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Pimpri Chinchwad University
Established under Govt. of Maharashtra Act No. V of 2023
Sate, Maval (PMRDA) Dist - Pune, Maharashtra - 412 106.

End-Semester Assessment – Nov/Dec- 2024

Program   : B. Tech   Semester: I

Maximum Marks: 60 marks   Time: 2.5 hrs.

Course Name: Engineering Graphics and Design   **Course Code:** UBTFY107I

Course Outcomes (CO):

1. To understand basics of engineering objects & its simple geometries.

2. To visualize the concept of projection for different condition of the object.

3. To realize concepts behind development of lateral surfaces of geometrical solids.

4. To understand reading skills of three dimensional objet to draw orthographic view.

5. To get familiar with visualization skills to draw an isometric view.

Instructions:
- All questions are compulsory.
- Figures to be right indicate full marks.

Question	CO	BL	Marks
Attempt any TWO of the following			
Q.1 A line AB 70 mm long, has its end A 35 mm above the HP and 30 mm in front of VP. The top view and front view has a length of 45 mm and 60 mm respectively. Draw its projections.	CO1	2	(10 marks)
Q.2)-(A) A square plate ABCD of side 40 mm is resting on HP on one of its corner and the diagonal AC inclined at 45^0 to HP. The diagonal BD of the plate is inclined at 30^0 to the VP and parallel to the HP. Draw its projections.	CO2	3	(10 marks)
Q.2)-(B) A regular hexagonal plate of 25 mm side has one of its corner in HP. The diagonal passing through that corner makes an angle of 30° and 45° to H.P. and VP resp. Draw the projection of plate.	CO2	3	(10 marks)
Attempt any TWO of the following			
Q.3) Draw the development of the surface of hexagonal prism having side 25 mm and axis height 70 mm, rest on HP on its base with an edge of base parallel to VP when it is cut by a cutting plane which is inclined at 40° to the HP and bisecting the axis of the prism.	CO3	4	(10 marks)

Q.4) - (A) Figure shows a pictorial view of an object. By using first angle method of projections, Draw:
i) F.V. in the direction of X
ii) Top view
iii) Right hand side view
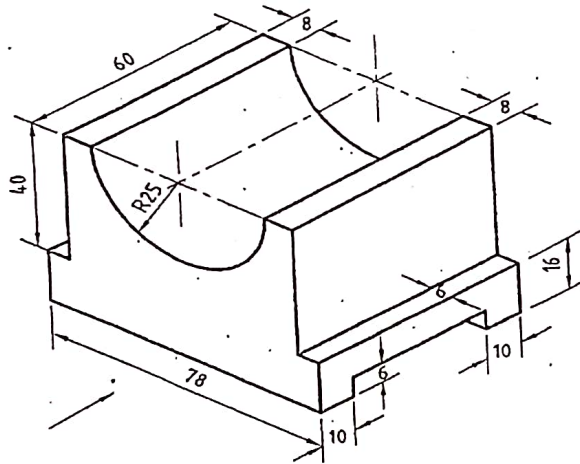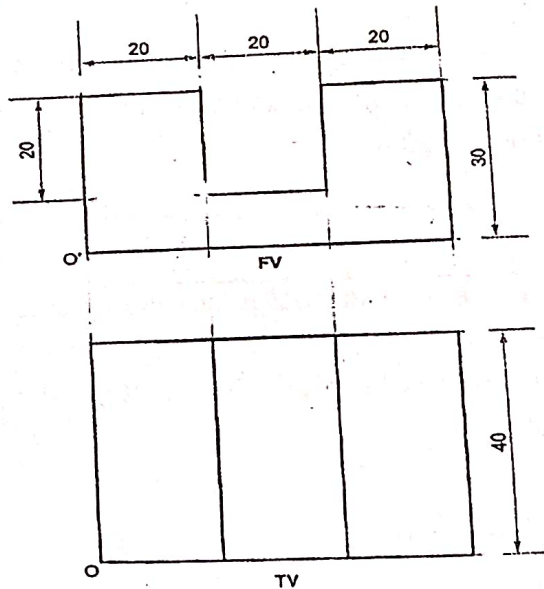

