**Code No.: MA1502** **R-14**

# I B.Tech. II Semester Regular Examinations, June 2015

## MATHEMATICAL METHODS

**(Common to Civil Engineering, Electrical & Electronics Engineering and Mechanical Engineering)**

**Time : 3 Hours** **Max.Marks: 60**

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**Note:** Answer **ALL** questions from **PART-A** at one place in the same order and Answer any **FOUR** questions from **PART – B**

### PART-A

**6×2 = 12M**

1. Briefly explain False position method.
2. Write Newton's forward and Backward interpolation formulae.
3. Write formula for Modified Euler method.
4. Write Cauchy Riemann equations in polar form.
5. State and prove shifting theorem of Laplace transforms.
6. State and prove initial value theorem of Z-transforms.

### PART-B

**4×12= 48M**

1. a) Find a real root of the equations $x^3 - 4x - 9 = 0$ using the bisection method correct to three decimal places. (6M)

   b) Find a real root of the equation $x^3 - 2x - 5 = 0$ by method of false position correct to three decimal places. (6M)

2. a) Use Lagrange's interpolation formula to fit a polynomial to the following data. Hence find y (– 2), y (1) and y (4).

| X: | – 1 | 0 | 2 | 3 |
|---|---|---|---|---|
| Y: | – 7 | 2 | 5 | 4 |

(6M)

   b) Compute y at x = 4.7 given that

| X: | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Y: | 1 | 2 | 5 | 7 | 12 | 20 |

(6M)

3. a) Using Taylor's series method ,compute y(0.3) to three places of decimal from $\frac{dy}{dx}$ = 1+2xy given that y(0) =0 (6M)

b) Compute y(0.1) and y (0.2) by using Runge – Kutta method for the Differential equation $\frac{dy}{dx} = x + y; y(0) = 1.$ (6M)

4. a) Derive Cauchy – Riemann equation in cartesian coordinate system. (6M)

b) If f (z) is an analytic function of z prove that

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) |f(z)|^2 = 4|f'(z)|^2$$ (6M)

5. a) Show that $L\{\frac{1}{t} f(t)\} = \int_s^\infty F(s)ds$ , where $L\{f(t)\} = F(s)$ (6M)

b) Using Convolution theorem, evaluate $L^{-1}\left\{\frac{1}{(s^2+1)(s^2+9)}\right\}$ (6M)

6. a) Show that $Z(\cos n\theta) = \frac{z(z-\cos\theta)}{z^2 - 2z\cos\theta + 1}$ (6M)

b) Solve the difference equation $y_{n+2} - 3y_{n+1} + y_n = 0$, $y_0 = -1$, $y_1 = 2$ using z – transforms. (6M)

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