SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act,1956)

Course & Branch :B.E/B.Tech - Common to ALL Branches (Except Bio groups)

Title of the Paper :Engineering Mathematics – II Max. Marks :80

Sub. Code :4ET202A/5ET202A Time : 3 Hours

Date :10/05/2010 Session :FN

PART - A (10 x 2 = 20)

Answer ALL the Questions

1. If α,β,γ are the roots of $x^3 - 2x^2 + 5 = 0$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\gamma}$.
2. Diminish the roots of the equation $x^3 + x^2 + x - 100$ by 4.
3. Find the radius of curvature at any point of the catenary $y = c \cosh\frac{y}{c}$.
4. Find the minimum value of $f(x,y) = 3x^2 + y^2 + 12x + 36$.
5. Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dy} + 13y + 0.6$. Solve $(xD^2 + D)y = 0$.
7. Solve $L\frac{dI}{dt} + RI = E_0$ with the following conditions. I_0 is the current flow initially. E_0 is the current e.m.f impressed on the circuit at t = 0.
8. Define simple harmonic motion.
9. Determine the constant a so that the vector $\vec{F} = (x+z)\vec{i} + (3x+ay)\vec{j} + (x-5z)\vec{k}$ is solenoidal.
10. State Green's theorem.

PART – B (5 x 12 = 60)

Answer All the Questions

11. If α, β, γ are the roots of $x^3 - 6x^2 + 11x - 6 = 0$ form the equation whose roots are $\alpha + 1, \beta + 1, \gamma + 1$.

(or)

12. Solve the equation $6x^5 + 11x^4 - 33x^3 - 33x^2 + 11x + 6 = 0$.

13. Find the equation of the circle of curvature at (3,4) on xy =12.

(or)

14. A rectangular box open at the top is to have a given volume of 32cc. Find the dimensions of the box which requires least materials for its construction.

15. Solve $(D^3 + D^2 - D - 1)y = \cos 2x + 7$.

(or)

16. Solve $\frac{d^2y}{dx^2} + y = \sec x$ by the method of variation of parameters.

17. Find the equation of the elastic curve and its maximum deflection for the simply supported beam of length 21, having uniformly distributed load ω unit/length.

(or)

18. A particle executes simple harmonic motion its velocity at a distance of 3cm and 4cm from the centre of the path are 6cm and 8cm per second respectively. Find its period, maximum velocity and acceleration when the particle is at its greatest distance from the centre.

19. Prove that $\vec{F} = (y^2 \cos x + z^3)\vec{i} + (2y \sin x - 4)\vec{j} + (3xz^2 + 2)\vec{k}$ is irrotational and find its scalar potential.

(or)

20. Verify Stroke's theorem for a vector field defined by $\vec{F} = (x^2 - y^2)\vec{i} + 2xy\,\vec{j}$ in the rectangular region in the XOY plane bounded by the lines x=0, x=a, y=0 and y=b.