TDP (General) 5th Semester Exam., 2021
(Held in 2022)

MATHEMATICS

(General)

FIFTH PAPER

Full Marks : 40

Time : 2 hours

The figures in the margin indicate full marks for the questions

GROUP—A

(Numerical Analysis)

(*Marks* : 20)

Answer *any* two questions

1. *(a)* Prove that

$$D = \frac{1}{h}\left[\Delta - \frac{\Delta^2}{2} + \frac{\Delta^3}{3} - \frac{\Delta^4}{4} + \cdots\right]$$

where the symbols have their usual meanings. 5

(b) Derive numerical differentiation formulae for $f'(x_0)$ and $f''(x_0)$ based on Newton's forward interpolation formula. 5

2. *(a)* Compute one positive root of $2x - \sin x - 5 = 0$ by bisection method, correct to three decimal points. 5

(b) Find the inverse of the given matrix by Gauss-Jordan method : 5

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 2 & 3 & 1 \end{bmatrix}$$

3. *(a)* Evaluate

$$\int_0^1 e^{-x^2} dx$$

by dividing the range of integration into 4 equal intervals using Simpson's $\frac{1}{3}$rd rule. 5

(b) Solve the following linear equations by Gauss-Jordan method : 5

$$2x + 2y + z = 1$$
$$x + 2y + 3z = 4$$
$$x + y + z = 3$$

GROUP—B

(Computer Science)

(Marks : 20)

Answer *any* **two** questions

4. *(a)* What is header file? State two examples of header file in C.

(b) Write down the purpose of # defined in C.

(c) Write C assignment statement to evaluate the following equations :

(i) Area $= \pi r^2 + 2\pi rh$

(ii) $S = \sqrt{a^2 + b^2 - 2ab}$

3+2+(2½+2½)=10

5. *(a)* Write a C program to convert a given temperature in Fahrenheit to Celsius.

(b) Find the output of the following program :

```
main( )
  {
    int a=100;
    printf("%d/n", a++);
    printf("%d/n", ++a);
  }
```

(c) What is switch statement in C program?

4+3+3=10

6. (a) Write a C program to find the reverse of a number.

(b) Explain briefly the different types of logical operators in C.

(c) Write a C program to check whether a number is even or odd. 4+2+4=10

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TDP (General) 5th Semester Exam., 2020
(Held in 2021)

MATHEMATICS

(General)

FIFTH PAPER

Full Marks : 40

Time : 2 hours

The figures in the margin indicate full marks for the questions

Scientific calculator is allowed

Use separate answer-script for each Group

GROUP—A

(Numerical Analysis)

(*Marks* : 20)

Answer any **two** questions

1. *(a)* Deduce Lagrange's interpolation formula. 5

   (b) Compute a real root of the equation $\log_{10} x = \cos x$, by regula-falsi method, correct to 4 significant figures. 5

2. *(a)* Find by Newton-Raphson method, a real root of the equation $3x - \cos x - 1 = 0$, correct to four decimal places. 5

(b) A curve is drawn to pass through the points (x_i, y_i), $(i = 0, 1, 2, 3, 4, 5, 6)$ given in the following table :

x	1·0	1·5	2·0	2·5	3·0	3·5	4·0
y	2·0	2·4	2·7	2·8	3·0	2·6	2·1

Using the above table, find the area bounded by the curve, the x-axis and the lines $x = 1$, $x = 4$, correct to 3 significant figures. 5

3. *(a)* Find the inverse of the following matrix by Gauss-Jordan method : 5

$$\begin{pmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{pmatrix}$$

(b) The angle of rotation θ (in radians) of a rod for various values of t (in seconds) is given below :

t	0	0·4	0·8	1·2
θ	0	0·493	0·2022	4·666

Find the angular velocity when $t = 1$ s correct to 4 significant figures. 5

GROUP—B

(Computer Science)

(*Marks* : 20)

Answer any **two** questions

4. *(a)* What do you mean by datatype in C? State examples.

(b) Write a C program to find the sum of digits of a number.

(c) Write any four types of logical operator used in C and give one example of each. 3+4+3=10

5. *(a)* Write a C program to check whether a year is leap year or not.

(b) Explain briefly the concept of array with example.

(c) Write a C program to find the area of a circle. 4+3+3=10

6. *(a)* Write a C program to check whether a number is palindrome or not.

(b) Write a C program to print even numbers from 1 to 100.

(c) Write a short note on if-else. 4+4+2=10

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(b) Write short notes on :

(i) if-else

(ii) do-while

(c) What do you mean by array? 4+4+2=10

6. (a) Write a C program to find the reverse of a number.

(b) Write short notes on :

(i) Relational operator

(ii) Assignment operator

(c) Explain the functioning of 'break' statement. 4+4+2=10

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TDP/TDPH (General) 5th Semester Exam., 2019

MATHEMATICS

(General)

FIFTH PAPER

Full Marks : 40

Time : 2 hours

The figures in the margin indicate full marks for the questions

Use separate answer-script for each Group

GROUP—A

(Numerical Analysis)

(*Marks* : 20)

Answer *any* **two** questions

1. (a) Given $U = x_1x_2 + x_1x_3 + x_2x_3$. find relative percentage error in the computation of U at $x_1 = 2{\cdot}104$, $x_2 = 1{\cdot}935$ and $x_3 = 0{\cdot}845$.

(b) Deduce Newton's forward interpolation formula.

(c) Find the value of $f'(0.4)$ from the following table :

x	:	0·1	0·2	0·3	0·4
$y = f(x)$	:	1·10517	1·22140	1·34986	1·49182

2+4+4=10

2. (a) Show that $\mu^2 = 1 + \frac{1}{4}\delta^2$. (Symbols have their usual meaning.)