CO4 | 3,4 | (10 marks)

Q.4) - (B) Figure shows a pictorial view of an object. By using first angle method of projections, Draw:
i) Front view in the direction of arrow
ii) Top view
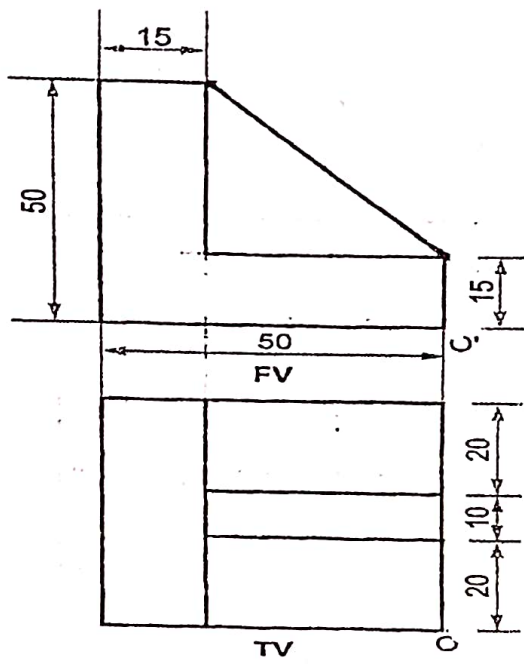iii) Left hand side view
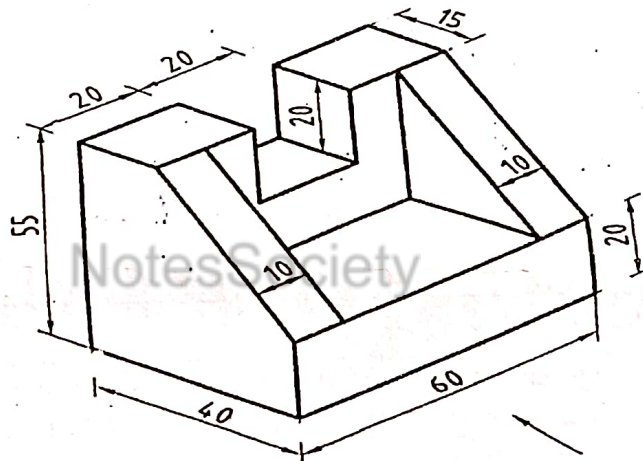
CO4 | 3,4 | (10 marks)

(20 marks

Q.5) Attempt the following

a) Figure shows Front View & Top View of an Orthographic object. Draw the Isometric view by taking O as origin.

CO5 | 6 | [10 Mark

b) Figure shows Front View & Top View of an Orthographic object. Draw the Isometric view by taking O as origin.
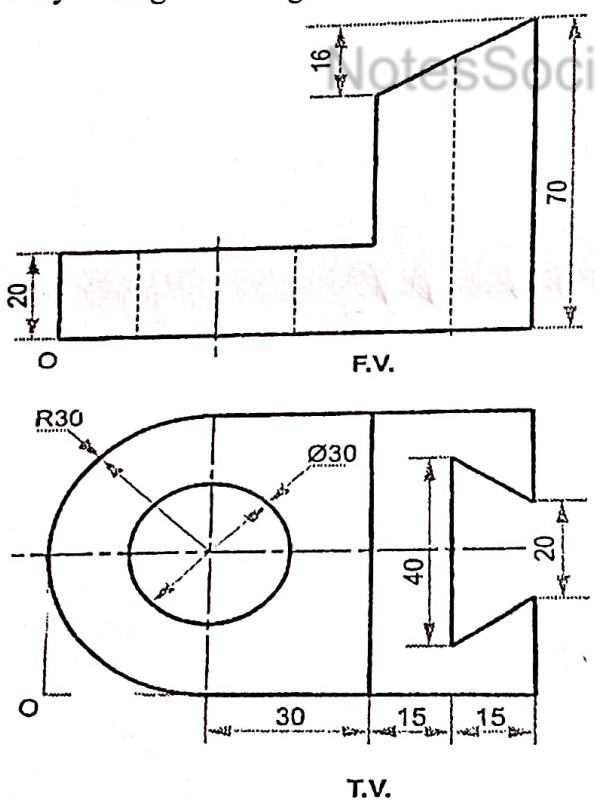

| | CO5 | 6 | [10 Marks] |

OR

b) Figure shows Front View & Top View of an Orthographic object. Draw the Isometric view by taking O as origin.

| | CO5 | 6 | [20 Marks] |

******End of Question Paper ******

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End-Semester Assessment – Nov/Dec- 2024

Program   : B.Tech   Semester: I

Maximum Marks: 60 marks   Time: 2.5 hrs.

