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BICS-033

DIPLOMA – VIEP – COMPUTER SCIENCE AND ENGINEERING (DCSVI)

00434

Term-End Examination

June, 2015

BICS-033 : NUMERICAL METHODS AND COMPUTATION

Time : 2 hours *Maximum Marks : 70*

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

1. (a) If f(x) is continuous in a closed interval [a, b] and f(a), f(b) are of opposite signs, then the equation f(x) = 0 will have at least _____ between a and b. *7×2=14*

(i) Four real roots

(ii) Two real roots

(iii) One real root

(iv) Three real roots

(b) Bisection method is also called _____ method.

(c) Regula Falsi method and Bisection method are somewhat similar. (True/False)

(d) Method of successive approximation is also called _____ method.

(e) Newton-Raphson method is referred to as the _____ .

(f) When an approximate value of a root of an equation is given, a better and closer approximation to the root can be found using _____ method.

(g) Regula Falsi method is also known as the method of false position. (True /False)

2. Find a root of the equation $x^3 - x - 11 = 0$ correct to four decimals using bisection method. *14*

3. (a) Solve the system of equations $3x + y - z = 3$, $2x - 8y + z = -5$, $x - 2y + 9z = 8$, using Gauss elimination method. *7*

(b) Solve the following system by the method of triangularisation : *7*

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

4. Solve by Gauss-Seidel method, the following system of equations : *14*

$28x + 4y - z = 32$, $x + 3y + 10z = 24$ and $2x + 17y + 4z = 35$.

5. Find a polynomial which takes the following values : *14*

x	1	3	5	7	9	11
y_x	3	14	19	21	23	28

and hence compute y_x at $x = 2,\ 12$.

6. Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ by using *14*

(a) Trapezoidal Rule.

(b) Simpson's 1/3 Rule.

(c) Simpson's 3/8 Rule.

7. Solve $\frac{dy}{dx} = x + z$, $\frac{dz}{dx} = x - y^2$ with $y(0) = 2$, $z(0) = 1$ to get $y(0{\cdot}1)$, $y(0{\cdot}2)$, $z(0{\cdot}1)$ and $z(0{\cdot}2)$, approximately, by Taylor's algorithm. *14*

8. Explain any ***four*** of the following : *$4 \times 3\frac{1}{2} = 14$*

(a) Relative Error in Numerical Computation

(b) Linear Programming

(c) Golden Section Search

(d) Trapezoidal Rule

(e) Runge-Kutta Method for 4^{th} Order

(f) Secant Method