

2 0 2 2

(CBCS)

(5th Semester)

PHYSICS

EIGHTH (B) PAPER

(C Language and Numerical Methods)

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

(SECTION : A—OBJECTIVE)

(Marks : 10)

Tick (✓) the correct answer in the brackets provided :

1×10=10

1. All keywords in C are in

(a) LowerCase letters ()

(b) UpperCase letters ()

(c) CamelCase letters ()

(d) All of the above ()

2. An identifier may contain

- (a) letters a–z, A–Z in basic character set. Unicode alphabet characters other languages ()
- (b) underscore_symbol ()
- (c) numbers 0 to 9 unicode numbers in other languages ()
- (d) All of the above ()

3. What is the default return-type of getchar()?

- (a) char ()
- (b) int ()
- (c) char* ()
- (d) reading character does not require a return-type ()

4. What will be the final value of x in the following C code?

```
#include <stdio.h>
void main()
{
    int x = 5 * 9 / 3 + 9;
}
```

- (a) 3.75 ()
- (b) Depends on compiler ()
- (c) 24 ()
- (d) 3 ()

5. What will be the output of the following C code?

```
#include <stdio.h>
void main()
{
    int x = 5;
    if (x < 1)
    printf("hello");
    if (x == 5)
    printf("hi");
    else
    printf("no");
}
```

- (a) hello ()
- (b) hi ()
- (c) no ()
- (d) hi! no! ()

6. What is an array in C language?

- (a) A group of elements of same data type ()
- (b) An array contains more than one element ()
- (c) Array elements are stored in memory in continuous or contiguous locations ()
- (d) All of the above ()

7. The round off value of 6488 cakes to the nearest 100 cakes is

- (a) 6400 cakes ()
- (b) 7000 cakes ()
- (c) 6500 cakes ()
- (d) 6600 cakes ()

8. Which of the following symbols is called backward difference operator?

(a) ∇ ()

(b) Δ ()

(c) ∇^2 ()

(d) Δ^2 ()

9. The truncation error in the Simpson's 1/3rd rule is of the order

(a) h^2 ()

(b) h^3 ()

(c) h^4 ()

(d) h^5 ()

10. $|E| = \frac{(b-a)h^4}{80} M$ is the error formula for

(a) Trapezoidal rule ()

(b) Simpson's 1/3rd rule ()

(c) Simpson's 3/8th rule ()

(d) All of the above ()

(SECTION : B—SHORT ANSWER)

(Marks : 15)

Answer the following :

3×5=15

UNIT—I

1. Write a C program to determine the perimeter of a circle.

OR

2. What are the basic data types associated with C?

UNIT—II

3. Rewrite the code below in the correct form :

```
#include <stdio.h>
int main()
{
    float num1 = 13.4;
    double num2 = 15.2;

    printf("number1 = %f\n");
    printf("number2 = %lf");
    return 0;
}
```

OR

4. What data types does the following format specifiers represent?

(a) %c (b) %d (c) %f (d) %lf (e) %Lf (f) %li

UNIT—III

5. What are the different types of loop statements in C?

OR

6. Write a C program loop to output the odd integer between 1 and 49.

UNIT—IV

7. Fit a curve of the form $y = ab^x$ to the data :

x	:	1	2	3	4	5	6
y	:	151	100	61	50	20	8

OR

8. A resistor labelled as 260 Ω is actually 265 Ω . What are the absolute and relative errors of the labelled value?

UNIT—V

9. Evaluate $\int_0^1 \frac{1}{x^2} dx$ using trapezoidal rule with $h = 0.2$.

OR

10. Evaluate $I = \int_0^6 \frac{1}{x^2} dx$ using Simpson's 1/3rd rule and verify your results by actual integration.

(SECTION : C—DESCRIPTIVE)

(Marks : 50)

Answer the following :

10×5=50

UNIT—I

1. (a) What is a C variable? Explain with two examples. 4
- (b) Write the following as C integer constants : 6
- (i) 3250
- (ii) 2 321 10⁴
- (iii) 4 34 10²
- (iv) 234 1

OR

2. (a) Write a C program to evaluate
- $$\begin{aligned} x &= 8t^2 - t^3 + 4 \\ y &= \sin t - \cos 2t \\ z &= e^{2t} + 5 \end{aligned}$$
- 5
- (b) Find the error in the following integer constants : 2
- (i) 10e5
- (ii) 8973.556
- (c) Determine which of the following is integer constants : 3
- (i) - 3,435
- (ii) 4.123
- (iii) + 1
- (iv) 0
- (v) - 1

UNIT—II

3. (a) Using formatted input and output commands, write a simple C program to enter three real numbers and then print the average of the three numbers. 5
- (b) What is a function? How many values can a C function return at a time? What will be the output of the code below after making necessary corrections? 5

```
#include <stdio.h>
int add(int, int);
int main()
{
int m=30, n=30,;
sum=add(m, n);
printf("Sum is %d");
}
int add(int a, int b)
{
return(a+b);
}
```

OR

4. (a) What are the equivalent functions of *getchar()* and *gets()* in C? What will be the equivalent *scanf* statement in the code below? 5

```
#include <stdio.h>
void main()
{
char c;
printf("\n Enter a character \n");
c = getchar();
printf("You have passed %c", c);
return 0;
}
```

- (b) What is function prototype? Explain with the help of an example. 5

UNIT—III

5. (a) Write a C program to compare if a number is greater or less than 50. 5
 (b) Write a C program to print numbers 1 to 100. 5

OR

6. (a) What are the four jump statements in C? Write a C program using the jump statement 'break'. 5
 (b) Explain 'continue' jump statements in C with an example. 5

UNIT—IV

7. (a) Using the method of least squares, fit a straight line to the data given below : 5

x	:	0	1	2	3	4
y	:	1	1.8	3.3	4.5	6.3

- (b) Determine the root of the equation, $f(x) = x^3 - x - 2$ between the interval [1, 2] by bisection method correct to three decimal places. 5

OR

8. (a) Using Lagrange's interpolation formula, find $y(10)$ from the following table : 5

x	:	5	6	9	11
y	:	12	13	14	16

- (b) From the data given below, find the number of students whose weight is between 60 and 70 using Newton's interpolation formula : 5

<i>Weight</i> (in lbs)	:	0-40	40-60	60-80	80-100	100-120
<i>No. of students</i>	:	250	120	100	70	50

UNIT—V

9. (a) Evaluate $\int_3^3 x^4 dx$ by using Trapezoidal rule and both Simpson's rule.

Verify your results by actual integration. 8

(b) What is the general rule for using Simpson's 1/3rd and 3/8th rule? 2

OR

10. Find the first three derivatives of the function at $x = 1.5$ from the table below : 10

x	:	1.5	2.0	2.5	3.0	3.5	4.0
y	:	3.375	7.0	13.625	24.0	38.875	59.0
