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 - II
Semester: II Max. Marks: 80
Sub.Code: 6C0016 Time: 3 Hours
Date: 10-12-2007 Session: AN

PART – A (10 x 2 = 20)

Answer All the Questions

1. Define De Moivre's theorem.
2. Find all the cube roots of unity.
3. Find the direction ratio's of the normal to the plane *ax + by + cz + d = 0.*
4. Find the equation of the plane through (1, 2, 3) and (-1, 1, 1) parallel to they y-axis.
5. Write the relation between Beta and gamma function.
6. Evaluate $\int_0^{\frac{\pi}{2}} Sin^7\theta\, Cos^5\theta\, d\theta$.
7. Define irrotational and solenoidal Vectors.
8. Define Gauss divergence theorem and Green's theorem.
9. Evaluate $\int_1^3\int_1^2 (x^2 + y^2)dxdy$.
10. Change the order of integration of $\int_0^a\int_0^x f(x, y)dydx$.

PART – B (5 x 12 = 60)

Answer All the Questions

11. (a) Express $Sin^8\theta$ interms of cosine multiples of θ.

    (b) If $\tanh\frac{y}{2} = \tan\frac{x}{2}$, show that

    (i) Cos x Cosh y = 1 (ii) tan x = sin h y.

(or)

12. (a) Express Cos 7θ in power of θ.

    (b) Show that $\left(\frac{1 + Sin\,\theta + iCos\,\theta}{1 + Sin\,\theta - Cos\,\theta}\right)^n = Cos\left(\frac{n\pi}{2} - n\theta\right) + iSin\left(\frac{n\pi}{2} - n\theta\right)$

13. (a) Find the equation to the plane that contains the two parallel line $\frac{x-3}{1}=\frac{y-2}{-1}=\frac{z-1}{2}$ *and* $\frac{x-1}{1}=\frac{y+2}{-1}=\frac{z+1}{2}$

(b) Show that $\frac{x-4}{2}=\frac{y-5}{3}=\frac{z-6}{4}$ *and* $\frac{x-2}{3}=\frac{y-3}{4}=\frac{z-4}{5}$ are Coplanar: Find also the equation of the plane containing them

(or)

14. Find the length and equation of the shortest line between the lines $\frac{x+1}{3}=\frac{y-2}{2}=\frac{z}{4}$ and $3x + 2y - 5z = 6$ and $2x - 3y + z - 3 = 0$.

15. (a) Prove that $\int_0^\infty \frac{x^5}{5^x}dx = \frac{120}{(\log 5)^6}$.

(b) Prove that $\int_0^{\frac{\pi}{2}} \sqrt{Cot\ \theta}\, d\theta = \frac{1}{2}\Gamma\left(\frac{1}{4}\right)\Gamma\left(\frac{3}{4}\right)$

(or)

16. Express $\int_0^1 \frac{dx}{\sqrt{1-x^4}}$ interms of Gamma function.

(b) Prove that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$

17. (a) Prove that $\nabla \times \nabla \times \nabla \times \nabla \times \overline{F} = \nabla^4 \overline{F}$.

(b) Show that the value of the integral $\int_{(0,0)}^{(1,2)} 3x(x+2y)dx+(3x^2-y^3)dy$ is independent of the path of integration

(or)

18. Verify Gauss's divergence theorem for $\overline{F} = 4xz\,i - y^2 j + yz\,k$ over the cube bounded by $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$.

19. (a) Evaluate $\int_A xy(x+y)dxdy$, over the region A bounded by $y = x^2$ and $y = x$.

(b) Change the order of integration and evaluate $\int_0^1 \int_{x^2}^{2-x} xy\,dxdy$.

(or)

20. Evaluate $\int_1^e \int_1^{\log Y} \int_1^{e^x} \log\ z\,dzdxdy$.