[Total No. of Questions : 8]

S.E. (Comp.) (Semester - III) (RC) Examination, Nov./Dec. - 2011
COMPUTER ORIENTED NUMERICAL TECHNIQUES

Duration : 3 Hours **Total Marks : 100**

Instructions : 1) Attempt five questions, atleast one from each module.
2) Assume suitable data, if necessary.

MODULE - I

Q1) a) What are inherent errors? How do they arise? [4]

b) Find the real root of equation $x^2 - \log_e x - 12 = 0$ using Regula Falsi method, correct upto 4 decimal places. [8]

c) Obtain a root of equation $x^3 - 4x - 9 = 0$ correct to 2 decimal places, by bisection method. [8]

Q2) a) What is pivoting? What is the difference between partial and complete pivoting? [5]

b) Solve the following system of equations using Gauss elimination method : [8]

$3.15x - 1.96y + 3.85y = 12.95$
$2.13x + 5.12y - 2.89z = -8.61$
$5.92x + 3.05y + 2.15z = 6.88$

c) Use Gauss Jordan method to solve the following system of equations : [7]

$2p + q + r = 10$
$3p + 2q + 3r = 18$
$p + 4q + 9r = 16$

MODULE - II

Q3) a) Determine by Langrange's method, the percentage no. of patients over 40 years, using following table. [7]

Age over (x) years :	30	35	45	55
% no. (y) of patients :	148	96	68	34

b) Derive Newtons divided difference interpolation formula. [6]

c) The pressure p of wind corresponding to velocity is given by the following data. Estimate p when v = 25 using Newton interpolation formula. [7]

V	10	20	30	40
P	1.1	2	4.4	7.9

Q4) a) Determine the eigen values and eigen vector for the matrix. [6]

$$\begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

b) Discuss Jacobi's method for solution of linear systems iterative scheme. [7]

c) Solve the following set of equations by Gauss Seidal method : [7]

$2x - 3y + 10z = 3$
$5x + 2y + z = -12$
$-x + 4y + 2z = 20$

MODULE - III

Q5) a) Derive trapezoidal rule to evaluate an integral. [5]

b) Evaluate $\int_0^2 \left(\frac{x^3}{e^x - 1} \right) dx$ using Simpson's 1/3rd rule with 10 sub-intervals. [8]

c) Use Romberg's method to compute $\int_0^1 \frac{1}{1+x} . dx$ with $h = 0.5, 0.25, 0.125$. [7]

Q6) a) Solve the boundary value problem $y''(x) = y(x)$
$y(0) = 0$ and $y(1) = 1.1752$ by shooting method, taking $M_0 = 0.8$ and $M_1 = 0.9$. [8]

b) From the following table of values of x and y, obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for $x = 1.1$. [8]

x:	1.0	1.1	1.2	1.3	1.4
y:	43.1	47.7	52.1	56.4	60.8

c) Evaluate $\int_0^{\pi} t . \sin t . dt$ using trapezoidal rule. [4]

MODULE - IV

Q7) a) Given the differential equation $\frac{dy}{dx} = x - y^2$ with conditions $y(0) = 1$, use Picard method upto 2 approximations to determine the value of $y(0.1)$. [6]

b) Using Runge-Kutta method, compute $y(0.1)$ given that

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

[8]

c) Solve $\frac{dy}{dx} + 2y = 0, y(0) = 1$ using Euler's method. Take $h = 0.1$ and obtain $y(0.1)$. [6]

Q8) a) Use predictor - corrector method to estimate $y(1.1)$ and $y(1.2)$, given that,

$$\frac{dy}{dx}=2y+3e^{x} \quad , y(1)=3$$ **[10]**

b) What are parabolic equations? Explain. **[4]**

c) Discuss the process of finite difference approximations to derivatives. **[6]**

☒☒☒☒