Department of Computer Science. Islamiah College (Autonomous).

Question Bank

Programming in C

for

I B.Sc.,/B.C.A./ B.Sc., (SW) First Year – Second Semester For the candidates admitted from 2018 onwards

(248 Questions)

Unit	Part-A	Part-B	Part-C
I	26	07	09
II	06	23	07
III	15	28	11
IV	41	18	14
V	15	13	15
Total Questions	103	89	56

Unit I Part A (2 Marks)

- What would be the value of x after executing the following?
 a. int x,y=10;char z='a';x=y+z;
- 2. Why and when do we use *#define* directive?
- 3. What are the qualifiers that an *int* can have?
- 4. Find the value of the expression if a=5,b=10,c=-6, (b>15 && $c<0 \parallel a>0)$
- 5. Write a statement to print the size of various data types in c.
- 6. Give any four features of C language?
- 7. What are the different data types in 'C'?
- 8. Define (i) variables (ii) constants.
- 9. What are the types of numeric constants?
- 10. What is ternary and comma operator?
- 11. Give the difference between '=' and '==' operator?
- 12. Write C assignment statement for the following:

a.
$$A = \pi r^2$$

b.
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- 13. What are postfix and prefix operations?
- 14. Write c code to read an integer and print whether it is even or odd.
- 15. What is a *local* and *global* variable?
- 16. What is mean by associativity?
- 17. What is the use of enumeration?
- 18. What are compound statements?
- 19. Write a simple code that will check if a number is positive or negative.
- 20. Explain the difference between bitwise AND and logical AND operators with the help of examples.
- 21. What is the value of the 'C' expression: 9 9 / 5 * 5 % 3 > 9 % 5 % 3?
- 22. Which of the following expressions are valid? Give reasons.

(i) +a +b (ii) a++-b (iii) a % 10 / b (iv) a++++b

- 23. Evaluate the expression: 1 && (30 % 10>= 0) && (30 % 10<=3)
- 24. What data types would you use to represent the following items: number of children at school, a letter grade on an exam, the average number of school days a child absent each year?
- 25. What is the difference between the post increment and pre increment operators? What is the output of the following if k=5, i=++k, j=k++, k++, ++k;
- 26. Evaluate the expressions given below if a=10, b=20:

(i) ++a+b-- /2.5 (ii) a/b + (a /(2 * b)) (iii) a % 6 / b%3

Unit I Part B (5 Marks)

- 1. Explain *enum* user define type with example.
- 2. How many bytes are required to store *integer*, *float*, *char and double* type values?
- 3. List relational, logical and bitwise operators in C?
- 4. How static variable is defined and initialized?
- 5. Write a program in C to print 15 terms of 1, 2, 4, 7, 11, 16,
- 6. What are C keywords, identifiers and literals? Explain with example.

- 7. Determine the value of the following 'C' expressions:
 - i. inti, j, k; i = j = k = 1; i = -j - k; printf("%d", i);
 - ii. int x = 5, z; float y; z = x + +; y = + + x; printf("%d %d ", x, y, z);
 - iii. int x = 5, x ? y = 0 : y = 1; printf("%d", y);

Unit I Part C (10 Marks)

- 1. What are the various operators available in C? Discuss each one of them with suitable illustration.
- 2. List at least ten mathematical functions and its purpose.
- 3. Write a short note on precedence and order of evolution of expressions.
- 4. Write a C program to find out sum of the following series $1! + 2! + 3! + \dots + n!$
- 5. Write a C program that takes from user an arithmetic operator ('+', '-', '*' or '/') and two operands. Perform the corresponding arithmetic operation on the operands using *switch* statement.
- 6. Write a program to illustrate the use of *typedef* declaration in a program.
- 7. What are enumerated constant? Explain using example.
- 8. Describe the purpose of the qualifiers *const* and volatile.
- 9. What is type casting? Explain it with suitable example.

