BCA - V Sem.

18024

B. C. A. Examination, Dec. 2016

NUMERICAL METHODS

(BCA-504)

(New Course)

Time : Three Hours]   *[Maximum Marks : 75*

Note : Attempt questions from all Sections as per instructions. Calculator is allowed.

Section-A

(Very Short Answer Questions)

Attempt all the *five* questions. Each question carries 3 marks. $3 \times 5 = 15$

1. Obtain the function whose first forward difference is $9x^2 + 11x + 5$.

2. Prove that $e^x = \left(\dfrac{\Delta^2}{E}\right) e^x \cdot \dfrac{E e^x}{\Delta^2 e^x}$, the interval of differencing being unity.

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11. Find the value of the integral $\displaystyle\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's one-third rule and Simpson's three-eighth's rule. Hence, obtain the approximate value of π in each case.

12. Solve the following system by Gauss-Seidel iterative method :

$$10x + 2y + z = 9$$
$$2x + 20y - 2z = -44$$
$$-2x + 3y + 10z = 22$$

13. Discuss Euler's method to compute the numerical solution of a first order and first degree differential equation. Using Euler's method, find the solution of the differential equation

$$\frac{dy}{dx} = x^2 + y^2, \quad y(0) = 0 \quad \text{in the range} \quad 0 \le x \le 0.5$$

taking $h = 0.1$.

3. Describe briefly false position method to find a real root of an algebraic or transcendental equation.

4. Using Lagrange's interpolation formula, find $f(4)$ from the following table :

x	0	1	2	5
$f(x)$	2	5	7	8

5. Evaluate $\int_0^6 \dfrac{dx}{1+x^2}$ using trapezoidal rule by dividing the range of intergration into six equal parts.

Section-B

(Short Answer Questions)

Attempt any *two* questions. Each question carries $7\frac{1}{2}$ marks. $7\frac{1}{2}\times2=15$

6. Using Newton's divided difference formula, find $f(x)$ from the following data :

x	−1	0	2	3	7	10
$f(x)$	−11	1	1	1	141	561

Hence find $f(1)$ and $f'(1)$.

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7. Using Picard's method, obtain a solution upto third approximation of the differential equation

$$\frac{dy}{dx} = x^4 y + x \text{ with } y(0)=3.$$

8. Solve the following system of equations by Gauss' elimination method :

$$2x + y + 4z = 12$$
$$8x - 3y + 2z = 23$$
$$4x + 11y - z = 33$$

Section-C

(Detailed Answer Questions)

Attempt any *three* questions. Each question carries 15 marks. $15\times3=45$

9. Describe Newton-Raphson's method to find a real root of an algebraic or transcendental equation. Also find the real cube root of 12 correct to five places of decimal by Newton-Raphson's method.

10. Using Gauss's interpolation formula, find the value of y for $x=41$ with the help of the following data :

x	30	35	40	45	50
y	3678.2	2995.1	2400.1	1876.2	1416.3

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11. Solve by Gauss-Seidel method of iteration, the equations:

$$10x + y + z = 12$$
$$2x + 10y + z = 13$$
$$2x + 2y + 10z = 14.$$

12. Using Stirling formula, find $f(28)$ from the following table:

$f(20) = 49225$, $f(25) = 48316$, $f(30) = 47236$,
$f(35) = 45926, f(40) = 44306$.

13. Find the real root of the equation $x \log_{10} x - 1.2 = 0$. Correct to five places of decimal.

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BCA-V Sem.

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B. C. A. Examination, Dec. 2018
Numerical methods
(BCA-504)
(New Course)

Time : Three Hours]   [Maximum Marks : 75

Section-A

(Very Short Answer Questions)

Attempt all the five questions. Each question carries 3 marks. $3 \times 5 = 15$

1. Find $\sqrt{12}$ by applying Newton-Raphson's method.

2. Prepare a divided difference table for the following data:

x	1	2	4	7	12
$f(x)$	22	30	82	106	216

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3. Find the first derivative of $f(x)$ at $x = 0.4$ from the following table :

x	0.1	0.2	0.3	0.4
$y = f(x)$	1.1051	1.2214	1.3498	1.4918

4. Solve :

$$5x - y - 2z = 142$$
$$x - 3y - z = -30$$
$$2x - y - 3z = 5$$

by Gauss's elimination method.

