

467/Math

UG/3rd Sem/MATH-H-SEC-T-1A&B/23

**U.G. 3rd Semester Examination - 2023**

**MATHEMATICS**

**[HONOURS]**

**Skill Enhancement Course (SEC)**

**Course Code : MATH-H-SEC-T-1A&B**

Full Marks : 40

Time : 2 Hours

*The figures in the right-hand margin indicate marks.*

*Symbols and notations have their usual meanings.*

**Answer all the questions from the Selected Option.**

**OPTION-A**

**MATH-H-SEC-T-1A**

**(Programming in 'C')**

1. Answer any five questions: 2×5=10

- a) Distinguish between  $(*p)[5]$  and  $*p[5]$ .
- b) Explain the use of `scanf()` and `printf()` functions in a C program.
- c) What are the main Data Types present in C?
- d) How many times will the loop be executed?

```
int c=2345;
```

```
while(x>0)
```

```
{
```

```
  x=x/10;
```

```
}
```

*[Turn over]*

e) What are three main types of control statements in C?

i) What will be the output of the following C code?

```
include<stdio.h>
```

```
int main()
```

```
{
```

```
  a=10;
```

```
  printf("%d,%d,%d,%d\n", a++, ++a, a--, --a);
```

```
  printf("%d", a);
```

```
  return 0;
```

```
}
```

g) Write the syntax of if-else statement in C and draw the corresponding flow diagram.

h) Explain do-while loop in C with a suitable example.

2. Answer any two questions: 5×2=10

a) What are break and continue statements in C? Explain with a suitable example. 2+3

- b) Write the syntax of do-while statement in C. Write a C program to find factorial of a positive integer using do-while statement. 1+4
- c) Illustrate function prototype in C with a suitable example. Define a function in C to compute GCD of two positive integers. 3+2
- d) Write an Algorithm and draw the corresponding Flowchart to find all roots of a quadratic equation. 2+3
3. Answer any **two** questions: 10×2=20
- a) i) What is if-else-if ladder structure? Explain it by suitable example.
- ii) Write a C program to find the sum of the series  $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \dots + \frac{1}{51}$ .
- ii) What is function call-by-value? Write a C program to illustrate function call-by-value. 3+3+(1+3)

- b) i) Write a program in C to print the following outputs using for loops:

1

2 2

3 3 3

4 4 4 4

5 5 5 5 5

- ii) Write a C program that will read the value of  $x$  and evaluate  $f(x)$ , where

$$f(x) = \begin{cases} e^x - x, & x < 0 \\ \sin(x) + 1, & x \geq 0 \end{cases}$$

- iii) Determine the value of the logical expression  $a == c \mid b > a$ , for  $a = 5$ ,  $b = 10$ ,  $c = -6$ . 4+4+2

- c) i) Write the differences between Hardware and Software.

- ii) Write a C program to find the mean and variance of 10 given real numbers. .

- iii) Write a C program to check whether a number is prime or not. 2+(2+3)+3

- d) i) Write a C program to print the largest of three real numbers.
- ii) What do you mean by local and global variables in C? Explain with suitable example.
- iii) Write a C program to find whether a given year is leap year or not.  $3+(2+2)+3$

**OPTION-B**  
**MATH-H-SEC-T-1B**  
**(Python Programming)**

1. Answer any **five** questions:  $2 \times 5 = 10$
- a) Differentiate between system software and application software.
  - b) Define the Big-O notation used to express algorithmic complexity.
  - c) How many bits are there in 64 petabyte?
  - d) Convert  $(701574)_8$  into a base-4 number system.
  - e) Given a list numbers = [1, 2, 3, 4, 5], write Python code to extract a sublist containing the elements from index 1 to 3.
  - f) Why is indentation important in Python?
  - g) Define what it means for Python to be an interpreted language.
  - h) What is the difference between '=' and 'is' keyword in Python?
2. Answer any **two** questions:  $5 \times 2 = 10$
- a) Describe the characteristics of each computer generation emphasizing technological advancements and key features.

- b) Draw a flowchart to find the factorial of a given integer.
  - c) Explain the dictionary data structure in Python with a suitable example.
3. Answer any two questions:  $10 \times 2 = 20$
- a) Explain the concept of dynamic typing in Python, covering its advantages, drawbacks, and comparisons with static typing. Write a Python program to illustrate dynamic typing.  $5 + 5$
  - b) Write a Python program to find and print the sum of all prime numbers and the product of all non-prime numbers in an input list.
  - c) Write a program in Python that takes a sentence as input, removes vowels from the sentence, reverses the remaining characters, and prints the modified sentence.
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