Unit II Part A (2 Marks)

- 1. State whether the following are True or False
 - a) A switch expression can be of any type.
 - b) The default case is required in the switch statement.
- 2. What is the output of the following:

for(m=1; m<=10; ++m)

printf("\n%d",(m%2)?m:m*2);

- 3. Define logical and syntax errors with example
- 4. What is the use of gets() and puts()?
- 5. What are the values of control variables and number of the iterations in the following for loops? (i) for(x=1.0 ; x>=0.5; x - = 0.1) (ii) for(ch= 'A' ; ch != 'F' ; ++ch)
- 6. Write the equivalent while loop for the following for loop: for(ch = 'a'; ch<= 'z'; ++ch) putchar(ch);

Unit II Part B (5 Marks)

- 1. Write a *while* loop to print the square root and square of numbers from 0 to 100 in steps of 10.
- 2. Give difference between *while* and *dowhile* loops?
- 3. Give the comparison between *switch case* statement and nested *if* statement.
- 4. Write a C program to find sum of even number up to given n.
- 5. Write a C program to find sum of series $7 + 14 + 21 + \dots + n$
- 6. Explain the *switch* statement with syntax and example.
- 7. List the various printf()format codes in C with example.
- 8. Give the difference between break and continue statements.
- 9. List five escape sequence characters with its purpose and example.
- 10. Write a program to solve a quadratic equation.
- 11. Given an integer number, write a program that displays the number as follows:First line:all digits, Second line:all except first digit, Third line:all except first two digitsLast line: last digit.
- 12. Write a program to read two integers m and n and print whether m is multiple of n.
- 13. Write a program to find the number of and sum of all integers between 100 to 200 that are divisible by 7.
- 14. Write a program to the Floyd's triangle

10

T		
2	3	
4	5	6
7	8	9

15. What would be the output of the following?

1. for(n=1; n!=10; n+=2)

sum=sum+n;

2. count=5;

while (count-- > 0) printf(count);

16. Write *for* statement to print the following sequence:

(i) 1, 3, 9, 27, 81, 243 (ii) -10, -12, -14, -18, -26, -42

17. Change the *for* loop to *while* loop and *do* loop.

for(m=1; m<10; ++m)
printf(m)</pre>

- 18. Given a number. Write a program using *while* loop to reverse the digits of the number.
- 19. Write a program to print the following using *for* loop.

- 20. Write program to print all integers between 1 and 100 that are not divisible by either 2 or 3.
- 21. Write a program in C to print 15 terms of 1, 2, 4, 7, 11, 16,
- 22. If *break* was not given in the switch statement, what happens? Explain with example.
- 23. Write a for loop to calculate the sum of squares of differences of consecutive numbers entered from the keyboard, e.g., for numbers 1, 4, 5 and 3, the program should calculate $(4 1)^2 + (5 4)^2 + (3 5)^2$

Unit II Part C (10 Marks)

- 1. Write a short note on branching statements in C.
- 2. Write a program to read three values and print (i) sum (ii) average (iii) largest (iv)smallest
- 3. Write a program to read three values and print the largest value using (i) nested if (ii) macro
- 4. Write a program to print from 1 to 10 using (i) while (ii) do while (iii) for (iv) goto (v) if
- 5. Write a C language program to check a given number is an Armstrong number.
- 6. Write a C language program to check a given number is a Prime number.
- 7. Write a program using *do while* loop to print first n Fibonacci numbers.

