(Following Paper ID and Roll No. to be filled in your Answer Book)										
PAPER ID : 1066	**Roll No.**									

B.Tech.

(SEM. IV) EVEN THEORY EXAMINATION 2012-13

COMPUTER BASED NUMERICAL METHODS

Time : 3 Hours *Total Marks : 100*

Note :– (1) Attempt **all** questions.

(2) All questions carry equal marks.

(3) The symbols have their usual meaning. In case of numerical problems assume data wherever not provided.

1. Attempt any **four** parts of the following : **(5×4=20)**

(a) If $\sqrt{29} = 5.385$ and $\sqrt{11} = 3.317$ correct to four significant figures. Find the relative error in their sum and difference.

(b) Evaluate $\sqrt{17}$ to four decimal places using Newton Raphson method.

(c) Write the concept numerical solution differ from analytical solutions.

(d) Find the real roots of the equations $2x - \log_{10} x = 7$ correct to 3 decimal places using iteration method.

(e) Find the root of the equations $e^{-x} = \sin x$ to four decimal places using Regula-Falsi method.

(f) Write a program in 'C' for finding out a real root of equation $f(x) = 0$ by bisection method.

2. Attempt any **four** parts of the following : **(5×4=20)**

(a) Show that nth differences (forward) of polynomial of the nth degree are constant.

(b) From the following table find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for x = 1.

x	1	2	3	4	5	6
y	1	8	27	64	125	216

(c) Find interpolation polynomial f(x) and also find the value f(19.5) using divided difference method :

x	1	3	5	7	11
f(x)	5	11	17	23	29

(d) Find $\int_0^6 \frac{dx}{1+x}$ by trapezoidal rule into six sub interval.

(e) Define the shift operator, forward and backward difference operators establish. The formula $\Delta(1+\Delta)^{-1/2} = \Delta(1-\Delta)^{-1/2}$.

(f) Write a computer programme in 'C' to evaluate a definite integral by Simpson's $\frac{1}{3}$ rule.

3. Attempt any **two** parts of the following : **(10×2=20)**

(a) Solve by Gauss elimination method x + 2y + z = 8 ; 2x + 3y + 4z = 20 and 4x + 3y + 2z = 16.

(b) Apply Gauss-Seidal iteration method to solve the equation $20x + y - 2z = 17; 3x + 20y - z = -18$ and $2x - 3y + 20z = 25$

(c) Explain the concept Crout's Method in system of linear equation to solve with example.

4. Attempt any **two** parts of the following : **(10×2=20)**

(a) Use Euler method to solve :

$\frac{dy}{dx} = x + y ; y(0) = 1$ numerically upto x = 0.2 with h = 0.1.

(b) Using Milne's method, solve $y' = 1 + y^2$ with y(0) = 0, y(0.2) = 0.2027, y(0.4) = 0.4228, y(0.6) = 0.6841 obtain y(0.8) and y(1).

(c) Apply Runge-Kutta fourth order method to find an approximate value of y for x = 0.2 and x = 0.4 if $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with y(0) = 1.

5. Attempt any **two** parts of the following : **(10×2=20)**

(a) Solve the following boundary value problem $\frac{d^2y}{dx^2} = y + x$, y(0) = 0 and y(1) = 0 with h = 0.25 by finite difference method.

(b) Explain the concept of solution Laplace's Equation by Liebmann's iteration process.

(c) Solve $u_{xx} + u_{yy} = 0$ over the square mesh of side 4 units; satisfying the following boundary conditions :

(i) u(0, y) = 0 for $0 \le y \le 4$

(ii) u(4, y) = 12 + y for $0 \le y \le 4$

(iii) u(x, 0) = 3x for $0 \le x \le 4$

(iv) $u(x, 4) = x^2$ for $0 \le x \le 4$.