Code No. 2245

FACULTY OF ENGINEERING

B.E. 2/4 (CE/EE/ ECE/Inst./Mech./Prod./CSE) I-Semester **(Main)** Examination,

November / December 2012

Subject : **Mathematics-III**

Time : 3 Hours **Max. Marks: 75**

Note: *Answer **all** questions of Part - A and answer any **five** questions from Part-B.*

PART – A (25 Marks)

1. Find a partial differential equation from $(x - a)^2 + (y - b)^2 + z^2=9$ by eliminating arbitrary constants a and b. (3)

2. Solve $p^3q^2x + p^2q^3y - zp^2q^2=1$. (2)

3. Find the Fourier coefficient 'a_1' of the Fourier series expansion of $f(x)=x \sin x$ in $(0, 2\pi)$. (2)

4. Find the half-range sine series for e^x in (0, 1). (3)

5. Solve $\frac{\partial z}{\partial x} = \frac{\partial z}{\partial y}$ by the method of separation of variables. (3)

6. Show that $u(x, y) = 6e^{-3x-2y}$ is a solution of $\frac{\partial u}{\partial x} - 2\frac{\partial u}{\partial y} - u = 0$. (2)

7. Using Bisection method, find the first two approximations to the root of the equation $x^3-4x-9=0$ which lies in (2, 3). (3)

8. Construct Newton's divided difference table for (2)

x	5	6	9	11
y	12	13	14	16

9. Determine the Z transform of $\{e^{n-2}\}$. (2)

10. If $Z\{f_n\} = \frac{3z^2 - 4z + 7}{(z-1)^3}$, then find f_1. (3)

PART – B (5x10=50 Marks)

11.(a) Solve $x(y^2 - z^2)p + y(z^2 - x^2)q = z(x^2 - y^2)$. (5)
(b) Solve $z^2= xypq$. (5)

12.(a) Explain $f(x) = |\sin x|$, $-\pi < x < \pi$ in a Fourier series. (5)
(b) Find the complex form of the Fourier series of the function (5)

$$f(x) = \begin{cases} 0, & 0 < x < \ell \\ a, & \ell < x < 2\ell \end{cases}$$

13. A homogeneous rod of conducting material of length 100 cm has its ends kept as zero temperature and the temperature initially is $u(x,0)=\begin{cases} x, & 0\le x\le 50 \\ 100-x, & 50\le x\le 100 \end{cases}$

Find the temperature u(x, t) at any time. (10)

14.(a) Compute $\frac{d^2y}{dx^2}$ at x = 1 from the table (5)

x	1	2	3	4	5	6
y	1	8	27	64	125	216

(b) Find the approximate value of y(1.1) for $\frac{dy}{dx}$= 3x+y^2, y(1)=1.2 by Runge-Kutta method of fourth order. (5)

15.(a) Using convolution theorem, find the inverse z transform of $\left(\frac{z}{z-1}\right)^3$. (5)

(b) Solve $y_{n+2} - 3y_{n+1} + 2y_n=0$, $y_0= -1$, $y_1=2$ using Z transform. (5)

16. Solve r – t $\cos^2 x$ + p tan x = 0 using Monge's method. (10)

17.(a) Perform the first two iterations of Gauss-Seidel iteration method to solve 4x-y + z= 4, -x + 4y – z = 2 and x – y + 4z = 4. (5)

(b) State and prove initial value theorem. (5)

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