5. Given that :

$$\frac{dy}{dx} = \frac{y - x}{y + x}, \quad y(0) = 1,$$

find $y(0.1)$ by Picard's method.

Section-B

(Short Answer Questions)

Attempt any *two* questions out of the following three questions. Each question carries 7½ marks. 7½×2=15

6. Given $f(0)=16.35$, $f(5)=14.88$, $f(10)=13.59$, $f(15)=12.46$ and $f(x) = 14.00$, find x.

7. Estimate the sale for 1966 using the following data :

Year	Sales (in thousand)
1931	12
1941	15
1951	20
1961	27
1971	39
1981	52

8. Find the root of $x^2 - 5x + 2 = 0$ correct to five decimal places by Newton-Raphson's method.

Section-C

(Detailed Answer Questions)

Attempt any *three* questions out of the following five questions. Each question carries 15 marks. 15×3=45

9. Using Runge-Kutta method, find an approximate value of y for $x = 0.2$ if $\frac{dy}{dx} = x + y^2$, given that $y = 1$ when $x=0$ and $h=0.1$.

10. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's '3/8' rule. Hence obtain the approximate value of π.

13. Given the following tables:

DIRECTOR

DIR_NUM	DIR_NAME	DIR_DOB
100	Arvind Gaur	30/6/43
101	Faizal Alkazi	12/8/50
102	Anuradha Kapoor	21/9/62

PLAY

PLAY_CODE	PLAY-NAME	DIR-NUM
1001	Jivit ya Mrit	102
1002	Bade Bhai Saab	101
1003	Galib in Delhi	102
1004	Safarnama	100
1005	Aadhe Adhure	101
1006	Konark	101
1007	Adhoori Kahani	NULL

(i) Identify the Primary and Foreign keys of both the tables.

(ii) Do the tables exhibit Entity and Referential Integrity Constraints? Explain.

(iii) Draw the entity relationship diagram to show the relationship between director and play.
Specify the cardinality and participation constraints also.

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BCA Examination, Dec- 2017
Introduction to DBMS
(BCA-501)
(New)

Time : Three Hours]   *[Maximum Marks : 75*

Note : Attempt **all** questions as per the Instructions.

Section-A

Note : Attempt all **five** questions. Each question carries **three** marks.   5×3=15

1. Differentiate between DDL and DML.

2. List three main advantages of database approach.

3. What is relational algebra? Explain.

4. Briefly describe B tree.

5. Explain ER diagram.

Section-B

Note : Attempt any **two** questions out of following 3 questions. Each question carries equal marks.   2×7.5=15

6. Discuss the three level architecture of DBMS.

7. Explain different collision resolution approaches in hashing.

8. What is strong and weak entity? Explain with example.

Section-C

Note : Attempt any **three** questions out of following 5 questions. Each question carries equal marks.   3×15=45

9. With respect to the relational data model, define and relate with example: primary key, foreign key, super key, candidate key and prime attribute.

10. Consider the following relations with underlined primary keys.

    PRODUCT (Pcode, Description, Stocking Date, QtyOnHand, MinQty, Price, Discount, VCode)

VENDOR (VCode, Name, Address, Phone)

Here a vendor can supply more than one product but a product is supplied by only one vendor.

Write SQL queries for the following:

(i) List the names of all the vendors who supply more than one product.

(ii) List the details of the products whose prices exceed the average product price.

(iii) List the Name, Address and Phone of the vendors who are currently not supplying any product.

11. List advantages and disadvantages of Indexed sequential, B tree and B+ tree file organization.

12. Write short notes on:

    (i) Functional dependency

    (ii) Types of SQL queries

    (iii) Transaction processing

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B.C.A. Examination, November-2019
NUMERICAL METHODS
(BCA-504)

Time : Three Hours] [*Maximum Marks : 75*

Note : Attempt questions from *all* sections as per instructions. Calculator is allowed.

Section–A
(Very Short Answer Questions)

Note : Attempt all *five* questions. Each question carries 3 marks. Very short answer is required not exceeding 75 words. 5×3=15

1. Evaluate the following for h = 1 :

$$E = c^{hD}$$

2. Construct a divided difference table for the following data :

x	3	5	9	15
y	2	14	38	74

3. Write the formula for Simpson's 3/8th rule.

4. Write the formula for Runge-Kutta method for 4th order.

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12. State Runge-Kutta method of second order. Using Runge-Kutta method of fourth order find the values of y (0.2), y (0.4) and y (0.6) for the following initial value

$$\frac{dy}{dx} = x^3 - y^3$$

Write Condition that y (0) = 1.

