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( CBCS )

( 5th Semester )

**PHYSICS**

EIGHTH (B) PAPER

**( C Language and Numerical Methods )**

*Full Marks : 75*

*Time : 3 hours*

**( PART : A—OBJECTIVE )**

*( Marks : 25 )*

*The figures in the margin indicate full marks for the questions*

SECTION—A

*( Marks : 10 )*

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

1×10=10

1. Which among the following is not part of a C token?

- (a) Keyword ( )                      (b) Multiplier ( )  
(c) String ( )                          (d) Symbol ( )

2. Which of the following is not a valid C variable name?

- (a) int number; ( )                      (b) float rate; ( )  
(c) int variable\_count; ( )              (d) int \$main; ( )

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

```
#include <stdio.h>
int main ()
{
    float f1 = 0.1;
    if (f1 == 0.1)
        printf("equal\n");
    else
        printf("not equal\n");
}
```

- (a) Equal ( )
- (b) Not equal ( )
- (c) Output depends on the compiler ( )
- (d) None of the mentioned ( )

4. The value obtained in the function is given back to main by using \_\_\_\_\_ keyword.

- (a) return ( )
- (b) static ( )
- (c) new ( )
- (d) volatile ( )

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

```
#include <stdio.h>
int main ()
{
    while ()
        printf("In while loop");
    printf("After loop\n");
}
```

- (a) In while loop after loop ( )
- (b) After loop ( )
- (c) Compile time error ( )
- (d) Infinite loop ( )

6. A conversion specification %7.4f means

- (a) print a floating-point value of maximum 7 digits where 4 digits are allotted for the digits after the decimal point ( )
- (b) print a floating-point value of maximum 4 digits where 7 digits are allotted for the digits after the decimal point ( )
- (c) print a floating-point value of maximum 7 digits ( )
- (d) print a floating-point value of minimum 7 digits where 4 digits are allotted for the digits after the decimal point ( )

7. Which is not appropriate for the use of least squares fitting?

- (a) A second-degree curve ( )
- (b) Exponential curve  $y = ae^{bx}$  ( )
- (c) A circular curve ( )
- (d) A straight line ( )

8.  $r_{i+1} = r_i - \frac{f(r_i)}{f'(r_i)}$ ,  $r = 0, 1, 2$ . This is the iterative formula of

- (a) Lagrange interpolation ( )
- (b) Newton-Raphson method ( )
- (c) bisection method ( )
- (d) Taylor series ( )

9. Errors may occur in performing numerical computation on the computer due to

- (a) rounding errors ( )
- (b) power fluctuation ( )
- (c) operator fatigue ( )
- (d) All of the above ( )

10. The two-segment trapezoidal rule of integration is exact for integrating at most \_\_\_\_\_-order polynomials.

- (a) first ( )
- (b) second ( )
- (c) third ( )
- (d) fourth ( )

SECTION—B

( Marks : 15 )

Answer the following questions :

3×5=15

1. What is a pointer? Explain how it is declared with an example.

**OR**

2. Why are the following unacceptable as C real constants?

- (a) 2375
- (b) 1A3·4B
- (c) -1,23·45
- (d) 36E25
- (e) 15·6665E6
- (f) 1·567·34

3. Write a C program to determine the area of a triangle.

**OR**

4. Identify the error, if any, in the following statements :

- (a) 

```
for (i=-1; i<=100; i++)
{
.....
i=1;
.....
.....
}
i=1;
```
- (b) 

```
sum=0;
i=1;
while (i<=100)
{
scanf ("%d", &a);
sum+=a;
}
```

5. Write a C program to print odd numbers between 1 to 100 using for loop.

**OR**

6. Express the following as floating-point constants (in decimal and exponential forms) :

(a)  $\frac{1}{2}$

(b) 17

(c)  $2\frac{1}{4}$

(d) 0.165

(e) 1

7. Evaluate a real root of  $4 \sin x - e^x$  between 0 and 0.5.

**OR**

8. Solve  $e^x - 3x = 0$  by the method of iteration.

9. Using Newton-Raphson method, find a root correct to three decimal places of the equation  $x^3 - 3x - 5 = 0$ .

**OR**

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

**( PART : B—DESCRIPTIVE )**

( Marks : 50 )

*The figures in the margin indicate full marks for the questions*

1. (a) What are operators in C programming? What are the different types of operator? Write a short C program using some arithmetic operators. 7
- (b) What are constants in C? How are they generally classified? 3

**OR**

2. (a) What are arithmetic, relational and assignment operators? Explain with examples. What will be the output of the following C program? 6

```
#include <stdio.h>
main ()
{
int a = 21;
int c;
c=a;
printf("Line 1 = Operator Example, Value of c = %d\n", c);
c+=a;
printf("Line 2 += Operator Example, Value of c = %d\n", c);
c-=a;
printf("Line 3 -= Operator Example, Value of c = %d\n", c);
}
```

- (b) What are the variables in C? What are the various types of variable? Write the general format for variable type declaration with examples. 4

3. (a) What are the general functions of *getchar( )* and *gets( )*? In the C program below, what will be the equivalent *scanf* statement? 4

```
#include <stdio.h>
main ()
{
char c;
printf("\n Type an alphabet");
c=getchar();
printf("\n The given alphabet is *c", c);
return 0;
}
```

(b) What is a function prototype? Explain how it works with the help of an example. 6

**OR**

4. (a) Write a C program to read a single character using *getchar()* and print it. 4

(b) Write a C program for bubble sort to sort numbers or arrange them in ascending order. 6

5. (a) Write a C program to find the average of 20 numbers using FOR loop structure. 6

(b) Using Nested if else statement, write a program for finding the largest of three variables *x*, *y* and *z*. 4

**OR**

6. (a) Write a simple C program to enter one integer and two real numbers and then print the entered three numbers in different lines. 6

(b) What will be the output of the following program? 4

```
#include <stdio.h>

int main ( )
{
int a=10;
do
{
printf("value of a : %d\n", a);
a=a+1;
} while(a<20);
return 0;
}
```

7. (a) Using the method of least squares, find a fit to a second-degree parabola to the data : 6

$x$ :	1929	1930	1931	1932	1933	1934	1935
$y$ :	352	356	357	358	360	361	361

- (b) Find the positive root of  $x \cos x = 0$  by bisection method. 4

**OR**

8. (a) Explain Lagrange's interpolation formula for unequal intervals. 7

- (b) Find the parabola of the form  $y = ax^2 + bx + c$  passing through the points (0, 0), (1, 1) and (2, 20). 3

9. (a) Compute the value of  $\int_1^2 \frac{dx}{x}$  using Simpson's rule, taking  $h = 0.25$ . 4

- (b) Find the first two derivatives of  $(x)^{1/3}$  at  $x = 50$  and  $x = 56$  given in the table below : 6

$x$ :	50	51	52	53	54	55	56
$y = x^{1/3}$ :	3.6840	3.7084	3.7325	3.7563	3.7798	3.8030	3.8259

**OR**

10. Derive the trapezoidal rule formula. Evaluate  $\int_0^6 \frac{dx}{1+x^2}$  by using trapezoidal rule. 10

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