Course Name: Procedural Programming   **Course Code: UBTFY114**

Course Outcomes (CO):

1. Explain algorithms, flowcharts and different programming constructs of C to be used for the development of applications.
2. To familiarize students with Data types and the use of Operators.
3. Illustrate the use of iterative statements and conditional Statements for solving real-world problems.
4. Demonstrate the use of all derived data types in C.
5. Develop simple C programs to illustrate the applications of Arrays, pointers, functions, and structures.

Instructions:

- All questions are compulsory.
- Figures to be right indicate full marks. etc.

Question	CO	BL	Marks
Q.1) Attempt any TWO of the following	CO1		**(10 marks)**
a) What is an algorithm? Write an algorithm to check whether the given number is positive or negative.		BL 2,3	[5 Marks]
b) What are variables and data types in C? Explain with examples how you declare and initialize variables.		BL 2,3	[5 Marks]
c) What is type conversion in C? Explain implicit and explicit type conversion in C with examples of each.		BL 2,3	[5 Marks]
Q.2) Attempt any TWO of the following	CO2		**(10 marks)**
a) Explain with an example how the break statement works in a switch-case. What happens if you omit the break statement in a switch-case?		BL 3,4	[5 Marks]
b) Describe the difference between a while loop and a do-while loop with an example 'C 'pseudocode of each.		BL 3,4	[5 Marks]
c) What is the goto statement in C? Explain its syntax with an example.		BL 3	[5 Marks]
Q.3) Attempt any TWO of the following	CO3		**(10 Marks)**
a) Write a C program to calculate the sum of elements stored at even-indexed positions in a one-dimensional array.Take input from user.		BL 3,4	[5 Marks]

b) What will be the output of the following code? Justify your answer with proper steps.
``c
#include <stdio.h>
int main() {
    int arr[2][3] = {{11,22, 33}, {44, 55, 56}};
    int transpose[3][2];
 	
    for (int i = 0; i < 2; i++) {
        for (int j = 0; j < 3; j++) {
            transpose[j][i] = arr[i][j];
        }
    }
    printf("Transpose of the matrix:\n");
    for (int i = 0; i < 3; i++) {
        for (int j = 0; j < 2; j++) {
            printf("%d ", transpose[i][j]);
        }
    printf("\n");
    }
    return 0;
}
``
		BL 4	[5 Marks]

c) What is a String and how is the String stored in memory? Write a C program to copy one string to another using strcpy().Take input from the user.		BL 2,3	[5 Marks]
Q.4 Attempt any TWO of the following	CO4		**(10 marks)**
a) Define user defined functions. Explain the benefits of using functions in a program.		BL 3	[5 Marks]
b) Write a C program for function with no arguments and no return value for calculating average of three numbers. Accept input from the user.		BL 3	[5 Marks]
c) Explain in brief recursion in C programming. Write a C program to calculate the factorial of a given number using recursion.		BL 3	[5 Marks]
Q.5) Attempt any FOUR of the following	CO5		**(20 Marks)**
a) What is a pointer in C? Write a C program to store n elements in an array and print the elements using a pointer.		BL 3	[5 Marks]
b) Explain dynamic memory allocation in C.		BL 2,3	[5 Marks]
c) What is structure in C? How do you declare structure and use it in a C program?		BL 2,3	[5 Marks]
d) What is an array of structure in C? How do you declare an array of structure variables and how do you access an array of structure members with an example?		BL 3	[5 Marks]
e) Write a C Program to Store and Display Information of five Employees Using an Array of Structures. Accept input from the user.		BL 3,4	[5 Marks]
Use following fields: • Employee Id • Employee Name • Employee Salary			
f) Explain the difference between call by value and call by reference with suitable examples in C.		BL 3,4	[5 Marks]