Unit III Part A (2 Marks)

- 1. State three advantages of function?
- 2. What is the purpose of $\langle 0 \rangle$ in strings?
- 3. What is subscript in array? What is the use of it?
- 4. Display the string using printf : *I've "Silver"*.
- 5. What's difference between *char* s[] and *char* *s in C?
- 6. What would be the values of following expression if a=5

a. (i)
$$a + = (a++)+(++a)$$
 (ii) $a = (--a)-(a--)$

- 7. What is the output:
 - a. int i=15;
 - b. printf("%d, %d, %d, %d, %d), i<=15, !i!=0, i>10, i+!i&&5,i+(!i&&5));
- 8. Write program to initialize and print identity matrix of size 4.
- 9. Write a program which would print alphabet a to z and A to Z in decimal and character form.
- 10. Write a program which reads a single letter of alphabet. If it is a lowercase between 'a' and 'g', the program prints out the alphabet in uppercase form. If it is anything else, the program should print 'X'.
- 11. What do you mean by call by value, call by reference?
- 12. What is the output of the following fragment of 'C' code? static int a[3][2][4] = { {2, 1, 4, 7, 2, 5, 8, 9}, {8, 6, 4, 4, 2, 5, 3, 5}, {2, 4, 5, 6, 1, 9, 8, 7}}; printf("%d", a[2][1][0]);
- 13. Which function is used to calculate square root of X in 'C'from Math.h Library? Give syntax.
- 14. 'Function can return multiple values'. Comment.
- 15. What is the output of the following Code?
 - a. sum=0;
 - b. for(i=1;i<2;i++)
 - c. for(j=10;j<3;j++)
 - d. for(k=0;k<4;k++)
 - e. sum += i+j+k;
 - f. printf("%d ",sum);

Unit III Part B (5 Marks)

- 1. Write a program in C to read a string and count number of vowels in it.
- 2. Describe the two ways of passing arguments to functions.
- 3. What is function, built in function, recursive function?
- 4. Write a C language program to read one matrix and find the sum of its diagonal elements.
- 5. Write a program to find given string is palindrome or not.
- 6. Write a recursive function for finding the factorial value of a given number.
- 7. Explain about the actual arguments and formal argument in functions.
- 8. Differentiate between built-in functions and user-defined functions.
- 9. Define array. Give syntax to declare and print one dimensional, two dimensional arrays.
- 10. Write a C program to accept an integer number and print the digits using words (for example 356 is printed as Three Five Six)
- 11. How to pass array to User defined function. Give proper example.
- 12. Explain any five string manipulation library functions with examples.

- 13. Write a program to read a matrix of size $m \ge n$ and print its transpose.
- 14. Write a function prime that returns 1 if its argument is a prime number and 0 otherwise.
- 15. Write a function to find the largest element of $am \ge n$ matrix.
- 16. Write statement to do the following:
 - a. Declare a 26-element character array named f.
 - b. Declare a character ch.
 - c. Read a character into the first element of f.
 - d. Copy that character into every other element of f.
 - e. Change the 7th element of f to the character 'x'.
- 17. Write statement that performs the indicated task.
 - a. Declare and initialize letter to be a character variable with the value 'B'.
 - b. Declare and initialize ch to be a character variable with the value 'y'.
 - c. Declare ptr to be a pointer to objects of type char.
 - d. Assign the address of ch to the variable ptr.
 - e. Assign the address of letter to the variable ptr.
 - f. Change the value of the object pointed to by ptr to 'd'
- 18. Write a function that calculates the sum $2 + 4 + 7 + 11 + 16 + 22 + \cdots + 121$ and prints out the result.
- 19. The recursive C function intsum3(int n) returns the sum $1^3 + 2^3 + \cdots + n^3$. Complete the details of the above function.
- 20. Write down the output of the following program. Explain your answers pictorially or otherwise.
 - a. #include <stdio.h>
 - b. int main()
 - c. { int a[3][4],i,j;
 - i. for(i=0;i<3;i++)
 - ii. for(j=0;j<4;j++)
 - iii. a[i][j]=i+2*j;
 - iv. printf("%d %d %d \n",*a[2]+2,*(a[2]+2),*(a[1]+6));
 - v. printf("%d %d %d \n",*(*a+3),**(a+3),*(&a[1][3]+5));
 - d. }
- 21. State and explain various types of standard function with example.
- 22. State and explain different phases used in user defined function.
- 23. Explain function with return and function with arguments with example.
- 24. Explain void and parameter less functions in C with examples.
- 25. Show how many comparisons occur in bubble sort for the following numbers: {15,8,42,51,11,16,74,71}.
- 26. List out the steps involved in insertion sort with your own example.
- 27. Show the contents of the array after fourth iteration of insertion sort {43,7,10,23,18,4}
- 28. Write a program to find the length of a given string.

