



PIMPRI CHINCHWAD UNIVERSITY
(Established Under Govt. of Maharashtra Act No. V of 2023)
Sate, Maval (PMRDA) Dist: Pune Maharashtra – 412106



Program : B.Tech. (All)

Batch : 2023-27

Semester : 1st

Course : Linear Algebra and Differential Calculus

Course Code : MTH-101

Day : Tuesday

Maximum Marks: 60 marks

Date : 02-01-2024

Time: 2.5 hrs.

Instructions:

- All the sections are compulsory and any kind of calculator is not allowed.
- Assume missing data suitably, if any.

SECTION A (10 marks)

(All questions are compulsory)

Question	BTL	CO	Marks
Q.1) Find the rank of matrix M, Where $M = \begin{bmatrix} 6 & 3 & 2 & 1 \\ -1 & 2 & 0 & 3 \\ 3 & 2 & 1 & 2 \end{bmatrix}$	L1	CO1	5
Q.2) Find the value of 'p' for which the system has a unique solution $\begin{aligned} px + 2y - 2z - 1 &= 0 \\ 4x + 2py - z &= 2 \\ 6x + 6y + pz - 3 &= 0 \end{aligned}$	L1	CO1	5

SECTION B (20 marks)

(Attempt any two questions from three)

(Each question carries 10 marks)

Q.1) Solve the system of equations and test for consistency $\begin{aligned} x_1 + 2x_2 + x_3 - 2 &= 0 \\ 3x_1 + x_2 - 2x_3 &= 1 \\ 4x_1 - 3x_2 - x_3 &= 3 \\ 2x_1 + 4x_2 + 2x_3 &= 4 \end{aligned}$	L3	CO1	10
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Q.2) Construct the characteristic equation of the matrix P, where $P = \begin{bmatrix} 1 & 2 & -2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$ and hence find P^{-1}	L3	CO2	10
Q.3) i. Estimate the value $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2}$, where u is the function of $f(x, y, z) = \frac{1}{x^2 + y^2 + z^2}$ ii. Justify whether following functions are functionally dependent, and if so find the relation between them $u = \frac{x+y}{1-xy}, v = \tan^{-1}x + \tan^{-1}y$	L4/L5	CO5/CO6	10
SECTION C (30 marks) (Attempt any two questions from three) (Each question carries 15 marks)			
Q.1) i. Estimate the half range Fourier sine series for the function $f(x) = x^3$ in $(0, \pi)$ ii. Test the convergence of the series $1 + \frac{2^3}{2!} + \frac{3^3}{3!} + \frac{4^3}{4!} + \dots$ iii. Justify Rolle's Mean Value theorem for $f(x) = x^2$ in $(2, 4)$	L4/L5	CO3/CO4	15
Q.2) i. Justify Euler's theorem for the function $u = \sin^{-1} \frac{x}{y} + \tan^{-1} \frac{y}{x}$ ii. Justify Euler's Extension theorem, $\sin 2x \frac{\partial u}{\partial x} + \sin 2y \frac{\partial u}{\partial y} + \sin 2z \frac{\partial u}{\partial z} = 2$ if $u(x, y, z) = \log(\tan x + \tan y + \tan z)$ iii. Estimate the absolute maximum and minimum values of $f(x, y) = y^2 + 4xy + 3x^2 + x^3$	L4/L5	CO5/CO6	15
Q.3) i. Estimate the limit $\lim_{x \rightarrow 0} \frac{xe^x - \log(1+x)}{x^2}$ ii. Justify U, V, W are functionally related if $U = 3x + 2y - z$, $V = x - 2y + z$, $W = x(x + 2y - z)$ iii. The power 'P' required to propel a ship of length 'l' moving with a velocity 'V' is given by $P = kV^3 l^2$. Estimate the percentage increases in power if increases in velocity is 3% and increase in length is 4%	L4/L5	CO3/CO6	15

Enrolment No.



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Program : First Year B. Tech. (All)

Batch : 2023-2027

Semester : Semester - I

Course : Engineering Physics

Course Code : PHY101

Day : Thursday

Maximum Marks: 60 marks

Date : 04 Jan 2024

Time: 2.5 hrs.

Instructions: - 1. All questions are compulsory.

2. Assume missing data suitably, if any.

Section A

(Marks 14)

This section contains short answers.

