) Find the solution of $\frac{d^2y}{dx^2}+\frac{dy}{dx}=0$.
(e) Evaluate $\nabla(r)$.
(f) Evaluate $\int_0^2 \int_0^{x^2} dy \quad dx$.
(g) If x= rcosθ, y = rsinθ find $\frac{\partial(x,y)}{\partial(r,\theta)}$
(h) Evaluate $\int_0^2 \int_0^3 \int_0^2 dzdydx$.
(i) If $u = x^y$ then find ∂u/∂x.
(j) State Gauss-Divergence theorem.

PART-B

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

UNIT-I

2 (a) Find the differential equation for the family of circles with centers on the x-axis.
(b) Solve the differential equation $\frac{dy}{dx} + 2\,x\,y = 2\,e^{-x^2}$ [6+6=12M]

(OR)

3 (a) Solve the differential equation $\frac{dy}{dx} + x\sin(2y) = x^3\cos^2(y)$.
(b) The rate at which bacteria multiply is proportional to the instantaneous number present. If original number doubles in 2 hours, in how many hours will it triple. [6+6=12M]

UNIT-II

4 (a) Solve the initial value problem $y^{11} - y^1 - 2y = 3e^{2x}$, $y(0) = 0$ and $y^1(0) = -2$.

(b) Solve $(D^2 + 4D + 4)\, y = e^{-2x}\cos(x)$. [6+6=12M]

(OR)

5 (a) Solve $(D^4 - 81)\, y = \cos(3x)$.

(b) Solve $(2D^2 + D)\, y = x^2$. [6+6=12M]

UNIT-III

6 Evaluate $\int_0^1 \int_{x=y^2}^{x=y} dxdy$ by changing the order of the integration. [12M]

(OR)

7 (a) Find the volume bounded by the paraboloid $x^2 + y^2 = az$, the cylinder $x^2 + y^2 = 2ay$ and the plane $z = 0$

b) Find the area lying inside the cardioid $r = a(1+\cos\theta)$ and outside the circle $r = a$. [6+6=12M]

UNIT-IV

8 (a) Expand $f(x,y) = x^2y + 3y$ in powers of $(x-1)$ and $(y+2)$ by using Taylor's series.

(b) Find the area bounded by the circles $r = 2\sin\theta$ and $r = 4\sin\theta$. [6+6=12M]

(OR)

9 Evaluate $\int_{y=1}^{e} \int_{x=1}^{\log y} \int_{z=1}^{e^x} \log(z)\ dz\ dx\ dy$ [12M]

UNIT-V

10 (a) What is the greatest directional derivate of $u = x^2 + yz^2$ at the point (1, -1, 3).

(b) If $\bar{F} = (x + y + 1)\, i + j - (x + y)\, k$, find $\nabla.(\nabla \times \bar{F})$. [6+6=12M]

(OR)

11 Apply Green's theorem to evaluate $\int_c (xy + y^2)dx + x^2 dy$ where c is bounded by $y = x$ and $y = x^2$. [12M]