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End-Semester Assessment – Nov/Dec- 2024

Program : B.Tech

Semester: I

Course Name: Linear Algebra & Differential Calculus

Course Code: UBTFY101

Course Outcomes (CO):

1. To apply knowledge of matrix rank to solve problems in various fields, including systems of linear equations, linear transformations, and data analysis
2. To evaluate Eigenvalues and Eigenvectors and its application in image processing.
3. To employ Taylor's and Maclaurin's theorems for expanding functions into infinite series and understand continuity concepts through L'Hospital's rule.
4. To deal with partial derivatives of functions of several variables that are essential in various branches of engineering
5. To utilize partial derivatives to solve optimization problems, including finding maximum and minimum values of functions, Jacobians & error percentage

Instructions:
- All questions are compulsory.
- Figures to be right indicate full marks. Etc.

Question	CO	BL	Marks
Q.1) Attempt any TWO of the following	CO1	BL3	(10 marks)

a) Examine for the consistency of the equations, if consistent then find the solution
$$2x - 3y + 5z = 1; \quad 3x + y - z = 2; \quad x + 4y - 6z = 1$$

[5 Marks]

b) Examine whether the following vectors are linearly dependent or independent. If dependent, find the relation between them.
$$x_1 = [1,2,3], x_2 = [3, -2,1], x_3 = [1,-6,-5]$$

[5 Marks]

c) For what values of a, b the system
$$2x + 3y + 5z = 9, 7x + 3y - 2z = 8, 2x + 3y + az = b$$

[5 Marks]

Has i) No Solution ii) Unique Solution iii) Infinite Number of Solutions

Q.2) Attempt any TWO of the following	CO2	BL3	(10 marks)

a) Find Eigen Values and Eigen Vector corresponding to highest
Eigen Value for the matrix : $A = \begin{bmatrix} 1 & 1 & -2 \\ -1 & 2 & 1 \\ 0 & 1 & -1 \end{bmatrix}$

[5 Marks]

b) The Singular Value Decomposition of matrix $A = U\Sigma V^T$
Hence find U for the given matrix $A = \begin{bmatrix} 1 & 0 \\ 0 & 2 \\ 1 & 0 \end{bmatrix}$

[5 Marks]

c) Using Cayley –Hamilton theorem find A^4 and A^{-1}

$$A = \begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix}$$

[5 Marks]

Q.3) Attempt any TWO of the following   CO3   BL2   (10 marks)

a) For $0 < a < b$, show that

$$\frac{b-a}{\sqrt{1-a^2}} < \sin^{-1} b - \sin^{-1} a < \frac{b-a}{\sqrt{1-b^2}}$$

[5 Marks]

b) Using Taylor's theorem expand $x^4 - 3x^3 + 2x^2 - x + 1$
In ascending powers of $(x - 3)$

[5 Marks]

c) Evaluate $\lim_{x \to 0} (1 + \sin x)^{\cot x}$

[5 Marks]

Q.4 Attempt any TWO of the following   CO4   BL3   (10 marks)

a) If $u = \log(\tan x + \tan y + \tan z)$ then prove that

$$\frac{1}{\sec^2 x} \frac{\partial u}{\partial x} + \frac{1}{\sec^2 y} \frac{\partial u}{\partial y} + \frac{1}{\sec^2 z} \frac{\partial u}{\partial z} = \frac{3}{\tan x + \tan y + \tan z}$$

[5 Marks]

b) If $u = \frac{x^4 + y^4}{x^2 y^2} + x^6 \tan^{-1} \frac{x^2 + y^2}{x^2 + 2xy}$ Find value of

[5 Marks]

$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} \quad \text{At } x = 1, y = 2.$$

c) If $u = f\left(\frac{x}{y}, \frac{y}{z}, \frac{z}{x}\right)$ prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 0$

[5 Marks]

Q.5) Attempt any FOUR of the following   CO5   BL3   (20 marks)

a) If $u^3 + v^3 = x + y, u^2 + v^2 = x^3 + y^3$ find $\frac{\partial(u,v)}{\partial(x,y)}$

[5 Marks]

b) Examine the functional dependence of
$u = \sin^{-1} x + \sin^{-1} y$, $v = x\sqrt{1 - y^2} + y\sqrt{1 - x^2}$

[5 Marks]

c) If $x = uv$ and $y = \frac{u+v}{u-v}$ find $\frac{\partial(u,v)}{\partial(x,y)}$

[5 Marks]

d) Find the percentage error in the area of an ellipse when an error of 1% is made in measuring its major and minor axes. Where area of ellipse is πab.

