National Institute of Technology, Delhi
Name of the Examination: End-Semester Examination
(Autumn Semester 2023)

Branch: CSE (B.Tech) | **Semester: I**
Title of the Course: Problem solving and computer programming | **Course Code: CSBB 101**
Time: 3 hours | **Maximum Marks: 50**

This Question paper consists of total 6 questions and 2 pages.
Attempt all the questions and be brief while writing the answers.

Q. No	Questions	Marks	CO	BL
1 (a)	If an array is declared as arr[]={1,2,3,4,5}; then what is the value of size of (arr[3])?	1	CO1	L2
1 (b)	Define a *multiline macro with argument* to print whether the given number is even or odd.	2	CO2	L2
1 (c)	Differentiate between *Function* and *Macro with argument(s)* with justification.	2	CO2	L2

1 (d)	A program is given below to print the factorial of all positive numbers except even numbers. The program is jumbled i.e. lines are not in proper order. Arrange the lines in proper order to correct this program. Draw the flow chart of your corrected program.
	1 printf("%d ",Result);
	2 Result *= j;
	3 Result = 1;
	4 for(j = 1;j <= i; ++j)
	5 continue;
	6 scanf("%d",&N);
	7 }
	8 void main( ) {
	9 }
	10 if(N > 0) {
	11 #include<stdio.h>
	12 while(++i <= N) {
	13 int i=0 , j, Result, N;
	14 }
	15 if(i % 2 == 0)
	16 printf("Enter a Number: ");
	17 // This program print factorial of all positive numbers except even no.
		4	CO1	L3

2 (a)	Following are the definitions of two structure types struct type1 and struct type2 struct type 1 {long a; int b; char c; } struct type 2 {long a; int b; char c; } (i) Both the types have the same members but listed in a different order. Would the sizeof operator return the size of both the types to be same? Give explanation in support of your answer. (ii) What will be the size returned by sizeof operator if struct is replaced with union?(Taking long of 4 bytes, int of 2 bytes and char of 1 byte?	3+2	CO3	L3
2 (b)	List the similarities between the following. (i) Auto variable and register variable (ii) A pointer to a pointer and pointer to an array (iii) Global and Static variable	3	CO2	L2

3 (a)	Write a C program to maintain a record of n students using an array of structures with four fields Roll No, Name, Grade and a structure dob that has date, month and year fields. Take the input from the user and display the details.	4	CO3	L4
3 (b)	Write a C program to read name and marks of n number of students from the user and store them in a file "sturec.txt". Then read the file and display the details of the student having maximum marks.	4	CO3	L4
3 (c)	Consider a 10x5 two dimensional array *Marks* which has base address=2000 and the number of words per location of the array=2. Now, compute the address of the element – *Marks*[8, 5].	2	CO4	L1
3 (d)	Calculate decimal equivalent of Octal Number: $(12570)_8$	2	CO2	L2
4 (a)	Given the declaration statement, int array[4] [4],i=3,j=2 ; What is the meaning of the following expressions? Expression / Meaning array *array array[i] **array array[i] [j] *(array+j)	3	CO4	L3
4 (b)	Compare NULL pointer and void Pointer with example code segment.	2	CO4	L2
4 (c)	List the *Logical* and *Bitwise* operators available in C, also specify their use. Briefly describe the use of *Associativity* when evaluating an expression.	4	CO1	L1
5 (a)	Write a program to define a function that take a string as an input and print the reverse of the string.	4	CO3	L3
5 (b)	Which header file do we need to use string handling function? Explain the following function with its prototype and example code. i) strcmpi( ) ii) strcat( ) iii) strcpy( )	4	CO3	L1
6.	Specify the error/output for the following program. Specify error(s) with reason.	4	CO2, CO3	L3

(i)
```
void main()
{
int *p;  char (*q)[10]; void *c=p;
printf("%d",sizeof(int));
printf("A=%d B=%d C=%d D=%d ",
sizeof(p), sizeof(q), sizeof(*q),
sizeof(*c)); }
```

