SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act, 1956)

Course & Branch: B.E/ B. Tech – Common to ALL Branches (Except to Bio Groups)
Title of the paper: Engineering Mathematics - I
Semester: I — Max. Marks: 80
Sub.Code: ET102/3ET102A/4ET102A/5ET102A — Time: 3 Hours
Date: 12-05-2008 — Session: AN

PART – A (10 x 2 = 20)

Answer All the Questions

1. Expand cos4θ in terms of cosθ.

2. Show that sinh 2x = 2sinhx coshx.

3. Find the point where the line $\frac{x}{1} = \frac{(y-1)}{I} = \frac{(z-3)}{2}$ meets the plane $x - y + z = 0$.

4. Find the tangent plane at (1, 2, 0) to the sphere $3(x^2 - y^2 - z^2) + 8x + 12y + 16z - 47 = 0$.

5. State cayly-hamilton theorem.

6. If λ = 3 and λ = -2 are twp eigen values of $A = \begin{pmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{pmatrix}$ then find third eigen value.

7. Change the order of integration $\int_0^4 \int_{x\frac{x^2}{4}}^{\sqrt[2]{x}} dy \quad dx.$

8. Find $\int_0^1 \int_0^2 \int_0^{y+z} dz \quad dy \quad dx.$

9. Prove that $\beta(m,n) = 2\int_0^{\frac{\pi}{2}} \sin^{2m-1}\theta \cos^{2m-1}\theta d\theta.$

10. Find $\int_0^2 \int_0^1 4xy \quad dx \quad dy.$

PART – B (5 x 12 = 60)

Answer All the Questions

11. Find $\frac{\cos 7\theta}{\cos\theta}$ in terms of cosines powers of θ.

(or)

12. Separate real and imaginary parts of cosech (x + iy).

13. Prove that the planes $x + y + z = 6$; $2x - 3y - 4z = 12$ and $2x + 7y + 8z = 12$ contains a common line.

(or)

14. Find the image of the line $\frac{(x-3)}{2} = \frac{(y-2)}{1} = \frac{(z-1)}{4}$ with respect to $x - y - z = 3$.

15. Show that the quadratic form $Q = 8x_1^2 + 7x_2^2 + 3x_3^2 - 12x_1x_2 = 8x_2x_3 + 4x_3x_1$ is positive semi definite.

(or)

16. Investigate for what values of a and b the simultaneous equations $x + y + z = 6$, $x + 2y + 3z = 10$, $x + 2y + az = b$. will have
(a) no solution
(b) unique solution

(c) infinite solution

17. Change the order of integration $\int_0^a \int_x^a (x^2 + y^2) dxdy$ and hence evaluate it.

(or)

18. Write the reduction formula for $\int_0^{\frac{\pi}{2}} \cos^n x dx$ n being the integer.

19. Prove that $\beta(m, n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$.

(or)

20. Evaluate $\iint_R xydxdy$ where R is the Quadrant of the circle $x^2 + y^2 = a^2$, $x \geq 0$, $y \geq 0$.