Code No. : **5324/N**

FACULTY OF ENGINEERING
B.E. 2/4 (Common to All Except – IT) I Semester (New) (Main) Examination, December 2011
MATHEMATICS – III

Time: 3 Hours] [Max. Marks: 75

Note : *Answer **all** questions from Part **A**. Answer **any five** questions from Part **B**.*

PART – A **(25 Marks)**

1. Form the partial differential equation by eliminating the arbitrary constants from $z = ax + by + a^2 + b^2$. **3**
2. Form the partial differential equation by eliminating the arbitrary functions from $z = f(x^2 = y^2)$. **3**
3. Define periodic function and give an example. **2**
4. Define even and odd functions. **2**
5. Solve by separation of variables method for $u_x = u_y$. **3**
6. Write the one dimensional heat flow equation and wave equation. **2**
7. Write Regula-Falsi iteration formula to find a root of the equation. **2**
8. Explain Bisection method. **3**
9. Find Z transform of $\left\{e^{-3n}\right\}$. **2**
10. Find the Z transform of $(n+1)^2$. **3**

PART – B **(5×10=50 Marks)**

11. a) Solve $x^2 (y - z) p + y^2 (z - x) q = z^2 (x - y)$. **5**
    b) Solve $2z + p^2 + qy + 2y^2 = 0$ by Charpit's method. **5**
12. A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially in a position given by $y = y_0 \sin^3\left(\pi x/l\right)$. If it is released from rest from this position, find the displacement $y(x, t)$. **10**

13. Solve $q^2r - 2pqs + p^2t = pq^2$ by Monge's method. **10**

14. a) Expand $f(x) = x \sin x$ as a Fourier series. **5**

b) Obtain Fourier series for the function f(x) given by $f(x) = \begin{cases} 1 + \frac{2x}{\pi}, & -\pi \le x \le 0, \\ 1 - \frac{2x}{\pi}, & 0 \le x \le \pi \end{cases}$. **5**

15. a) Find the inverse Z transform of $\frac{2z}{(Z-1)(Z^2+1)}$. **5**

b) Using the Z-transform, solve

$u_{n+2} + 4u_{n+1} + 3u_n = 3^n$ with $u_0 = 0$, $u_1 = 1$. **5**

16. a) Using Newton-Raphson method, find a root of the equation $x \sin x + \cos x = 0$. **5**

b) Find the first derivative at x = 1 for the following values of x and y : **5**

x :	1	2	4	8	10
y :	0	1	5	21	27

17. a) Using Euler's method, find approximate value of y when x = 0.6 of $\frac{dy}{dx} = 1 - 2xy$, given that y = 0 when x = 0 (take h = 0.2). **4**

b) Using Runge-Kutta method of fourth order,

solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with y(0) = 1 at x = 0.1, 0.2. **6**