(All questions are compulsory)

Q. No.	QUESTION	BTL	CO	Marks
1	Explain reflection and total internal reflection using wavefront.	KL1	CO1	4
2	Define translational vector and translational symmetry with diagram.	KL2	CO2	3
3	If the critical angle for total internal reflection from a medium to vacuum is 40° , what is the velocity of light in the medium?	KL4	CO1	3
4	Distinguish between intrinsic and extrinsic semiconductor	KL1	CO2	4

SECTION B

(Marks 16)

This section contains descriptive / Application based questions

(Attempt any two questions from three)

(Each question carries 8 marks)

1	a) What is FTIR spectroscopy? b) What is Meissner effect in superconductor?	KL1/ KL2	CO3/C O4	8
2	a) What is population inversion? Explain the necessity of population inversion for lasing. b) Evaluate the magnetization and magnetic flux density in diamagnetic material which is subjected in an external	KL2/ KL4	CO3/C O4	8

(P.T.O)

	magnetic field of $10^3 \frac{A}{m}$. (Given, Magnetic susceptibility of diamagnetic material $= -2 \times 10^{-5}$).			
3	a) The two states in a He-Ne laser that produces light of wavelength 5330 Å at 28°C. Find the ratio of populations in these. b) What is hysteresis? Define term coercivity and retentivity of ferromagnetic material.	KL4/ KL2	CO3/C O4	8

Section C **Marks 30**

This section contains Case study / Experimental learning / Analytics based questions

(Attempt any two questions from three)

(Each question carries 15 marks)

1	a) Prove that electron cannot exist inside the nucleus through applications of Heisenberg's uncertainty principle. b) Explain the different properties of Nano materials based on surface to volume ratio	KL3/ KL1	CO5/C O6	8 7
2	a) An electron is confined to a box of length 2 Å. Calculate the minimum uncertainty in its velocity b) Describe the nanoscale modeling and simulation which are essential tools for nanotechnology	KL4/ KL3	CO5/C O6	8 7
3	a) What is wave function ψ ? Explain physical significance of $ \psi ^2$. b) Describe CVD technique for characterization of nanomaterials with figure.	KL2/ KL3	CO6/C O5	8 7

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Program : First Year B. Tech. (All)

Batch : 2023-2024

Semester : Semester - I

Course : Engineering Chemistry

Course Code : CHM101

Day : Thursday

Maximum Marks: 60 marks

Date : 04 Jan 2024

Time: 2.5 hrs.

Instructions:

1. All questions are compulsory.
2. Assume missing data suitably, if any.

SECTION A (14 marks)**This section contains short answers.****(All questions are compulsory)**

Question	BTL	CO	Marks
Q.1) a. Define the terms: i) Resistance ii) Cell constant iii) Equivalent Conductance iv) Molar Conductance	L1/L2	CO1	4
b. Explain the titration curve for conductometric titration of weak acid and weak base.	L1/L2	CO1	3
Q.2) a. Explain the mechanism of corrosion due to oxygen with respect to Na, Au, Cr & Mo metals with reactions	L1/L2	CO2	3
b. Illustrate the factors that are influencing on the rate of corrosion with respect to nature of metal.	L1/L2	CO2	4

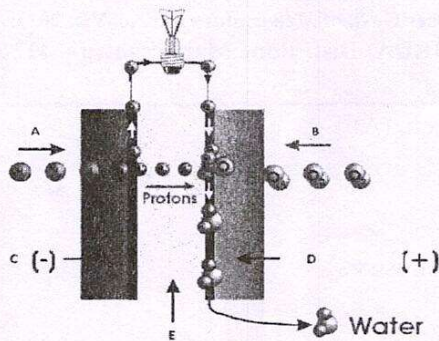
SECTION B (16 marks)**This section contains Descriptive / Application-based questions****Attempt any two questions**

Q.1) a. What is a glass transition? State factors affecting on T _g .	L3/L4	CO3/CO4	4
b. Distinguish between Scales and Sludge	L3/L4	CO3/CO4	4
Q.2) a. What are quantum dots? Explain with suitable example different types of semiconductor quantum dots.	L3/L4	CO3/CO4	4
b. 25 ml of water sample requires 8.7 ml of 0.01 N H ₂ SO ₄ upto phenolphthalein end point and further 3.3 ml upto methyl orange end point during the titration. Calculate types and amounts of alkalinity present in water.	L3/L4	CO3/CO4	4
Q.3) a. What are carbon nanotubes? Discuss the types of CNT with respect to their structure.	L3/L4	CO3/CO4	4
b. Demonstrate Reverse osmosis process with suitable diagram?	L3/L4	CO3/CO4	4

SECTION C (30 marks)

**This section contains Case study / Experiential Learning / Analytics based questions
(Each question carries 15 marks) Attempt any two questions**

Q.1) a. Identify following components of H_2-O_2 cell A,B,C,D,E



L4/L5 CO5 5

b. What are the challenges of bio-ethanol production from lignocellulosic biomass and give critical analysis with a suitable diagram

L4/L5 CO5 5

c. Explain production of hydrogen gas by steam reforming of methane and coke with reaction conditions and removal of CO_2 .