[5 Marks]

e) Find the percentage error in computing the parallel resistance r of three resistances r_1, r_2, r_3 from the formula: $\frac{1}{r} = \frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3}$

if s r_1, r_2, r_3 are in error by 2% each.

[5 Marks]

f) Examine maxima and minima of the following function and find their extreme values: $x^2 + y^2 + 6x + 12$

[5 Marks]

*** ALL THE BEST ***

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End-Semester Assessment – Nov/Dec- 2024

Program : B.Tech FY   Semester: I

Maximum Marks: 60 marks   Time: 2.5 hrs.

Course Name: Engineering Physics   **Course Code: UBTFY103**

Course Outcomes (CO):
1. To deploy the reflection, refraction, interference and diffraction phenomena.
2. To understand crystal structure theory and concepts in semiconductor physics.
3. To get familiar with the Laser and their types, and molecular spectroscopy techniques.
4. To realize concepts behind magnetism and superconductors and get familiar with several magnetic and superconducting materials.
5. To deliver the basic concepts of nanotechnology, and understand nanomaterials' fabrication, analysis, and characterization methods.

Instructions:
- All questions are compulsory.

Question	CO	BL	Marks
Q.1) Attempt any TWO of the following	CO1		**(10 marks)**
a) Describe with suitable diagrams how specular and diffuse reflection occurs. Give examples of surfaces that exhibit these types of reflection.		BL2	[5 Marks]
b) Explain the concept of a diffraction grating. Derive the relationship the grating element, the glancing angle, and the wavelength of the incident light i.e. $2dsin\theta = n\lambda$.		BL2	[5 Marks]
c) A ray of light travels from water (μ_1=1.33) to air (μ_2=1). Calculate the critical angle (θ_c) for total internal reflection at the water-air boundary.		BL3	[5 Marks]
Q.2) Attempt any TWO of the following	CO2		**(10 marks)**
a) Copper crystallizes in a face-centered cubic (FCC) structure with an atomic radius of 0.128 nm. (i) Calculate the edge length of the unit cell. (ii) Calculate the volume of the unit cell.		BL3	[5 Marks]
b) Explain the following terms with suitable figures: (i) Lattice, (ii) Basis (iii) Translational vector, (iv) Translational symmetry.		BL2	[5 Marks]
c) Differentiate between p-type and n-type semiconductors. Additionally, explain the position of		BL4	[5 Marks]

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the Fermi energy level in each type, using appropriate diagrams.			
Q.3) Attempt any TWO of the following	CO3		(10 marks)
a) Explain Laser. What are their main characteristics and write their applications in various fields.		BL2	[5 Marks]
b) Describe the Raman effect and provide a classical derivation for it.		BL2	[5 Marks]
c) In a laser system, two energy levels E_1 and E_2 have populations of $N_1 = 3 \times 10^{20}$ $atoms/cm^3$ and $N_2 = 7 \times 10^{20}$ $atoms/cm^3$, respectively, with $E_2 > E_1$. Determine if there is population inversion and calculate the population difference $\Delta N = N_2 - N_1$.		BL3	[5 Marks]
Q.4 Attempt any TWO of the following	CO4		(10 marks)
a) Differentiate between type I and type II superconductors with suitable diagrams.		BL4	[5 Marks]
b) Differentiate between the following terms using appropriate domain diagrams: (i) Diamagnetic, (ii) Paramagnetic, (iii) Ferromagnetic, (iv) Antiferromagnetic and (v) Ferrimagnetic materials.		BL4	[5 Marks]
c) A superconductor has a critical temperature $T_c = 7.2\ K$ and a critical magnetic field $H_c = 0.030\ T$ at 0 K temperature. Calculate the critical magnetic field H_c at a temperature of $T = 5\ K$.		BL3	[5 Marks]
Q.5) Attempt any FOUR of the following	CO5		(20 marks)
a) Describe the properties of nanomaterials based on their surface to volume ratio.		BL2	[5 Marks]
b) Write the applications of nanomaterials in five different industry sectors.		BL2	[5 Marks]
c) Describe the working principle of a scanning electron microscope (SEM) with a supporting diagram and discuss its applications.		BL2	[5 Marks]
d) Explain the ball milling method for nano particle fabrication.		BL2	[5 Marks]
e) Define and describe the following terms: Nanomaterials, Nanoscience, Nanotechnology and Nanoscale.		BL1	[5 Marks]
f) Consider a spherical nanoparticle with a radius of 10 nm. Calculate the surface-to-volume ratio for this nanoparticle.		BL3	[5 Marks]