Unit III Part C (10 Marks)

- 1. Develop a program to implement binary search.
- 2. Write a C language program to read two matrices and multiply them.
- 3. Write a program that uses a function to sort an array of integers.
- 4. Write function which returns true if at least any two arguments are, same and returns false if all three arguments are different.
- 5. Write a C function using recursion to print numbers from 0 to *n*.
- 6. Write a function which accepts n as argument and returns the sum of the series $1*2 + 2*3 + 3*4 + 4*5 + \cdots + (n-1)*n$
- 7. Write a C program that:
 - i. Implements string copy operation STRCOPY (str1,str2) that copies a string str1to another string str2 without using library function.
 - ii. Reads a sentence and prints frequency of each of the vowels and total count of consonants.
- 8. What is a character array? Explain the various string handling functions.
- 9. Explain in detail about function prototypes with suitable example.
- 10. Write a single Recursive C function to generate the nth Fibonacci number Fib(n) (n being a +ve non zero integer). You cannot use any array, global variables and/or additional parameters/functions. Trace out the Call & Return sequences along with return values clearly by a schematic diagram when your function Fib(n) is invoked from main() with n = 6. Also mention the TOTAL no. of times any Fib(n) is called for each value of n for invoking Fib(6) from main(), e.g. Fib(2) is called a total of 4 times etc.
- 11. Define 2 dimensional array a (3,3), b(3,3),sum(3,3) ,diff(3,3),mult(3,3). Store 9 arbitrary numbers in a(3,3) and 9 arbitrary numbers in b(3,3). Do the following:
 - a) Calculate sum of a(3,3) and b(3,3) and store in sum(3,3) where sum(i,j)=a(i,j)+b(i,j)
 - b) Calculate difference of a(3,3) and b(3,3) and store in diff(3,3) where diff(i,j)=a(i,j)-b(i,j)
 - c) Calculate product of two arrays a(3,3) and b(3,3) and store in mult(3,3) where mult(i,j)= summation of a(i,k)*b(k,j) over k where k=1 to 3. Print the result in a tabular form.

Unit IV Part A (2 Marks)

- 1. What is a pointer and a structure?
- 2. What happens in each of the following statement?
 - int x, *p, y; x = 10; p = & x; y = *p; *p = 20;
- 3. What are command line arguments?
- 4. What are the advantages of command line arguments?
- 5. Write three ways to access members of structure variables with examples.
- 6. What is the use of period (.) operator?
- 7. How to increment the value of a variable using pointer? Give example.
- 8. What is NULL pointer? Is it same as an uninitialized pointer?
- 9. What is a conditional compilation? How does it help?
- 10. Define bit-fields in structures.
- 11. How to declare structure? Write uses of structure.
- 12. What is indirection operator and what is its role in pointers?
- 13. Why addition and multiplication of two addresses is not possible in pointers.
- 14. What is the output of the following fragment of 'C' code?
 - int a[] = {10, 20, 30, 40, 50}, *p; p = a + 3; printf("%d", p[-2]);
- 15. What is the output of the following 'C' program?
 - void main() { struct { a : 5; b : 1; c : 15; }a; printf("%d", sizeof(a)); }
- 16. Write a program to swap two numbers using copy by address.
- 17. Write a program to print command line arguments on the screen.
- 18. Can we read from a file and write to the same file without resetting the file pointer? Justify.
- 19. What is the significant of EOF?
- 20. Which mode is used for opening a file for updating?
- 21. Which function is used to position a file at the beginning?
- 22. Which function gives the current position in the file?
- 23. Which function is used to write the data to randomly accessed file?
- 24. Why it is necessary to close a file during execution of the program?
- 25. Write different modes in file handling.
- 26. What are the basic file operations?
- 27. What argc and argv stand for in command line arguments?
- 28. What is a stream?
- 29. What are standard streams?
- 30. What is memory leak in C?
- 31. What is file pointer?
- 32. What is the difference between printf() and puts() ?
- 33. What is a volatile variable?
- 34. What is a generic pointer?
- 35. What is a binary file?
- 36. What is errno() in C?
- 37. Give difference between * and ** operators with example.
- 38. What is pointer? How a pointer is initialized?