L4/L5 CO5 5

Q.2) a. Match the following IR range with functional group

IR range	Functional group
1.3300 cm^{-1}	1. Ester
2.1730 cm^{-1}	2. Alcohol
3.1680 cm^{-1}	3. Acid anhydride
4.3100 cm^{-1}	4. Carboxylic acid
5.1800 cm^{-1}	5. Amide

L4/L5 CO6 5

b. Explain how fundamental modes of vibration of linear and non-linear molecules are calculated with examples.

L4/L5 CO6 5

c. What is the role of auxochrome in enhancing the wavelength of any molecule? Explain with any two examples.

L4/L5 CO6 5

Q.3) a. Define GCV. Draw neat labelled diagram and give working of Bomb calorimeter to determine GCV of solid fuel. State formula of GCV with corrections?

L4/L5 CO5/CO6 7

b. Identify which of the following molecule will show $\sigma \rightarrow \sigma^*$, $\pi \rightarrow \pi^*$ and $n \rightarrow \pi^*$ transition only. a) Ethylene b) Acetone c) Aniline d) 2- methyl butane

L4/L5 CO5/CO6 8

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Program : First Year B. Tech. (All)

Batch : 2023-24

Semester : I

Course : Problem Solving Using C

Course Code : CSE101

Day : SATURDAY

Maximum Marks: 60 marks

Date : 06-01-2024

Time: 2.5 hrs.

Instructions:

1. All questions are compulsory.
2. Assume missing data suitably, if any.

Q. No.		QUESTION	BTL	CO	Marks
		SECTION A (14 Marks)			
		All questions are compulsory			
1.		List and describe any four hardware components of a computer.	L2	CO1	5
2.	a)	Define algorithm and list any four characteristics of an algorithm.	L4	CO1	5
	b)	Design an algorithm or a pseudo code to check the given number is even or odd.	L4	CO1	4
		SECTION B (16 Marks)			
		Attempt any two questions from three			
		Each question carries 8 marks			
1.	a)	Discuss all phases of program development in c with a neat flow diagram.	L1	CO2	4
	b)	Discuss integer data types used in c programming with its size and range.	L4	CO2	4

2.	a)	Define error. Give an example C program for syntax error and explain in detail.	L2	CO2	4
	b)	Discuss importance of the following functions i. printf() ii. scanf()	L2	CO2	4
3.		Explain working of nested if else statements in C with its syntax and an example C program.	L3	CO3	8
SECTION C (30 marks)					
		Attempt any two questions from three Each question carries 15 marks			
1.	a)	Define keyword. Discuss usage of keywords goto and break.	L3/L4	CO3	5
	b)	Discuss the use of conditional statements. Explain the working of the following conditional statements with their syntax i. if statement ii. if else statement	L3/L4	CO3	10
2.	a)	Define loop and discuss importance of Loop control statements.	L3/L4	CO3	5
	b)	Distinguish for loop and while loop with an example C program of for loop and while loop.	L3/L4	CO3	10
3.	a)	Define and declare two-dimensional array with syntax.	L3/L4	CO4	5
	b)	Describe ways to access two-dimensional array elements with a proper example c program.	L3/L4	CO4	10



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Program : First Year B. Tech. (Div:- A,B,C,D,E)
Batch : 2023-2024
Semester : Ist
Course : Basic Electronics Engineering
Course Code : ELT101
Day : Monday
Date : 8/01/2024

Maximum Marks : 60 marks
Time : 2.5 hrs.

Instructions :

- All questions are compulsory
- Assume missing data suitably, if any.

