



Code No. : 6009

FACULTY OF ENGINEERING
B.E. 2/4 (Civil/ E & EE/Inst./ECE/Mech./Prod./CSE) I Semester (Suppl.)
Examination, July 2010
MATHEMATICS – III

Time : 3 Hours]

[Max. Marks : 75

Note : 1) Answer all questions from Part A.

2) Answer five questions from Part B.

PART – A

25

1. Form a partial differential equation by eliminating the functions 'f' and 'g' from $z = f(xy) + g(x/y)$. 3
2. Solve $p+q = zpq$. 2
3. Find the Fourier coefficient of a_1 in the Fourier series expansion $f(x) = |\sin x|$, $-\pi \leq x \leq \pi$. 3
4. Find the Fourier sine series for $f(x) = x$, $0 \leq x \leq \pi$. 2
5. Explain the method of separation of variable. 2
6. Solve by separation of variables method for $u_x = u_y$. 3
7. Find Z transform of $\{e^{-3n}\}$. 2
8. Find the inverse Z_1 transform of $\frac{z}{(z+2)(z+3)}$. 3
9. Write Lagrange interpolation formula. 2
10. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's rule for $h = 1/4$. 3



PART - B

(5×10=50 Marks)

11. a) Solve $(y - z)p + (x - y)q = z - x$. 4
 b) Solve $2zx - Px^2 - 2pxy + pq = 0$ by Charpit's method. 6
12. Solve $q^2r - 2pqs + p^2t = pq^2$ by Mongi's method. 10
13. a) Obtain the Fourier series for the function $f(x) = x^2, -\pi < x < \pi$. Hence show

$$\text{that } \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots = \frac{\pi^2}{6}.$$

- b) Obtain the Fourier series. 5

$$f(x) = \begin{cases} x & ; \text{ for } -1 < x \leq 0 \\ x+2 & ; \text{ for } 0 < x \leq 1 \end{cases}$$

Hence show that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots = \frac{\pi}{4}$. 5

14. a) Find the Z_1 - transform of $f * g$ where $f(x) = u(n)$; $g(n) = 2^n u(n)$. 5
 b) Solve $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ given; $y_0 = y_1 = 0$ by using the Z - transforms. 5

15. a) Using the method of separation of variables, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$; $u(x,0) = 6e^{-3x}$. 5
 b) Write complete solution of wave equation. 5

16. a) Apply the Gauss-Siedel iteration method, to solve the following system of equations.

$$5x_1 + x_2 + 2x_3 = 19; x_1 + 4x_2 - 2x_3 = -2; 2x_1 + 3x_2 + 8x_3 = 39. \quad 5$$

- b) Obtain $f(x)$ from the following data :

$$\begin{array}{cccccc} x & : & -3 & -1 & 0 & 2 & 3 \\ f(x) & : & -9 & 5 & 3 & 11 & 33 \end{array}$$

Using Newton's divided differences. 5



17. a) Find the approximate value of $\int_0^{\pi} \sin x \, dx$ by using trapezoidal rule taking six intervals. 5

b) Compute $y(0.1)$ and $y(0.2)$ by using Runge-Kutta method for the differential equation.

$$\frac{dy}{dx} = x + y; y(0) = 1.$$

5