

VIVA Institute of Technology

Department of Applied Mathematics

All divisions(Sem-II)

Academic year: 2014-15

Assignment no 6

1

Solve $\frac{d^4 y}{dx^4} - y = e^x + \cos x \cdot \cos 3x$

2

Solve $\frac{d^2 y}{dx^2} - y = x \sin x + e^x (x^2 + 1)$

3

Solve $\frac{d^2 y}{dx^2} + a^2 y = 2a \tan ax$

4

Find the area of the cardioide $r=a(1+\cos \theta)$

5

Evaluate $\iiint xyz(x^2 + y^2 + z^2) dx dy dz$ over the first octant of the sphere

$$x^2 + y^2 + z^2 = a^2$$

6

Find the volume the paraboloid $x^2 + y^2 = 4z$ cut off by the plane $z=4$

7

Show that $\int_0^1 \frac{x^a - 1}{\log x} dx = \log(a + 1), a > -1$

8

Show that $\int_0^\infty e^{-x} \left(\frac{e^{-ax} - e^{-bx}}{x} \right) dx = \log \left(\frac{1+b}{1+a} \right) \quad a > 0, b > 0$

9

1. Show that $\int_0^{\frac{\pi}{2}} \frac{dx}{a^2 \sin^2 x + b^2 \cos^2 x} = \frac{\pi}{2ab}$ and deduce that

$$\int_0^{\frac{\pi}{2}} \frac{dx}{(a^2 \sin^2 x + b^2 \cos^2 x)^2} = \frac{\pi}{4ab} \left(\frac{1}{a^2} + \frac{1}{b^2} \right)$$

- 10** Find the length of the cardioide $r=a(1-\cos \theta)$ lying
i) outside the circle $r=a \cos \theta$ ii) inside the circle $r=a \cos \theta$