- 39. What is array of pointer? How it is initialized?
- 40. What is main difference between structure and union?
- 41. Give the syntax for opening file, closing file

Unit IV Part B (5 Marks)

- 1. Explain * operator and & operator with example.
- 2. Consider following declaration and Give the values of following expressions: int x = 10, y = 10;

int *p1 = &x, *p2 = &y;

i. (*p1) ++ ii. - (*p2) iii. *p1 + (*p2) iv. + (*p2) - *p1

- 3. Explain self-referential structures.
- 4. List any four advantages of using pointers in C.
- 5. Write a function using pointers to exchange the values stored in two locations in the memory.
- 6. Write a C program to find the area of a circle with radius passed as command line parameter.
- 7. Write a C program to find the sum of given n numbers given as command line arguments.
- 8. Write a C program to find the largest of n numbers given as command line arguments.
- 9. Write symbolic constants for the binary arithmetic operators +, -, *, and /. Write a program to illustrate the use of these symbolic constants.
- 10. Discuss about character pointers and functions with examples.
- 11. What are the advantages of union over structures? Explain both with examples.
- 12. Explain the passing of structure as arguments with suitable 'C' program
- 13. Write the procedure for swapping two strings using pointers.
- 14. What is the difference between a sequential file and a random file?
- 15. What are the difference among getch(),getche(),getchar()?
- 16. What operations that can be performed on binary files? Explain.
- 17. What is a file pointer? Explain the steps for sequential file operations.
- 18. Explain the difference between the Standard I/O and formatted I/O with suitable examples.

Unit IV Part C (10 Marks)

- 1. Explain in detail (i) pointer to structure (ii) pointer to function.
- 2. How to pass structure variable to functions? Explain with example.
- Represent a complex number using a structure in C. Write a program that uses functions to perform

 (i) Addition (ii) Subtraction of two complex numbers
- 4. Write a C program to access the values of an array of elements using pointer
- 5. Explain array of structure.
- 6. Explain structure inside structure with example.
- 7. Give the difference between an array of pointers and a pointer to an array?
- 8. Write a program to illustrate the use of pointers in arithmetic operations.
- 9. Define a structure called time containing three members hour, minute and second. Develop a program to read and print the time.
- 10. Create two structures metric and british which stores values of distances. The metric structure stores in meters and centimeters. The british structure stores in feet and inches. Write a program that adds one variable of metric to another variable of british and display the result.
- 11. Write a C language program to display the content of file using command line argument.

- 12. Write a C language program to copy the contents of one file to another file.
- 13. Explain the following functions in files:
 - a. fseek() (ii) ftell() (iii) rewind() (iv) fopen() (v) fclose() (vi) feof()
- 14. Discuss the different methods of error handling in C.

