S.E. (Comp.) Semester – III (Revised Course 07-08) Examination, May 2009

COMPUTER ORIENTED NUMERICAL TECHNIQUES

Duration : 3 Hours

Max. Marks : 100

Instructions : *1) Answer **any 5 full** questions by selecting at least **one full** question from **each** Module.*
*2) Assume **suitable** data, **if necessary**.*
*3) Answer **in the same** sequence of questions.*

MODULE – I

1. a) List and discuss different sources of errors. Explain their safe guard measures. Give suitable examples. 10

   b) Provide a detailed comparision between successive bisection method and Regula-Falsi method. 10

2. a) Find a real root of the equation $f(x) = x^3 - 2x - 5 = 0$ by Regula-Falsi method. 6

   b) Find a real root of the equation $x = e^x$ by Newton-Raphson method. 6

   c) Solve the following system by Gauss-Jordan method. 8

   $2x + y + z = 10$

   $3x + 2y + 3z = 18$

   $x + 4y + 9z = 16.$

MODULE – II

3. a) The table given below is for the values of tan x for $0.10 < x < 0.30$.

x	0.10	0.15	0.20	0.25	0.30
y = tan x	0.1003	0.1511	0.2027	0.2553	0.3093

   Find :

   i) tan 0.12

   ii) tan 0.26 10

   b) Explain central difference interpolation formulae. Give an illustration. 10

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4. a) Explain Bessel's formula for interpolation. Give suitable illustration. 10

b) For the below given table of values of e^x, find the value of e^x when x = 0.644. 10

x	0.61	0.62	0.63	0.64	0.65	0.66	0.67
$y = e^x$	1.8404	1.8589	1.8776	1.8964	1.9155	1.9347	1.9542

MODULE – III

5. a) Explain Simpson's 1/3 -rule for numerical integration. Give an illustration. 10

b) Find, from following table, the area bounded by the curve and x-axis from x = 7.47 for x = 7.52. 6

x	7.47	7.48	7.49	7.50	7.51	7.52
f (x)	1.93	1.95	1.98	2.01	2.03	2.06

c) Find the value of $\int_3^7 x^2 \log x \, dx$ by taking 4 strips.

6. a) From the below given table, find out $\frac{dy}{dx}$ at x = 2.2 and $\frac{dy}{dx}$ at x = 2.0. 10

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.71	3.32	4.05	4.95	6.04	7.38	9.02

b) Explain Ramberg Integration method and provide an illustration. 10

MODULE – IV

7. a) $\frac{dy}{dx} = \frac{x^2}{y^2+1}$ with initial condition $y = 0$ when $x = 0$, use Pi-card's method to obtain Y for $x = 0.25, 0.5$ and 1.0. Correct to three decimal places. 10

b) $\frac{dy}{dx} = y - x$ where $y(0) = 2$, find $y(0.1)$ and $y(0.2)$ by Runge-Kutta method. Explain this method. 10

8. a) Use the predictor-Corrector formulae for obtaining a solution of

$10\frac{dy}{dx} = x^2 + y^2 \quad y(0) = 1$ for the range $0.5 \leq x \leq 1.0$. 10

b) Explain Parabolic equations and illustrate, for numerical solution to partial differential equations. 10