(ii)
```
void main()
{ char ch='A';
switch(ch)
{case 'A':
printf("case label A");
case 'B':
printf("case label B");} }
```

(iii)
```
c_area(int);
 int main()
 { int r=2.5;
 float area;
 area=c_area(r);
 printf("Area of circle is %f",area);
 return 0; }
 c_area(int r)
 { float area=3.14*r*r;
 return area;}
```

(iv)
```
void main()
{char lang[][20]={"java", "fortran", "cobol",
"c++"};
int i, char *t;
t=lang[2];
lang[2]=lang[3];
lang[3]=t;
for(i=0;i<4 ;i++)
printf("%s\n",lang[i]);}
```

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National Institute of Technology, Delhi

End Semester Examination (Autumn 2023)

Branch	**: B.Tech**	**Semester**	**: 1st**
Title of the Course	**: Introduction to Computer Systems**	**Course Code**	**: CSBB 102**
Time	**: 3 Hours**	**Maximum Marks**	**: 50**

Q.No.		Marks	COs	BL	PO
Q1.	a) Explain the organization of a computer system in detail. Illustrate how computers in one generation are better than their predecessors. b) Describe computer software and differentiate between system software and application software. Also, explain the packages offered by Application software. c) Describe the terms Utilities and Device drivers in detail.	5+3+2	CO1	L1	1
Q2.	a) Explain in detail the evolution of the programming languages. b) What is the difference between compiling and running a program? Do these two processes generate the same output? c) Illustrate memory hierarchy organization with a trade-off diagram between performance and cost. Differentiate between static RAM and dynamic RAM.	3+2+5	CO1	L1	1
Q3.	a) Differentiate among ring, star, bus and hybrid topology with the help of diagrams. b) Differentiate between multiprogrammed and multitasking operating system with the help of example. c) Explain the main functions of file management in OS. d) Briefly explain why Windows operating system is one of the most popular operating systems.	4+2+2+2	CO2	L2	2
Q4.	a) Explain types of interfaces provided by Operating System. b) How are OMR devices used for recognising the characters in the document to be scanned? c) Explain the different types of non-impact printers. d) Minimize the following expression by use of Boolean rules: I. $F = XYZ + X\bar{Y}Z + XY\bar{Z}$	2+2+2+2+2	CO2	L2	2

	II. F= $\overline{A}\overline{B}\overline{C} + A\overline{B}\overline{C} + \overline{A}\overline{B}C$				
Q5.	a) State Demorgan's law. Briefly discuss various laws of Boolean algebra. b) Implement following expressions using Boolean gates: I. Y = (A.B) + (C.D).E II. Y = A + (C+D).(B.A) c) Convert the hexadecimal number AB21.34 into its equivalent in the decimal system. d) Describe the C program for converting the decimal number 92.25 into its binary equivalent.	2+4+1+3	CO3	L3	3

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National Institute of Technology, Delhi

Examination: B. Tech. End Semester Examination December 2023 (Autumn Semester)

Branch	**: CSE, ECE, EEE**	**Semester**	**: 1st**
Title of the Course	**: Advanced Calculus**	**Course Code**	**: MALB 101**