13. Evaluate

$$\int_0^6 \frac{dx}{1+x^2} \text{ by using}$$

(a) Trapezoidal rule

(b) Simpson's 1/3 rule

5. Perform two iterations of Picard's method to find an approximate solution of the initial value problem :

$$\frac{dy}{dx} = x - y, \quad y(0) = 1$$

Section–B

(Short Answer Questions)

Note : Answer any *two* questions out of the following three questions. Each question carries 7½ marks. Short answer is required not exceeding 200 words.

$$2 \times 7\frac{1}{2} = 15$$

6. Using Euler's method find an approximate value of y for x = 1, considering h = 0.5, given that

$$\frac{dy}{dx} = x + y, \quad \text{and } y(0) = 1$$

7. Apply Newton's divided difference method to obtain an interpolatory polynomial for the following data:

x	3	5	7	9	11	13
f(x)	31	51	17	19	90	110

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8. Find the first two derivatives of f(x) at x = 1 from the following table :

x	-2	-1	0	1	2	3	4
f(x)	104	17	0	-1	8	69	272

Section–C

(Detailed Answer Questions)

Note : Attempt any *three* questions out of the following five questions. Each question carries 15 marks. Answer is required in detail. $3 \times 15 = 45$

9. Derive Newton– Raphson's method to find a root of the equation f(x) = 0. Prove that this method has Quadratic Convergence.

10. Solve the following system of linear equations using Gauss-Seidel method :

$$10x + 3y + 7z = 41$$
$$3x + 20y + 17z = 101$$
$$x + 19y + 23z = 201$$

perform three iterations.

11. Define Lagrange's interpolation formula. Obtain Lagrange's interpolatory for the following data :

x	1	3	5	7	10
f(x)	13	31	25	37	101

3. Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with y=1 for x=0. Find y(0.3) by Euler's method taking h=0.1.

4. Define Simpson's three-eight rule for Numerical integration.

5. What do you understand by Gauss's eliminations method?

Section-B

(Short Answer Questions)

Note : Attempt any **two** questions out of the following **three** questions. Each question carries **7½** marks.

$$7½ \times 2 = 15$$

6. Use Picard's method to approximate y when x=0.2, given that y=1 when x=0 and $\frac{dy}{dx} = x - y$.

7. Find the value of y when x=10 for the following table:

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x	5	6	9	11
y	12	13	14	16

8. Using Bessel's formula, find y (25) from the following data:

x	20	24	28	32
y	24	32	35	40

Section-C

(Detailed Answer Questions)

Note : Attempt any **three** questions out of the following **five** questions. Each question carries **15** marks. 15×3=45

9. Apply Gauss-Seidal iteration method to solve the equations.

20x+y−2z=17

3x+20y−z=−18

2x−3y+20z=25

10. Use Runge-Kutta method of fourth order, to find y (0.2) for the equation.

$$\frac{dy}{dx} = \frac{y-x}{y+x} \quad y(0)=1, \text{ take } h=0.2$$

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

   (a) Trapezoidal rule

   (b) Simpson's ⅓ rule.

12. By using Newton-Raphson's method, find the root of $x^4-x-10=0$ which is nearer to $x=2$ correct to three places of decimal. Also obtain the rate of Convergance of Newton-Raphson's method.

13. (a) The following value of the function $f(x)$ for values of x are given:

    $f(1)=4$, $f(2)=5$, $f(7)=5$, $f(8)=4$.

    Find the value of $f(6)$ and also the value of x for which $f(x)$ is maximum or minimum.

   (b) Apply Lagrange's formula to find the cubic polynomial which includes the following values of x and y_x:

x	0	1	4	6
y_x	1	−1	1	−1

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B.C.A. Examination, Dec. 2020

Numerical Methods

(BCA-504)

Time : Three Hours]   *[Maximum Marks : 75*

Note : Attempt questions from all Sections as per instructions. Calculator is allowed.

Section-A

(Very Short Answer Questions)

Note : Answer all the **five** questions. Each question carries **3** marks. $3\times5=15$

1. Find the real root of the equation:

   $f(x)=x^3-x-1=0$

2. Define operators E, Δ and ∇. Also obtain relation between E and Δ.