Code No. 2009

FACULTY OF ENGINEERING

B.E. 2/4 I – Semester (Suppl.) Examination, May 2013

Subject : Mathematics – III (Common to All Except I.T.)

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. Find a partial differential equations by eliminating arbitrary constants a and b from $z = ax + by + a^2b^2$. 2

2. Solve pq = xy. 2

3. Fourier series expansion of an odd function in $(-\ell, \ell)$ has only _____ terms. 2

4. The half range sine series for f(x) = 1 in $(0, \pi)$, is _____ . 2

5. Write the equations of the one dimensional heat flow and two dimensional steady state heat flow. 2

6. Solve $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial t}$, given $u(0, t) = 8e^{-3t}$. 3

7. Explain Bisection method. 3

8. If $f(x) = 3x^3 - 2x^2 + 1$, then find $\Delta^3 f(x)$. 3

9. Find the Z transform of $\{e^{an}\}$. 3

10. State initial value theorem of Z transforms. 3

PART – B (50 Marks)

11.a) Solve $x(y - z)p + y(z - x)q = z(x - y)$. 5

b) Solve $(p^2 + q^2)x = PZ$ by Charpit's method. 5

12.a) Find the Fourier series expansion of $f(x) = x^3$ in $(-\pi, \pi)$. 5

b) Obtain the Fourier cosine series of 5

$$f(x) = \begin{cases} -1, & 0 \le x \le 1 \\ 1, & 1 < x \le 2 \end{cases}$$

13. Find the solution of the heat equation

$$\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}, \quad 0 < x < \pi, \; t > 0$$

Subject to the conditions $4(0, t) = 4(\pi, t) = 0$ and $4(x, 0) = \sin x$, $0 < x < \pi$. 10

..2

14.a) Solve the system of equations x + 2y – 2z = 1, 2x – 3y + z = 0, 5x + y – 5z = 1 and 3x + 14y – 12z = 5 by Gauss elimination methods. 5

b) Find the approximate value of y(1.2) for $\frac{dy}{dx} = -2xy^2$, y(1)=1 using Euler's method with step size h = 0.1. 5

15.a) If $Z\langle f_n \rangle = \frac{3z^2 - 4z + 7}{(z-1)^3}$, find f_2 . 5

b) If $Z\langle n^3 \rangle = \frac{z^3 + 4z^2 + z}{(z-1)^4}$, then find $Z\langle n^4 \rangle$. 5

16.a) Solve r = t by Monge's method. 5

b) Using convolution theorem of Z transforms, 5

find $Z^{-1}\left\langle \frac{z^2}{(z-1)(z-2)} \right\rangle$

17.a) Find the smallest positive root of the equation $x^3 - 5x - 1 = 0$ correct to two decimal places using Newton-Raphson method. 5

b) Find $f^1(1.0)$ from the following : 5

x	1.0	1.2	1.4
f(x)	0.6931	0.7885	0.8755

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