SECTION A (14 marks)**(All questions are compulsory)**

Question	BTL	CO	Marks
Q.1) Draw the block diagram of regulated power supply and explain it in detail.	L1/L2	CO1	7
Q.2) Explain the working of N-channel FET with characteristics.	L2	CO2	7

SECTION B (16 marks)**(Attempt any two questions from three)****(Each question carries 8 marks)**

Q.1) a) Construct Op-amp as differentiator and explain it. b) Describe the Gas sensor with diagram.	L3 L4	CO3 CO4	4 4
Q.2) a) Build the diagram op-amp as an adder and explain it. b) Identify which sensor used to measure temperature and explain it.	L3 L4	CO3 CO4	4 4
Q.3) a) Construct Op-amp as inverting amplifier and explain it. b) Describe bio-sensor with any one any example.	L3 L4	CO3 CO4	4 4

SECTION C (30 marks)**(Attempt any two questions from three)****(Each question carries 15 marks)**

Q.1) a) What is meant by modulation index of AM .Calculate modulation factor if a carrier wave of 100 V and 1500 KHz is modulated by 50V ,1000Hz. b) Solve the Following 1. Binary addition a. 00011 + 11000 2. 2's Complement of 1111100 3. Binary Subtraction using 2's complement a. 7-5	L5	CO5	07
	L6	CO6	08
Q.2) a) Convert the Following: 1. Binary to Hexadecimal a. (0001) ₂ b. (11101) ₂ 2. Octal to Binary a. (42) ₈ b. (67) ₈ 3. Decimal to Hexadecimal a. (33) ₁₀ b. (46) ₁₀ 4. Hexadecimal to binary (DA2) ₁₆ b. (FA4) ₁₆ b) Derive the equation of Frequency Modulation with neat waveform.	L6	CO6	08
	L5	CO5	07
Q.3) a) Compare AM and FM. Draw the block diagram of AM transmitter. b) Discuss which are universal gates and basic gates .Explain them using logic diagram and truth table.	L5	CO5	07
	L6	CO6	08

Enrolment No.

20004



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Program : First Year B. Tech. (All)

Batch : 2023-2027

Semester : Semester - I

Course : Basic Electrical Engineering

Course Code : ELE101

Day : Monday

Maximum Marks: 60 marks

Date : 08 Jan 2024

Time: 2.5 hrs.

Instructions: - 1. All questions are compulsory.
2. Assume missing data suitably, if any.

Section A

(Marks 14)

This section contains short answers. (All questions are compulsory)

Q.No.	QUESTION	BTL	CO	Marks
1	a) Derive the expression for temperature Coefficient of resistance.	KL2	CO1	3
	b) For the given circuit, write the KVL equations for mesh1,2 &3 Find the mesh currents I_1 , I_2 & I_3	KL3	CO2	4
2	a) For the given circuit, Find the Req between A-B for the circuit	KL3	CO1	3
	b) What is the condition to transfer maximum power in D C Circuit? Derive its equation.	KL2	CO2	4

SECTION B**(Marks 16)****This section contains descriptive / Application based questions****(Attempt any two questions from three)****(Each question carries 8 marks)**

1	a) Write a short note on BH Curve with the help of hysteresis loop.	KL2	CO3	4
	b) Define the following (a) Frequency (b) Phase and Phase difference (c) Time period (d) form Factor.	KL2	CO4	4
2	a) A ring shaped electromagnet has an air gap of 6mm and cross sectional area 12cm^2 . The mean length of the core 60cm. Calculate the mmf required to produce a flux density of 0.4wb/m^2 in the air gap. Take $\mu_r = 400$	KL3	CO3	4
	b) Define Average value and hence derive the expression for average value.	KL3	CO4	4
3	a) Derive the equation of coefficient of coupling and hence define it. What is the maximum value of coefficient of coupling? What is its unit?	KL3	CO3	4
	b) Prove that current lead the voltage by 90° for purely Capacitive circuit. Draw circuit diagram, waveforms and phasor diagram.	KL3	CO4	4

Section C**(Marks 30)****This section contains Case study / Experimental learning / Analytics based questions****(Attempt any two questions from three)****(Each question carries 15 marks)**

1	a) A single phase, 50Hz, 50KVA transformer has full load primary current of 260A and total resistance referred to primary is 0.005Ω . If the iron loss amounts to 210W. Find the efficiencies for full load at i) Unity power factor and ii) 0.8 power factor.	KL3	CO5	5
	b) Write a short note on Miniature Circuit Breaker (MCB).	KL3	CO6	5
	c) What is Earthing? Explain Plate Earthing in detail.	KL3		5
2	a) Derive the Expression for Star Connected Load in Three Phase System.	KL3		5
	b) Define the regulation of Transformer. Explain the various types of losses occurring in Transformer.	KL3	CO5	5
	c) Explain with the help of diagram, how Earth Leakage Circuit Breaker is used for leakage protection.	KL3	CO6	5
3	a) What is Fuse & explain the principle of operation of Fuse.	KL3	CO6	5
	b) Compare Core type & Shell type transformer.	KL3	CO5	5
	c) Explain the construction and working of D C Motor.	KL3		5



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Program : First Year B. Tech.

