

**333451 (14)**BE (4<sup>th</sup> Semester)  
Examination, Nov.-Dec., 2014

Branch : IT

**COMPUTATIONAL  
MATHEMATICS (NEW)**

Time Allowed : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d) of each question.

- Q. 1. (a) In Regula-Falsi method, the first approximation is given by \_\_\_\_\_ 2

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- (b) Find the iterative formula for finding  $K\sqrt{N}$ , where  $N$  is a real number. Use Newton-Raphson method to find the value of  $(238)^{1/7}$  correct to 6 places of decimals. 7
- (c) Find a real root of the equation  $x^3 - 11x^2 + 32x - 22 = 0$  by Birge-Vieta method correct to four decimal places. 7
- (d) Solve  $x^4 - 5x^3 + 20x^2 - 40x + 60 = 0$ , given that all the roots of  $f(x) = 0$  are complex, by using Lin-Bairstow method. 7
- Q. 2. (a) By Gauss elimination method solve : 2

$$x + y = 2$$

$$2x + 3y = 5$$

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(3)

(b) Solve  $10x - 7y + 3z + 5u = 6$ ;  $-6x + 8y - z$

$$-4u = 5; 3x + y + 4z + 11u = 2; 5x - 9y -$$

$$2z + 4u = 7 \text{ by Gauss-Jordan method. } 7$$

(c) Solve the following equations by Crouts

$$\text{method : } 3x + 2y + 7z = 4; 2x + 3y + z = 5;$$

$$3x + 4y + z = 7. \quad 7$$

(d) Solve, by Relaxation method, the equations :

$$9x - 2y + z = 50; x + 5y - 3z = 18; -2x + 2y$$

$$+ 7z = 19. \quad 7$$

Q. 3. (a) The relationship between the operators E

and D is \_\_\_\_\_ 2

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(4)

(b) Evaluate : 7

$$\Delta^2 \left( \frac{5x+12}{x^2+5x+16} \right)$$

(c) From the following table, estimate the

number of students who obtained marks

between 40 and 45 : 7

Marks	: 30-40	40-50	50-60	60-70	70-80
No. of students	: 31	42	51	35	31

(d) Find the polynomial  $f(x)$  by using Lagrange's

formula and hence find  $f(3)$  for : 7

x :	0	1	2	5
f(x) :	2	3	12	147

Q. 4. (a) Write the formula for Trapezoidal rule. 2

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(5)

(b) The following data gives the velocity of a particle for 20 seconds at an interval of 5

seconds. Find the initial acceleration using

the entire data :

Time t (sec)	:	0	5	10	15	20
Velocity v (m / sec)	:	0	3	14	69	228

(c) Evaluate  $\int_0^6 \frac{dx}{1+x^2}$  by using :

(i) Trapezoidal rule,

(ii) Simpson's 1/3 rule

(iii) Simpson's 3/8 rule

and compare the results with its actual value.

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(6)

(d) A slider in a machine moves along a fixed straight rod. Its distance x cm along the rod is given below for various values of the time

t seconds. Find the velocity of the slider and

its acceleration when t = 0.3 second.

t =	0	0.1	0.2	0.3	0.4	0.5	0.6
x =	30.13	31.62	32.87	33.64	33.95	33.81	33.24

Q. 5. (a) Write the formula for Picard's method.

(b) Find by Taylor's series method, the values of

y at x = 0.1 and x = 0.2 to five places of

decimals from  $\frac{dy}{dx} = x^2y - 1$ ,  $y(0) = 1$ .

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(7)

(c) Using Runge-Kutta method of fourth order,

solve :

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$$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2} \text{ with } y(0) = 1 \text{ at } x = 0.2, 0.4.$$

(d) Given  $\frac{dy}{dx} = x^2(1+y)$  and  $y(1) = 1$ ,  $y(1.1) =$

1.233,  $y(1.2) = 1.548$ ,  $y(1.3) = 1.979$ , evaluate

$y(1.4)$  by Adams-Bashforth method.

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