

OPTION-C

Paper : MAT-HE-5066

(**Programming in C**)

Full Marks : 60

Time : Three hours

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

1. Answer **any seven** questions : $1 \times 7 = 7$
- (a) Write the output of *a*:
`int a;`
`a=5/2;`
 - (b) Write one arithmetic and one logical operator in C.
 - (c) What is a global variable?
 - (d) Name the header file that is used to compile the function '`sqrt(x)`'.
 - (e) Which of the following can be used as a variable : `x1`, `x_1`, `x%1` ?

- (f) Write *two* reserved words used in C language.
- (g) Convert the following mathematical expression into a C expression :

$$z = \frac{5x+6}{3x^2+2} - \frac{\sin x^2}{\sqrt{x}}$$

- (h) State whether True **or** False :
C-language is case-sensitive.
 - (i) Write *any two* built-in functions used in C-language.
 - (j) For $x=5$, $y=2$, write the output of `x%y`.
 - (k) Write the utility of `getch()` function.
 - (l) Define a *two-dimensional* array.
2. Answer **any four** questions : $2 \times 4 = 8$
- (a) What is the difference between C character and C string?

(b) Write four different C statements each adding 1 to integer variable x .

(c) Name any four functions available in 'stdio.h'.

(d) Write a C program that will input a character and give output, the same.

(e) `int a, b, temp;`

`a = 5;`

`b = 3;`

`temp = a;`

`a = b;`

`b = temp;`

Write the output of 'a' and 'b'.

(f) Write the general syntax of `scanf()` function to read the integer variable a .

(g) Write the syntax of 'nested if' statement in C language.

(h) Write the output of the following:

`c = 0`

for (`i = 1; i ≤ 5; i++`)

`c = c + i;`

3. Answer any three parts: $5 \times 3 = 15$

(a) Write a C program to calculate the commission for a sales representative as per the sales amount given below:

if sales ≤ 500 , commission is 5% of sales

if sales > 500 but ≤ 2000 , commission is Rs. 35 plus 10% above Rs. 500 of sales

if sales > 2000 but ≤ 5000 , commission is Rs. 185 plus 12% above Rs. 2000 of sales

if sales > 5000 , commission is 12.5% of sales

(b) Write a C program to find the average of best three marks from the given four test marks.

(c) Give a general syntax of 'switch' statement in C.

Write the outputs of a and b of the following:

(i) $a = 5;$ (ii) $a = 5;$ (iii) $a = 5;$

$b = 7;$ $b = 7;$ $b = 7;$

$\text{if } (a > b) \quad \text{if } (a > b) \quad \text{if } (a > b \parallel a < b)$

$\{a = a + 1; \quad a = a + 1; \quad a = a + 1; .$

$b = b + 1\}; \quad b = b + 1$

(d) Write a C program to print integers from 1 to n omitting those integers which are divisible by 7.

(e) Write a C program to generate the Fibonacci series up to n terms.

(f) Write a C program to find the sum of squares of all integers between 1 and n .

(g) Write a C program to print the $n \times n$ zero matrix.

(h) Write a C program to add 1 to each element of a 3×3 matrix.

4. Answer **any three** parts: 10×3=30

(a) Write the differences between 'while loop' and 'do-while' loop using examples. Write a C program to check whether the given number is an Armstrong number. (An Armstrong number is one that is equal to the sum of cubes of individual digits. For ex. $153 = 1^3 + 5^3 + 3^3$ $5+5=10$)

(b) Develop a C program to compute the value of π from the series

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} \dots$$

Write a C program to convert a binary number into a decimal number.

$$5+5=10$$

(c) Write a C program for each of the following: 5+5=10

(i) to find the mean and standard deviation of any n values.

(ii) to add two matrices of order $m \times n$.

- (d) Write a C program to compute the value of e^x using the series

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$$

For this build two functions—one to find the factorial and the other to compute x^n , for a given n .

- (e) Write a C program to find the LCM of two numbers a and b , where b is the sum of the digits of a . Use two functions—one is to find LCM and the other is to find the sum of the digits.

$$(gcd.lcm=a.b)$$

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- (f) Write the syntax of 'nested for' loop and show with a suitable C program. What are the differences between 'break' statement and 'exit()' function. Write a C program using 'break' statement, and write the outputs. Also write the outputs of the same program if the 'break' statement is replaced by 'exit()' function.

$$1+4+2+3=10$$

- (g) What is meant by recursive function? What is its use? Demonstrate the use of recursive function by a suitable C program.

$$2+2+6=10$$

- (h) What are the uses of 'continue' and 'goto' statements in a C program? Explain each with a suitable C program segment.

$$5+5=10$$