Batch : 2023-24

Semester : I

Course : Engineering Mechanics and Civil Engineering

Course Code : EM 101

Day : Wednesday

Maximum Marks : 60 marks

Date : 10/01/2024

Time : 2.5 hrs.

SECTION A (14marks)

(All questions are compulsory)

Question	BTL	CO	Marks
<p>Q.1) Find the resultant of the force system shown in fig.</p>	L1	CO1	7
<p>Q.2) Show and calculate moment of 200 N about point 'A' for the bracket as shown in Fig.</p>	L2	CO2	7

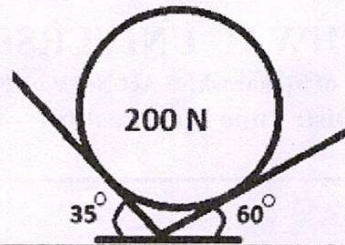
SECTION B (16marks)

(Attempt any two questions from three)

(Each question carries 8 marks)

<p>Q.1) Solve the given figure to find out the support reactions.</p>	L3	CO3	8
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Q.2) Determine the reactions at all the points of contact for a sphere of 200 N kept in trough as shown in fig.



L5

CO4

8

Q.3) Determine the Coefficient of restitution between two identical balls of same mass. The initial velocity of ball A & Ball B before impact was $V_a=7\text{m/s}$ & $V_b=3\text{m/s}$ and after impact its velocity become $V_a=2\text{m/s}$ & $V_b=8\text{m/s}$.

L4

CO4

8

SECTION C (30 marks)

(Attempt any two questions from three)

(Each question carries 15 marks)

Q.1A) Identify the system which relate information system with spatial coordinates and construct a chart of contributing disciplines to this system

L5

CO6

7

Q.1B) Explain the terms 1. Privacy, 2. Roominess and 3. Circulation

L5

CO5

8

Q.2A) Ashwin want to construct a RCC house. For that enlist the different materials he will have to use for construction purpose. At the same time which properties should he observe in bricks and cement before using in construction work.

L4

CO5

7

Q.2B) Explain the application of remote sensing and also explain the practical example of Remote sensing.

L5

CO6

8

Q.3A) Discuss the device which works on the principle of trilateration and explain that principle and elaborate its components.

L6

CO6

7

Q.3B) While doing surveying Swapnil found that ground was uneven. He then set his auto level on ground in order to take levels which are as follows 0.255, 0.575, 0.785, 1.990, 2.005, 2.525, 2.775, 2.850, 2.095, 3.010 & 3.220. He then considered Bench Mark (BM) as 100.000m.

L5

CO5

8

Mark the RL (Reduced Level) of each point.



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Program : F.Y. B. TECH (CSE/AIIML/AIDS)

Batch : 2023-27

Semester : I

Course : Engineering Graphics

Course Code : MEC101

Day : Wednesday

Maximum Marks: 60 marks

Date : 10/01/2023

Time: 2.5 hrs.

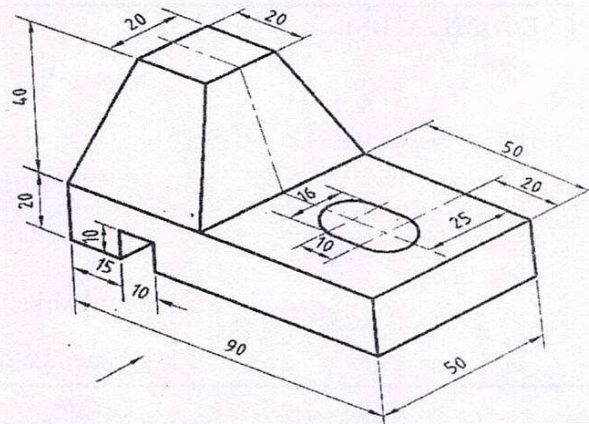
Instructions:

- Figure to the right indicates Full Marks.
- Assume suitable dimensions if necessary.