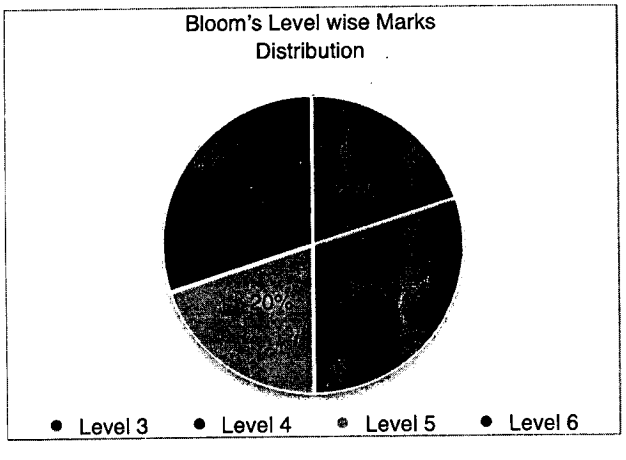
Time: Three Hours **Maximum Marks: 50**

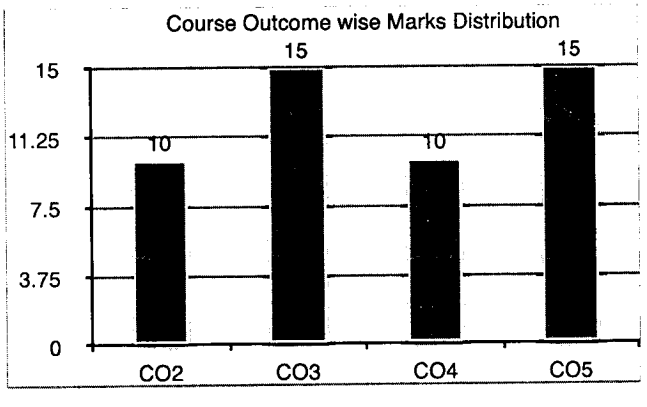
Note : All sections are compulsory.

Course Outcomes: Student will be able to:		**Cognitive Levels**
CO1	Understand the theory and methods of Differential, Integral and Vector Calculus	**Understanding Level-II**
CO2	Apply different methods for solving problems in Differential, Integral and Vector Calculus	**Applying Level-III**
CO3	Analyze sequence and series for its convergence. Analyse function for continuity and differentiability. Analyse curves and surfaces for concavity, inflection points, maxima and minima. Compare different integration techniques for finding area and volume.	**Analyzing Level-IV**
CO4	Evaluate extreme points for function of several variables. Evaluate limits. Evaluate limit of sequences and sum of some convergent series. Evaluate multiple integrals in rectangular, polar, cylindrical, and spherical coordinates.	**Evaluating Level-V**
CO5	Create power series. Formulate problems on maxima and minima. Combine vector differential calculus and vector integral calculus. Construct counter-examples for theorems and arguments. Formulate problems on integral and vector calculus.	**Creating Level-VI**

Q.No.	Question	Marks	CO	BL
1	Suppose you are designing a cylindrical storage tank with hemispherical ends for storing liquid petroleum gas for a company. The company wants the tank to hold 8000 m^3 of gas and wants you to use smallest amount of material possible to built the tank. Formulate the minimisation problem. What radius and height of the tank do you recommend for the cylindrical portion of the tank?	5	CO5	L6
2	Define second derivative test for local extreme values. Find the absolute maximum and minimum of the function $f(x,y) = x^2 - xy + y^2 + 1$ on the closed triangular plate in the first quadrant bounded by the lines $x = 0$, $y = 4$, $y = x$.	5	CO4	L5
3	(i) State and prove the first fundamental theorem of integral calculus. (ii) Analyse the convergence of $\sum_{n=1}^{\infty} \frac{(-1)^n(x+2)^n}{n}$. Also, give the interval and radius of convergence.	5	CO3	L4

