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BICS-033

DIPLOMA VIEP COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

00041

Term-End Examination

December, 2013

BICS-033 : NUMERICAL METHODS AND COMPUTATION

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt **any five** questions. Question No. **1** is **compulsory**. Calculator is **allowed**. Each question carries **equal** marks.*

1. (a) The order of convergence of Newton-Rphson method is 1.62. (True/False) **7x2=14**
   (b) A homogeneous system of linear equations always has infinitely many solutions. (True/ False)
   (c) Computers do not introduce any sort of error in a numerical computation. (True/ False)
   (d) Define shift operator.
   (e) Define forward difference operator.
   (f) What is the necessary and sufficient condition for the convergence of Gauss-Seidal iteration method ?
   (g) Write Euler's method for solving an initial value problem.

2. (a) Use Regular-Falsi method to solve the equation $x \log_{10} x = 1.2$ correct upto three decimal places. 7
   (b) Use Newton-Raphson method to solve the transcendental equation $e^x = 5x$. 7

3. (a) Apply Gauss - Jordan method to solve 7
$x+y+z=9$,
$2x-3y+4z=13$,
$3x+4y+5z=40$.

(b) Solve $5x-y+z=10$, $2x+8y-z=11$, 7
$-x+y+4z=3$, using the Gauss - Seidel iteration method.

4. (a) Find the Lagrange's interpolating 7
polynomial passing through (0, 2), (1, 3) (2, 12) and (5, 147)

(b) Show that $\Delta+\nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$ 7

5. Find the least square fit $y=a+bx+cx^2$ for the 14
data :

x	-3	-1	1	3
y	15	5	1	5

6. (a) Evaluate the first derivative at $x=-3$ from 7
the following table :

x	-3	-2	-1	0	1	2	3
y	-33	-12	-3	0	3	12	33

(b) Use Simpson's $\frac{1}{3}^{rd}$ rule to solve the integral 7

$$\int_0^1 e^{x^2}\,dx.$$

7. Apply the fourth order Runge-kutta method to find y (0.2), given that $\frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$ (Take stepsize $h = 0.1$) **14**

8. Write short notes on **any four** of the following : **3.5x4=14**
   (a) Types of error
   (b) Linear programming
   (c) Brents method
   (d) Linear regression
   (e) Bisection method
   (f) Trapezoidal Rule