Unit V Part A (2 Marks)

- 1. Given two variables *a* and *b*. Exchange their values.
- 2. Given two integer variables *a* and *b*, exchange their values without using a third temporary variable.
- 3. Design an algorithm that makes the following exchanges: $\overset{a \to b \to c}{\longrightarrow}$
- 4. Design an algorithm that makes the following exchanges:
 5. Given a set of n student?
- 5. Given a set of n students' examination marks (0-100). Count the number of students that passed the examination (40 and above).
- 6. Design an algorithm that reads a list of numbers and count number of negatives and number of nonnegatives in that list.
- 7. Given a set of n numbers, design an algorithm that adds these numbers and returns the resultant sum.
- 8. Design an algorithm to compute the average of n numbers.
- 9. Input a 4-digit integer and check if it's divisible by 2,3,4 and 12.
- 10. Design an algorithm to sum the digits in an integer.
- 11. Write the ASCII code for characters 0,9, a, z, A, Z.
- 12. Compute the maximum value from an array of n integers.
- 13. Write pseudo code to print all multiples of 5 between 1 and 100
- 14. Consider a recursive 'C ' function to compute n Fibonacci numbers of the following. How many times f is called (including the first call) for an evaluation of f (7)?

$$f(n) = \begin{cases} 1, & \text{if } n = 0\\ 1, & \text{if } n = 1\\ f(n-1) + f(n-2) \end{cases}$$

15. What is algorithm? Write an algorithm for the finding the given number is Armstrong or not?

Unit V Part B (5 Marks)

- 1. Develop an algorithm to compute the sums for the first *n* terms of the series S=1+2+3+...
- 2. Develop an algorithm to compute the sums for the first *n* terms of the series S=1+3+5+...
- 3. Develop an algorithm to compute the sums for the first *n* terms of the series S=1+1/2+1/3+...
- 4. Develop an algorithm to the sum of first *n* terms of the series S=1-3+5-7+9-11+...
- 5. Generate the first *n* terms of the series 1 2 4 8 16 32 without using multiplication.
- 6. Develop an algorithm that prints out n values of the sequence 1 -1 1 -1 1 -1
- 7. Write an algorithm to find the sum of the square series: $1^2+2^2+3^2+4^2+..n^2$
- 8. Write pseudo code that will count all the even numbers up to *n*.
- 9. Design an algorithm to compute the sum of squares of n numbers. $s = \sum_{i=1}^{n} (a_i)^2$
- 10. Design an algorithm that counts the number of digits in an integer.
- 11. Given a number, compute *n* factorial.
- 12. Design an algorithm that reads in a set of n single digits and converts them into a single decimal integer. For example, convert 2,7,4 to 274.
- 13. Compute Greatest Common Divisor (GCD) of 2 numbers by Euclid's method.

Unit V Part C (10 Marks)

- 1. Write pseudo code to compute the series $sin(x) = x \frac{x^3}{3!} + \frac{x^5}{5!} \frac{x^7}{7!} + \dots$
- 2. Design an algorithm to evaluate the function $\cos(x)$ as defined by the infinite series expansion $\cos(x) = 1 \frac{x^2}{2!} + \frac{x^4}{4!} \frac{x^6}{6!} + \cdots$. The acceptable error for the computation is 10^{-6} .
- 3. Given a number *m*, develop an algorithm to compute its square root.
- 4. Given an integer *n*, devise an algorithm to find its smallest exact divisor other than one.
- 5. Write algorithm to convert a decimal integer to its corresponding octal representation.
- 6. Write algorithm to convert a decimal integer to its corresponding binary representation.
- 7. Design an algorithm that converts binary numbers to octal.
- 8. Design an algorithm to convert binary numbers to decimal.
- 9. For a given x and n, design an algorithm to compute $x^n/n!$
- 10. Design an algorithm to determine whether or not a number n is a factorial number.
- 11. Design an algorithm to evaluate ${}^{n}C_{r} = \frac{n!}{r!(n-r)!}$
- 12. Design an algorithm to produce a list of all exact divisors of a given integer n.
- 13. For the integers in the range 1 to 100, find the number that has the most divisors.
- 14. A perfect number is one whose divisors add up to the number. Design and implement an algorithm to print all perfect numbers between 1 and 500.

$$H = \frac{n}{\sum_{i=1}^{n} (1/a_i)}$$

15. The harmonic mean defined by $\sum_{i=1}^{n} (1/a_i)$ Develop an algorithm to compute the harmonic mean of *n* data values.