4	State alternating series test for convergence. Discuss the absolute and conditional convergence for the following: (i) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}(n!)^2}{(2n)!}$ (ii) $\sum_{n=1}^{\infty} (-1)^n \frac{tan^{-1}n}{n^2+1}$	5	CO2	L3
5	Consider the region in the first quadrant bounded from above by a parabola $y = x^2$ and below by x-axis and on the right by line x=2. Find the volume of the solid generated by revolving the region (i) about the x-axis, (ii) about the y-axis.	5	CO3	L4
6	Sketch the region of integration, reverse the order of integration and hence evaluate the integral $\int_0^8 \int_{\sqrt[3]{x}}^2 \frac{1}{y^4+1} dydx$	5	CO5	L6
7	Convert the integral $\int_{-1}^{1} \int_{0}^{\sqrt{1-y^2}} \int_{0}^{x} (x^2+y^2) dzdxdy$ into an equivalent integral in cylindrical coordinates and then evaluate the integral.	5	CO4	L5
8	Define Green's theorem in tangential and normal form. Apply Green's theorem to calculate the circulation and outward flux created by the field $\vec{F} = (y^2 - x^2)\vec{i} + (x^2 + y^2)\vec{j}$ on the curve C : the triangle bounded by $y = 0, x = 3, y = x$	5	CO2	L3
9	Use the surface integral in Stokes theorem to calculate the flux of the curl of the vector field F across the surface S in the direction of the outward unit normal n, when $\vec{F} = x^2y\vec{i} + 2y^3z\vec{j} + 3z\vec{k}$ and $S : \vec{r}(r,\theta) = rcos\theta\vec{i} + rsin\theta\vec{j} + r\vec{k}, 0 \le r \le 1, 0 \le \theta \le \pi$	5	CO5	L6
10	Define conservative field. Analyze if $\vec{F} = (e^x cosy + yz)\vec{i} + (xz - e^x siny)\vec{j} + (xy + z)\vec{k}$ is conservative over its natural domain and find potential function for it.	5	CO3	L4





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NATIONAL INSTITUTE OF TECHNOLOGY DELHI

Name of the Examination: End Semester Examination

(Autumn Semester-2023)

Name of the Examination: B. Tech.

Branch	**CSE/EE**	**Semester**	**1st**
Title of the Course	**Engineering Visualization**	**Course Code**	**MEBB 162**
Time: 3 Hours		**Maximum Marks**	**50**

Note: All the questions are compulsory and need to be answered. Assume suitable data if required.

QN	Questions	Marks	CO	BL	PO
1.	a. Describe the elevation, plan and end view for any object and also differentiate between orthographic and isometric projections methods. b. On a survey map the distance between two places 1 km apart is 5 cm. Construct the scale to read 4.6 km.	**04** **04**	CO1 CO2	L2	01
2.	a. Draw an involute of a square having side as 20 mm. b. Projectors drawn from HT and VT of a line AB are 80 mm apart and those drawn from it's ends are 50 mm apart. End A is 10 mm above Hp, VT is 35 mm below HP while it's HT is 45 mm in front of VP. Draw projections, locate traces and find TL of line & inclinations with HP and VP.	**04** **06**	CO2 CO3	L3	02
3.	a. Illustrate the following cases for line and plane i. Line inclined to HP & parallel to VP ii. Surface inclined to HP b. A cylinder 40 mm diameter and 50 mm axis is resting on one of a base circle on VP while it's axis makes 45° with VP and FV of axis 35° with HP. Draw its projections with drawing steps.	**04** **07**	CO3	L3	02

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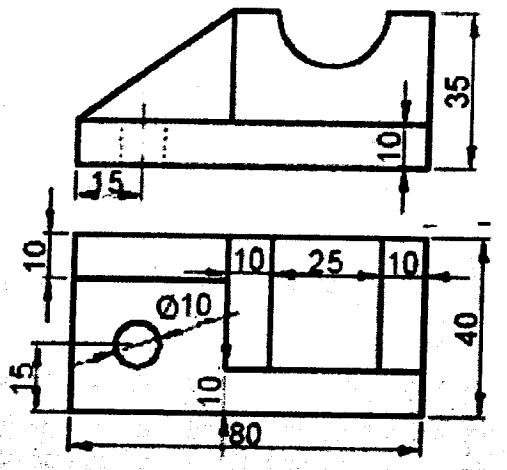
4.	a. Describe the important terms used in projection of solids. b. A cone, base 80 mm diameter and axis 85 mm long is resting on its base on the HP. It is cut by a section plane perpendicular to the VP and parallel to and 12 mm away from one of its generators. Draw the front view, sectional top view and true shape of the section. Draw the front view, sectional top view and sectional side view with drawing steps.	**04** **07**	CO4	L4	02
5.	Draw the isometric view from the given orthographic view. All dimensions are in mm. 	**10**	CO5	L4	03

**********The End & Good Luck**********