SECTION A (14 marks) (All questions are compulsory)			
Question	BTL	CO	Marks
Q.1) A Line MN 75 mm long is inclined to H.P. at 40° and 55° to VP. Draw its projections if point M is 15 mm above the H.P. and 20 mm in front of V.P.	L3	CO1	7
Q.2) A rectangular plate (40mm X 80mm) is resting on smaller side on HP. Its surface makes 45° with HP. Draw its Projections if its smaller side is inclined at 30° with VP.	L3	CO2	7
SECTION B (16 marks) (Attempt any two questions from three) (Each question carries 8 marks)			
Q.1) A cube of 40 mm sides rests with one of its edges/side on HP such that one of the square faces containing that edge is inclined at 45° to HP. (up to stage II).	L3,L4	CO3	8
Q.2) Draw the development of lateral surface of Pentagonal pyramid having base side 30 mm and axis height 60 mm.	L3,L5	CO4	8
Q.3) Draw the development of surface of the cone having base Diameter 50 mm and axis height 70 mm. If it is cut by cutting plane which bisects the axis of the cone and inclined at 45° with the H.P.	L3,L5	CO4	8

SECTION C (30 marks)
(Attempt any two questions from three)
(Each question carries 15 marks)

Q.1) Figure shows a pictorial view of an object. By using first angle method of projections, draw;
 i) Sectional Front View ii) Right hand side view iii) Top View



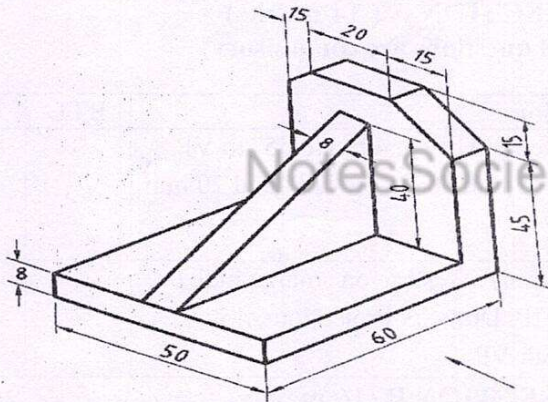
L5

CO5

15

Q.2) Figure shows a pictorial view of an object. By using first angle method of projections, Draw:

i) Front View ii) Left Hand side view iii) Top View

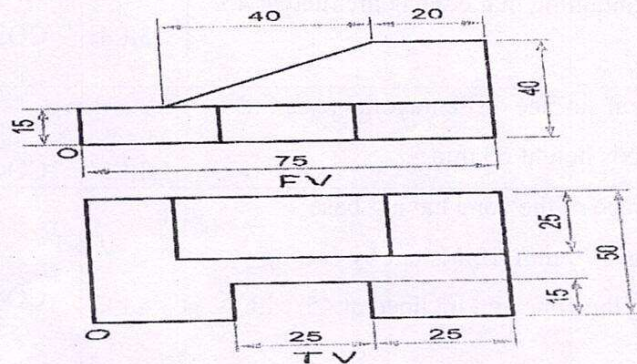


L5

CO5

15

Q.3) Figure shows Front View & Top View of Orthographic object. Draw the Isometric view. Take O as origin. Give the basic dimensions.



L5

CO6

15



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Program : B.Tech.
Batch : 2023-24
Semester : I
Course : Applied Technical Communication
Course Code : CENG101
Day :
Date :

Maximum Marks: 60 marks
Time: 2.5 hrs.

Instructions: All Questions are Compulsory

SECTION A (10marks)			
This section contains short answers. (All questions are compulsory)			
Question	BTL	CO	Marks
Q.1) Change the following sentences into passive voice: A. Who teaches you English? B. I've instructed them in the class. C. Please call them immediately. D. They can ask these questions. E. What did she answer?	L1	CO1	5
Q.2) Explain the standard abbreviation: WHO, NET, JEE, CUET, FSSAI	L2	CO2	5
SECTION B (20marks)			
(Attempt any two questions from three) (Each question carries 10 marks)			
Q.1) How do the process of clipping and compounding help in creating new words? Support your answer with appropriate examples.	L3	CO2	10
Q.2) What are the elements involved in communication process? Elucidate with schematic representation.	L4	CO3	10
Q.3) Elucidate Upward, Horizontal, and Diagonal flow of communication with suitable examples and schematic representation.	L4	CO3	10
SECTION C (30 marks)			
(Attempt any two questions from three) (Each question carries 15 marks)			
Q.1) Categorize the different levels of communication along with their importance.	L4	CO4	15
Q.2) Explain various psychological barriers to communication. Support your views with appropriate examples.	L5	CO4	15
Q.3) Assess the role of a language in the development of human civilization.	L5	CO4	15