(b) Evaluate approximately, by trapezoidal rule, the integral

$\int_0^1 (4x - 3x^2)\,dx$, by taking $n = 10$

Compute also the exact integral and find the absolute and relative errors.

(c) The following table gives

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

What is the form of the function $f(x)$?

2+4+4=10

3. (a) Solve the following by Gauss-Jordan method :

$$x_1 + 2x_2 + x_3 = 8$$
$$2x_1 + 3x_2 + 4x_3 = 20$$
$$4x_1 + 3x_2 + 2x_3 = 16$$

(b) Given the table of $y = f(x)$

x	1	1·5	2	2·5
$f(x)$	0	0·4055	0·6931	0·9163

Find the value of $f'(2·3)$ and $f''(2·3)$.

(c) Evaluate $\Delta^2(3e^x)$, taking $h = 1$. (Symbols have their usual meaning.) 4+4+2=10

GROUP—B

(Computer Science)

(*Marks* : 20)

Answer *any* **two** questions

4. (a) Write a C program to check whether a year is leap-year or not.

(b) What is header file? State two examples of header file in C.

(c) Distinguish between datatype int and float. 5+3+2=10

5. (a) Write a C program to generate the series of even numbers up to *n*th term where n is the input.

TDP (General) 5th Semester Exam., 2018

MATHEMATICS

(General)

FIFTH PAPER

Full Marks : 40

Time : 2 hours

The figures in the margin indicate full marks for the questions

GROUP—A

(Numerical Analysis)

(*Marks* : 20)

Answer *any* **two** questions

Allowed to use scientific calculator

1. *(a)* Show that $\Delta \equiv E - 1$
(Symbols have their usual meaning.)

(b) Deduce Newton's Backward interpolation formula.

(c) Compute a real root of the following equation by bisection method correct to three decimal places $x^3 - 3x - 5 = 0$.

2+4+4=10

2. (a) An approximate value of π is given by 3·14278152 and its true value is 3·14159265. Find absolute and relative errors.

(b) By Simpson's $\frac{1}{3}$rd rule, find the value of $\int_0^{\pi/2} \sqrt{\sin x}\, dx$, taking $n = 8$, correct to five significant figures.

(c) Solve the following equations by Gauss elimination method :

$$x + y + z = 9$$
$$2x - 3y + 4z = 13$$
$$3x + 4y + 5z = 40$$

3+4+3=10

3. (a) Prove that $\left(\frac{\Delta}{E}\right)x^2 = 2x - 1$, taking $h = 1$.

(Symbols have their usual meaning.)

(b) Find the inverse of the given matrix by Gauss-Jordan method :

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 2 & 3 & 1 \end{bmatrix}$$

(c) Evaluate $\int_0^4 e^{-x^2} dx$ by dividing the range of integration into 4 equal intervals using Simpson's $\frac{1}{3}$rd rule. 2+4+4=10

GROUP—B

(Computer Science)

(*Marks* : 20)

Answer *any* **two** questions

4. (a) Write a C program to print all prime numbers between 1 to 200.

(b) What is keyword? State two keywords in C.

(c) With the help of suitable example, explain the functioning of switch statement. 4+2+4=10

5. (a) Write a C program to print even numbers from 1 to 100.

(b) Differentiate between while and do-while loop structures.

(c) Write any four types of arithmetic operators used in C and give one example of each. 4+2+4=10

6. (a) How do you define constant and variable? Explain various types of constants in C.

(b) Write a C programme to find the largest among 10 numbers using array. 5+5=10

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TDP (General) 5th Semester Exam., 2016

MATHEMATICS

(General)

FIFTH PAPER

Full Marks : 40

Time : 2 hours

The figures in the margin indicate full marks for the questions

GROUP—A

(Numerical Analysis)

(*Marks* : 20)

Answer *any* **two** questions

Allowed to use scientific calculator

1. *(a)* Find the absolute error and relative error in x_A, when $x_T = \frac{1}{3}$, $x_A = 0 \cdot 333$.

(b) Deduce Newton's forward difference interpolation formula.

(c) Compute the integral

$$\int_0^1 \frac{dx}{1+x}$$

by Simpson's $\frac{1}{3}$rd rule and then use it to compute the value of $\log_e 2$. 2+4+4=10

2. (a) Prove that $E = 1 + \Delta$, where the symbols have their usual meanings.

(b) Evaluate $f(3 \cdot 8)$ using Newton's backward difference interpolation formula from the following data :

x :	0	1	2	3	4
$f(x)$:	1	1·5	2·2	3·1	4·3

(c) Find the positive root of $x^4 - x = 10$, correct to three decimal places, using Newton-Raphson method. 2+4+4=10

3. (a) Prove that $\Delta \cdot \nabla = \Delta - \nabla$.

(Symbols have their usual meanings.)

(b) Find a positive root of the equation $x^3 - 4x - 9 = 0$ using bisection method correct up to four significant figures.

(c) Using the Gauss-Jordan method, find the inverse of the matrix

$$\begin{pmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{pmatrix}$$

2+4+4=10

GROUP—B

(Computer Science)

(*Marks* : 20)

Answer *any two* questions

4. (a) Explain different data types variable in C in detail with example of each. 4

(b) Write a programme in C to arrange 10 integers in descending order using array. 6

5. (a) How do you declare a variable in C? What are token and header file in C? 2+1+1=4

(b) Write a C programme to read a year as an input and find whether it is leap year or not. 6

6. (a) (i) Explain different types of loop in C with syntax and example.

(ii) What is the function of 'break statement' in C? 3+2=5

(b) Write a C programme to check whether a given number is prime or not. 5

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