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End-Semester Assessment – Nov/Dec- 2024

Program   : B.Tech

Semester: I

Maximum Marks: 60 marks

Time: 2.5 hrs.

Course Name: Basic Electronics Engineering

Course Code: UBTFY 105

Course Outcomes (CO):
1. Describe the operation of diode and their role in simple electronic applications.
2. Understand the operation of BJT, and MOSFET and Compare it
3. Use of Operational Amplifier for various applications
4. Study and Classify active and passive sensors
5. Study the basic digital circuits using universal/basic gates.

Instructions:
- All questions are compulsory.
- Figures to be right indicate full marks. etc.

Question	CO	BL	Marks
Q.1) Attempt any TWO of the following	CO1		**(10 marks)**
a) Draw the Centre tap full wave rectifier and explain it with waveforms.	CO1	3,1	[5 Marks]
b) Draw the V-I Characteristics of Zener diode and explain the operation of diode.	CO1	3,1	[5 Marks]
c) Draw the block diagram of regulated power supply and explain in detail.	CO1	3,1	[5 Marks]
Q.2) Attempt any TWO of the following	CO2		**(10 marks)**
a) Compare BJT, FET, MOSFET.	CO2	5	[5 Marks]
b) Define the α & β, and γ. Derive the relation between them.	CO2	2	[5 Marks]
c) Classify the types of transistors and explain any one with its operation.	CO2	4	[5 Marks]
Q.3) Attempt any TWO of the following	CO3		**(10 marks)**
a) Analyse Op-amp as a Integrator with neat diagram.	CO3	5	[5 Marks]
b) Prove that $V_0= (1 + R_f/R_1)V_{in}$ with diagram.	CO3	4	[5 Marks]
c) Explain op-amp block diagram and write ideal characteristics of op-amp.	CO3	2	[5 Marks]
Q.4) Attempt any TWO of the following	CO4		**(10 marks)**
a) Which transducer used for measurement of temperature and explain in details.	CO4	1	[5 Marks]

b) Explain LVDT in detail.	CO4	2	[5 Marks]
c) Explain the bio sensor in detail.	CO4	2	[5 Marks]
Q.5) Attempt any FOUR of the following	CO5		(20 marks)
a) Convert following 1. $(1111)_2 = (?)_{10}$ 2. $(42)_8 = (?)_{10}$ 3. $(63)_{10} = (?)_{16}$ 4. $(CA2)_{16} = (?)_2$ 5. $(29AF.1EB4)_{16} = (?)_2$	CO5	5	[5 Marks]
b) Represent (-17) in following format i) Sign Magnitude ii) One's Complement iii) Two's Complement	CO5	5	[5 Marks]

c) Solve the following
1. Binary addition
    111000 + 000111
2. 2's Complement of 0000111000
3. Binary Subtraction using 2's complement
    7-5
	CO5	5	[5 Marks]

d) State the de-Morgan's theorem and prove it.	CO5	4	[5 Marks]
e) Explain any 5 Boolean laws with their statements.	CO5	1	[5 Marks]
f) Draw the block diagram microcontroller(8051) and explain in details.	CO5	3,1	[5 Marks]