(Pages : 3) CCF(M) **A – 4163**

Reg. No. : ....

Name : ....

Fourth Semester B.Tech. Degree Examination, June 2016
(2013 Scheme)
13.401 : Engineering Mathematics – III (BCHMNPSU)

Time : 3 Hours Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **4** marks.

1. Show that coshz is analytic and then find its derivative.
2. Evaluate $\int_C \frac{3z^2+2}{(z^2+1)(z^2+9)}$ where C is $|z| = 2$.
3. Solve the following system of equations using Gauss elimination method $x - y + z = 1$, $-3x + 2y - 3z = -6$, $2x - 5y + 4z = 5$.
4. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule with h = 0.2.
5. Determine a positive root of the equation $x^3 - 4x - 9 = 0$ by bisection method.

PART – B

Answer **one full** question from each Module. **Each** question carries **20** marks.

Module – I

6. a) Show that an analytic function $f(z) = u + iv$ with constant modulus is constant. 7

   b) Find the bilinear transformation which maps $z = 0, -1, \infty$ into $w = -1, -2-i, i$. 7

   c) If $f(z) = u + iv$ is analytic function, find f(z) if $u - v = e^x (\cos y - \sin y)$ 6

7. a) Discuss about the transformation $w = z^2$. 8

   b) Show that $f(z) = \frac{x+iy}{x^2+y^2}$ is analytic except at z = 0. 6

   c) Let $f(z) = u + iv$ is analytic function of z, then prove that the family of curves $u(x, y) = c_1$ and $u(x, y) = c_2$ form an orthogonal system. 6

P.T.O.

Module – II

8. a) Evaluate $\int_0^{2\pi} \frac{1}{(5-3\cos\theta)^2} d\theta$. 10

b) Evaluate $\oint_C \frac{dz}{(z^2+4)^2}$ where C is the circle | z | = 2. 10

9. a) Evaluate $\int_{-\infty}^{\infty} \frac{x^2}{(x^2+1)(x^2+4)} dx$. 10

b) Find the Taylor series of $f(z) = \frac{z}{(z+1)(z+2)}$ about $z = 2$. 5

c) Evaluate $\int_0^{2+i} (\bar{z})^2 dz$ along the line $y = \frac{x}{2}$. 5

Module – III

10. a) Calculate y(4), y(23) from the data given below. 10

x :	0	5	10	15	20	25
y :	7	11	14	18	24	32

using Newton's interpolation formula.

b) Solve the system of equation by using Gauss elimination method : 7

$5x - 9y - 2z + 4w = 7$, $3x + y + 4z + 11w = 2$, $10x - 7y + 3z + 5w = 6$, $-6x - 8y - z - 4w = 5$

c) Find f(9.1) using Lagrange interpolation formula. Given 3

x :	8.9	9	9.3
f(x) :	0.3	3.5	0.25

11. a) Solve the following system of equations by using Gauss-Seidel method correct to 3 decimal places $30x - 2y + 3z = 75$, $2x + 2y + 18z = 30$, $x + 17y - 2z = 48$. 10

b) Find a positive root of the equation $2x = 3 + \cos x$ using bisection method correct to 3 decimal places. 6

c) Find the cube root of 24 using Newton-Raphson method. 4

Module – IV

12. a) Use Runge-Kutta fourth order method to calculate y(0.1) and y(0.2). Given

$$\frac{dy}{dx} = \frac{(1+x)y^2}{2}, \; y(0) = 1.$$ 10

b) Solve $\nabla^2 u = 0$ in the square region bounded by x = 0, x = 4, y = 0, y = 4 and with the following boundary conditions
u(0, y) = 0, u(4, y) = 8 + 2y

$$u(x, 0) = \frac{x^2}{2}, \; u(x, 4) = x^2 \text{ (take } h = k = 1).$$ 10

13. a) Find y(0.6), y(0.8), y(1). Given $\frac{dy}{dx} = x + y$, $y(0) = 0$ taking h = 0.2 using Euler's modified method. 10

b) Use Taylor series method to find y(0.1). Given that $\frac{dy}{dx} = x^2 y - 1$, $y(0) = 1$. 5

c) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal rule. (Take n = 6). 5