

B.Tech II Year I Semester (R15) Regular Examinations November/December 2016

**MATHEMATICS – III**

(Common to CE, CSE, IT, ME, EEE, ECE &amp; EIE)

Time: 3 hours

Max. Marks: 70

**PART – A**

(Compulsory Question)

\*\*\*\*\*

1 Answer the following: (10 X 02 = 20 Marks)

(a) What is the rank of the matrix

$$\begin{pmatrix} 1 & 2 & 0 & 3 \\ 1 & -2 & 3 & 0 \\ 0 & 0 & 4 & 8 \\ 2 & 4 & 0 & 6 \end{pmatrix}$$

- (b) Explain Unitary matrix with proper example.  
 (c) What are the merits of Newton's method of iteration?  
 (d) Write the sufficient condition for Gauss Seidel method to converge.  
 (e) Write the formula of gauss forward formula.  
 (f) Write the formula of Stirling's formula.  
 (g) What is the use of method of least squares?  
 (h) Write about simpson's 3/8 rule.  
 (i) Write the formula of Taylor's method.  
 (j) What are the advantages of finite difference method?

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

2 Find the characteristic equation of the matrix  $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$  and hence find its inverse. Use Cayley-Hamilton theorem.

OR

3 Find a matrix P which transforms the matrix,  $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$  to diagonal form.

**UNIT – II**

4 Determine the approximate root of the equation  $x^2 - 3x + 1 = 0$ , using Regula-Falsi method, up to 3-stages.

OR

5 Solve by Gauss Seidel method  $x - 2y = -3$ ,  $2x + 25y = 15$  correct to four decimal places.

**UNIT – III**

6 The table gives the distances in nautical miles of the visible horizon for the given heights in feet above the earth's surface:

x = height	100	150	200	250	300	350	400
y = distance	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Find the values of y when: (i)  $x = 218$  ft. (ii)  $x = 410$  ft. Use Newton's formula.

OR

7 Given the values:

x	8	9	9.5	11
f(x)	150	392	1452	2366

Evaluate  $f(9.4)$ , using Newton's divided difference formula.

Contd. in page 2

## UNIT – IV

8 Using Simpson's one third rule evaluate  $\int_0^6 xe^x dx$  taking 4 intervals. Compare your result with actual value.

OR

9 The following data related to drying time of a certain varnish and the amount of an additive that is intended to reduce the drying time.

amount of varnish additive(x)	0	1	2	3	4	5	6	7	8
Drying time(hours)y	12.0	10.5	10.0	8.0	7.0	8.0	7.5	8.5	9.0

Fit a second degree polynomial by the method of least square method.

## UNIT – V

10 Using Runge-Kutta method of fourth order, solve  $y' = (y^2 - x^2)/(y^2 + x^2)$  with  $y(0) = 1$  at  $x = 0.2, 0.4$ .

OR

11 Solve differential equation  $y'(x) = x + y$  satisfying  $y(0) = 1$  by Taylor series method and hence compute  $y(0.2)$  and  $y(0.4)$ . Compare the results with exact solution

\*\*\*\*\*