Code: EE3T6

II B.Tech - I Semester – Regular Examinations - January 2014

NUMERICAL METHODS WITH C PROGRAMMING
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours   Marks: 5x14=70

Answer any FIVE questions.   All questions carry equal marks

1 a) Solve the following system of linear equations by Gauss elimination method.   7 M

$$5x+ 3y + 4z = 23$$
$$2x+ 6y + 7z = 35$$
$$6x+ 9y + 10z = 54$$

   b) Write an algorithm for Gauss-Seidal iteration method for solving set of simultaneous equations.   7 M

2 a) Use the Givens method to find the eigenvalues of the tridiagonal matrix.   7 M

$$\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

   b) Write a corresponding C program to find the numerically largest eigenvalue of a square matrix using power method.
                                                             7 M

3 a) Find a real root of the equation $xe^x - \cos x = 0$ using Newton Raphson method. 7 M

b) Find a real root for $e^x \sin x = 1$ using Regulafalsi method. 7 M

4 a) Prove the following operator relations (3x2=6 M)

i.) $\nabla = \delta E^{-1/2}$

ii.) $\delta = \Delta(1 + \Delta)^{-\frac{1}{2}} = \nabla(1 - \nabla)^{-\frac{1}{2}}$

iii.) $\Delta + \nabla = \dfrac{\Delta}{\nabla} - \dfrac{\nabla}{\Delta}$

b) From the table given below find the value of y when x=23 by using Lagrange's interpolation. 8 M

x	10	15	20	25	30
f(x)	2.2	2.6	3.0	3.3	3.6

5 a) Write an algorithm of Trapezoidal rule method. 7 M

b) Evaluate $\int_0^6 \dfrac{1}{2x+3}\, dx$ by using Simpson's 1/3 rule take number of subintervals n=6. 7 M

6 a) Solve $\dfrac{dy}{dx} = y - x^2, y(0) = 1$ by Picard's method. Hence find the value of y(0.1). 7 M

b) Find by Taylor's series method the value of y at x=0.1 and x=0.2 to five places of decimals from

$$y' = x^2y - 1, y(0) = 1.$$
7 M

7 a) Estimate the production for the year 2010, by fitting a straight line to the following data: 7 M

Year	2003	2004	2005	2006	2007
production	5	8	14	12	13

b) An experiment gave the following results: 7 M

v	350	400	500	600
t	61	26	7	26

It is known that v and t are connected by the relation $v = at^b$. Find the best possible values of a and b.

8 a) Solve by difference methods the boundary-value problem

$$y'' + y = 0, \quad y(0) = 0, y(1) = 1$$

Take h=1/4 and solve the resulting system. 7 M

b) Solve the equation

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial t^2}$$

Subject to the conditions

$u(x, 0) = \sin\pi x, 0 \le x \le 1; u(0, t) = u(1, t) = 0.$

Carry out computations for two levels, taking h=1/3, k=1/36. 7 M