Printed Pages – 7

322451 (14)

BE (4th Semester)

Examination, April-May, 2014

Branch : CSE

COMPUTATIONAL MATHEMATICS (NEW)

Time Allowed : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all five questions. Part (a) is compulsory and carries 2 marks. Attempt any two from (b), (c) and (d) will carry 7 marks for each.

Q. 1. (a) Write the general formula for secant method.

(b) Find a real root of the equation $x^3 - 2x - 5 = 0$ by the method of false position, correct to three decimal places.

(c) Evaluate $\sqrt{12}$ to four places of decimal by using Newton-Raphson method.

(d) Find a real root of the equation $x^3 - 11x^2 + 32x - 22 = 0$ by Birge-Vieta method correct to four decimal places using the initial approximation p = 0.5.

Q. 2. (a) Explain Gauss elimination method.

(b) Solve the following system of equations by the method of Crout's triangularisation :

$$x + 5y + z = 14$$

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

$$3x + y + 4z = 17$$

(c) Use Jacobi's method and solve the system of equations :

$$6x + 3y + 12z = 35$$

$$8x - 3y + 2z = 20$$

$$4x + 11y - z = 33$$

(d) Solve by using relaxation method the following systems :

$$9x - 2y + z = 50$$

$$x + 5y - 3z = 18$$

$$-2x + 2y + 7z = 19$$

Q. 3. (a) Explain forward and backward difference.

(b) In an examination the number of candidates who secured marks between certain limits were as follows :

Marks	0 – 19	20 – 39	40 – 59	60 – 79	80 – 99
No. of Candidates	41	62	65	50	17

Estimate the number of candidates getting marks less than 70.

(c) Use Lagrange's formula to fit a polynomial to the data :

x	−1	0	2	3
y	−8	3	1	12

and hence find y(1).

(d) Given :

θ	0°	5°	10°	15°	20°	25°	30°
tanθ	0	0.0875	0.1763	0.2679	0.3640	0.4663	0.5774

Using Stirling's formula, show that tan $16° = 0.2867$.

Q. 4. (a) Define Quadrature.

(b) A rod is rotating in plane about one of its ends. If the following table gives the angle "θ" radians through which the rod has turned for different values of time "t" seconds, find its angular velocity and angular acceleration when t = 0.7 seconds :

t(sec.)	:	0	0.2	0.4	0.6	0.8	1.0
θ(radians)	:	0	0.12	0.48	1.10	2.0	3.20

(c) Find the value of log2 from $\int_0^1 \frac{x^2}{1+x^3} dx$ using Simpson's $\frac{1}{3}^{rd}$ rule, by dividing the range into four equal parts. Also find the error.

(d) A river is 80 meters wide. The depth d (in meters) of the river at a distance x from the bank is given by the following table :

x :	0	10	20	30	40	50	60	70	80
d :	0	4	7	9	12	15	14	8	3

Find approximately the area of cross section of the river.

Q. 5. (a) Write Taylor's series for solving $\frac{dy}{dx} = f(x, y)$, $y(x_0) = y_0$.

(b) Using modified Euler's method solve $\frac{dy}{dx} = y^2 + x^2$, $y(0) = 1$ find y at x = 0.1 and 0.2.

(c) Using Runge-Kutta method to find an approximate value of y for x = 0.2 in steps of 0.1, if $\frac{dy}{dx} = x + y^2$ given that y = 1 when x = 0.

(d) If $\frac{dy}{dx} = x - y^2$ and y(0) = 0, y(0.2) = 0.0200, y(0.4) = 0.0795, y(0.6) = 0.1762. Evaluate y(0.8) by Adams-Bashforth method.