Code No. 6009

FACULTY OF ENGINEERING

B.E. 2/4 (CE/EE/Int/ECE/M/P/AE/CSE) I – Semester (Main.) Examination, December 2013

Subject: **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 a partial differential equation by eliminating the arbitrary function f from $z = e^{ax+by} f(ax-by)$. 3
2. Reduce the partial differential equation $z^2(p^2+q^2) = x^2+y^2$ to the form $f(x,p) = g(y,q)$. 2
3. Find a_o in the Fourier series expansion of $f(x) = e^{-x}$ in (-1,1). 2
4. If $x = \sum_{n=1}^{\infty} b_n \sin nx$, $0 < x < \pi$, then find b_n. 3
5. Solve $py^3+qx^2 = 0$ by the method of separation of variables. 2
6. Solve $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$, $u(0,y) = 8e^{-3y}$. 3
7. Find the iterative formula to find $\sqrt{N}$ using Newton-Raphson method. 2
8. If f(1) = -3, f(3) = 9, f(4) = 30 and f(6) = 132, then find f(x). 3
9. Find the Z transform of $\{n\, a^n\}$. 3
10. Find the convolution $\{2^n * 3^n\}$. 2

PART – B (50 Marks)

11.(a) Solve $y^2p - xyq = x(z-2y)$. 5

(b) Solve $q(q^2+s) = pt$ by Monge's method. 5

12. Find the Fourier series expansion for $f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$ and hence find the sum $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots$ 10
13. Solve $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2} = 0$, $0 < x, y < \pi$ subject to $u(0,y) = u(\pi,y) = u(x,\pi) = 0$ and $u(x,0) = \sin^2 x$. 10

14.(a) Solve the system of equations $4x - 3y - 9z + 6w = 0$, $2x + 3y + 3z + 6w = 6$ and $4x - 21y - 39z - 6w = -24$ by Gauss elimination method. 5

(b) Find the approximate value of y(1.3) for $\frac{dy}{dx} = -2xy^2$, y(1) = 1 using Euler's method. 5

15.(a) Find the inverse Z transform of $\frac{7z-11z^2}{(z-1)(z-2)(z+3)}$. 5

(b) State and prove convolution theorem of Z transforms. 5

16. Solve $pxy + pq + qy = yz$ by Charpit's method. 10

17.(a) Find the Fourier series expansion of $f(x) = |\cos x|$ in $[-\pi, \pi]$. 5

(b) Find $\frac{dy}{dx}$ at x = 0.5 from the following table. 5

x:	0	1	2	3
y:	1	3	15	40

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