

(4)

11. Find the value of the integral $\int_0^1 \frac{dx}{1+x^2}$ 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

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

taking $h = 0.1$.

0.5	0.4	0.3	0.2	0.1	0
1.0	0.8	0.6	0.4	0.2	0

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BCA - V Sem.

Roll No.

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

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(2)

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

Section-B

(Short Answer Questions)

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

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 $f'(1)$.

(3)

7. Using Picard's method, obtain a solution upto third approximation of the differential equation $\frac{dy}{dx} = x^4 y + x$ 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. $15 \times 3 = 45$

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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(4)

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.

Roll No.

18024

B. C. A. Examination, Dec. 2018

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. 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

(2)

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

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 .

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(3)

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. $15 \times 3 = 45$

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 .

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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

- Identify the Primary and Foreign keys of both the tables.
- Do the tables exhibit Entity and Referential Integrity Constraints? Explain.
- Draw the entity relationship diagram to show the relationship between director and play.
Specify the cardinality and participation constraints also.

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(Printed Pages 4)

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Roll No.

BCA- V Sem.

18021

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. $5 \times 3 = 15$

- Differentiate between DDL and DML.
- List three main advantages of database approach.
- What is relational algebra? Explain.
- Briefly describe B tree.
- Explain ER diagram.

P.T.O.

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Section-B

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

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. $3 \times 15 = 45$

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)

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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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P.T.O.

(41)

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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

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Printed Pages : 4

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Roll No.

B.C.A.-V Sem.

18024

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. $5 \times 3 = 15$

1. Evaluate the following for $h = 1$:

$$E = e^{hD}$$

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 $3/8^{\text{th}}$ rule.
4. Write the formula for Runge-Kutta method for 4^{th} order.

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[P.T.O.]

(2)

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 $7\frac{1}{2}$ 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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(3)

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

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[P.T.O.]

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.

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

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. $15 \times 3 = 45$

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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P.T.O.

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

- (a) Trapezoidal rule
(b) Simpson's $\frac{1}{3}$ 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 Convergence 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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BCA.-V Sem.

(Printed Pages 4)

Roll No.

18024

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. $3 \times 5 = 15$

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 .

P.T.O.

Year (x)	Population (y) (in thousand)
1901	12
1911	15
1921	20
1931	27
1941	39
1951	52

11. Find the value of the integral $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's $\frac{1}{3}$ and $\frac{3}{8}$ rule.
12. Using Runge-Kutta method of fourth order solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0)=1$ at $x=0.2, 0.4$.
13. Find the solution of the system by Gauss-Seidel Method.
- $$83x + 11y - 4z = 95$$
- $$7x + 52y + 13z = 104$$
- $$3x + 8y + 29z = 71$$

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BCA-V Sem.

(Printed Pages 4)
Roll No.

18024 (CV-III)
B.C.A. Examination, Dec.-2021
Numerical Methods
(BCA-504)

Time : 1½ Hours] [Maximum Marks : 75

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

Section-A

(Very Short Answer Questions)

Note : Attempt any **two** questions. Each question carries **7.5** marks.

2×7.5=15

- Find a root of the eq $f(x) = x^3 - 4x - 9 = 0$ using the bisection method in four iterations.
- Find the form of the function from following given data:

x :	0	1	2	3	4
f(x):	3	6	11	18	27

P.T.O.

3. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Trapezoidal Rule.
4. Use Euler's Method with $h=0.1$ to find the solution of $\frac{dy}{dx} = x^2 + y^2$, $y(0)=0$ in the range $0 \leq x \leq 0.5$
5. Solve by Gauss-elimination method.
 $2x+y+4z=12$
 $8x-3y+2z=23$
 $4x+11y-z=33$

Section-B

(Short Answer Questions)

Note : Attempt any **one** question out of the following three questions. Each question carries **15** marks. $1 \times 15 = 15$

6. By means of Newton's divided difference formula find the value of $f(8)$ and $f(15)$ from the following table.

x:	4	5	7	10	11	13
f(x):	48	100	294	900	1210	2028
7. From the given table. Find $\frac{dy}{dx}$ at $x=1.2$.

18024(CV-III)/2

x	y
1.0	2.7183
1.2	3.3201
1.4	4.0552
1.6	4.9530
1.8	6.0496
2.0	7.3891

8. Using Picard's method of successive approximation obtain a solution upto fourth approximation of the equation.
 $\frac{dy}{dx} = y + x$, $y(0) = 1$

Section-C

(Detailed Answer Questions)

Note : Attempt any **two** questions out of the following five questions. Each question carries **22.5** marks.

$$2 \times 22.5 = 45$$

9. Find a real root of the equation $x^3 - x^2 - 2 = 0$ by False Position Method.
10. Interpolate by mean of Gauss's formula the population for the year 1936, given the following table.

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P.T.O.