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BICS-033

00386

DIPLOMA VIEP COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

Term-End Examination

June, 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**.*

1. (a) If a number is rounded to k decimal places, then the absolute error is : **7x2=14**

(i) $\frac{1}{2}10^{k-1}$ (ii) $\frac{1}{2}10^{-k}$

(iii) $\frac{1}{3}\ 10^{k}$ (iv) $\frac{1}{4}10^{-k}$

(b) The Newton - Raphson method fails when :

(i) $f'(x) < 0$ (ii) $f'(x) > 0$

(iii) $f'(x) = 0$ (iv) Never fails

(c) The relation between E, Δ and ∇ is :

(i) $\Delta = E.\nabla$ (ii) $E = \nabla - \Delta$

(iii) $\Delta = \frac{E}{\nabla}$ (iv) None of these

(d) Relation between E and Δ is :

(i) $E = 1 + \Delta$ (ii) $E = 1 - \Delta$

(iii) $E = \Delta - 1$ (iv) None of these

(e) Interpolatian is the technique of estimating the value of a function for any _____.

(f) Any solution to a L.P.P which satisfies the non-negativity restrictions of the problem is called its _____.

(g) Whenever Trapezoidal rule is applicable Simpson's $\frac{1}{3}$rd rule can also be applied. (True/False).

2. (a) Find a root of the equation, $x - \cos x = 0$, using bisection method correct to 3 decimal places. 7

(b) Using Regula-Falsi method find a root of $2x - \log x = 6$ correct to 3 decimal places. 7

3. (a) Find a root of the equation $x^3 + x^2 + x + 7 = 0$ correct to 3 decimal places by Secant method. 7

(b) Find the positive root of $x^4 - x = 10$ correct to three decimal places using Newton - Raphson method. 7

4. (a) Solve by Gauss elimination method for the following equations : 7

$2x + 2y + z = 12$

$3x + 2y + 2z = 8$

$5x + 10y - 8z = 10$

(b) Solve by Gauss-Seidal method, for the following equations : 7

$2x + y + 6z = 9$

$8x + 3y + 2z = 13$

$x + 5y + z = 7$

5. (a) Construct Newton's forward interpolation polynomial for the following data : 7

x	:	4	6	8	10
y	:	1	3	8	16

(b) Given $u_1 = 40$, $u_3 = 45$, $u_5 = 54$, find u_2 and u_4. 7

6. (a) Derive Lagrange's interpolation formula. 7

(b) Given the values 7

x	:	5	7	11	13	17
$f(x)$	:	150	392	1452	2366	5202

Evaluate f (a) using Lagrange's formula.

7. (a) Evaluate $\int_0^5 \frac{dx}{4x + 5}$ using Simpson's $\frac{1}{3}^{rd}$ rule by dividing the range into 10 equal parts. Deduce the value of $\log_e 5$. 7

(b) Using Runge-Kutta method, solve 7

$\frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$, compute $y(0.2)$

taking $h = 0.1$.

8. Explain **any four** of the following : **3.5x4=14**

(a) Secant method

(b) Cramers rule

(c) Finite difference operators

(d) Types of Error

(e) Brents method

(f) Linear programming