PIMPRI CHINCHWAD UNIVERSITY

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

|		
Program	:	First Year Engineering B. Tech
Batch	:	CSE/AIDS/AIML
Semester	:	I
Course	:	Engineering Graphics
Course Code	:	MEC101
Day	:	Friday
Date	:	29/12/2023

Maximum Marks: 60 marks

Time: 2.5 hrs.

Instructions –

- *Figure to the right indicates Full Marks.*
- *Solve Q.1 OR Q.2, Q3 OR.Q4. Q.5 OR Q.6, Q7 OR.Q8.*

SECTION A (15 marks)			
Question	BTL	CO	Marks
1. The point A of 70 mm long line AB is 10 mm above HP and 15 mm in front of VP. The line is inclined to HP and VP at 40° and 45° respectively. Draw the projections of line AB.	L1/L2	CO1	15
OR			
2. An isosceles triangle having base 40 mm and height 70 mm long is resting on HP on its base. Its surface is inclined to HP so that its TV is an equilateral triangle. Draw its projections if its base makes 30° with VP. Find inclination with HP.	L1/L2	CO2	15
SECTION B (15 marks)			
3. A square prism, side of base 35 mm and axis 60 mm has one of the side of base in the H.P. which makes an angle of 30^0 with V.P. and axis inclined at an angle of 45^0 with the H.P. Draw its projections.	L3/L4	CO3	15
OR			
4. Draw the development of the surface of pentagonal pyramid having side 35 mm and axis height 80 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 30^0 to the HP and bisecting the axis of pyramid.	L3/L4	CO4	15

SECTION C (30 marks)

5. Figure shows a pictorial view of an object. By using first angle method of projections, draw;
   i) Sectional Front View , along the symmetry of object.
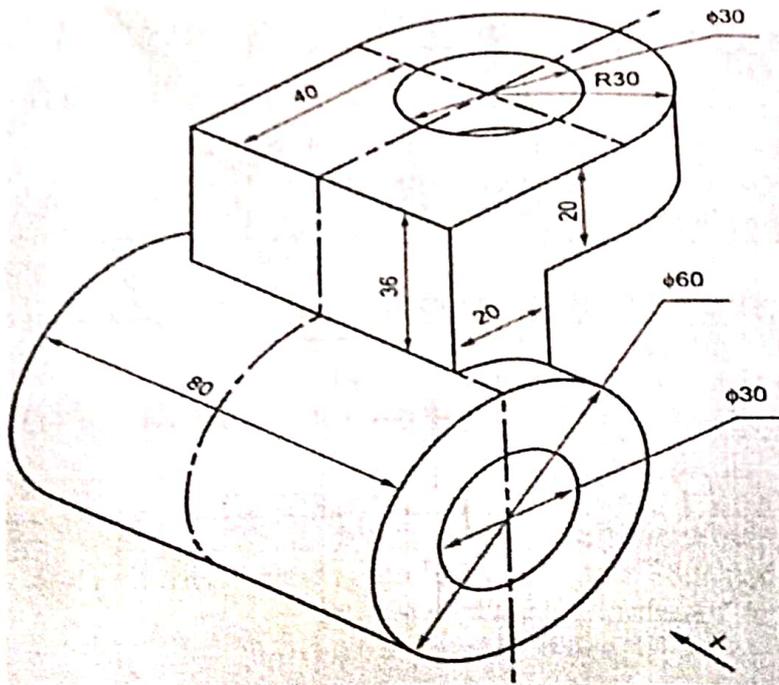   ii) Right hand side view. iii) Top View. iv) Dimentions.
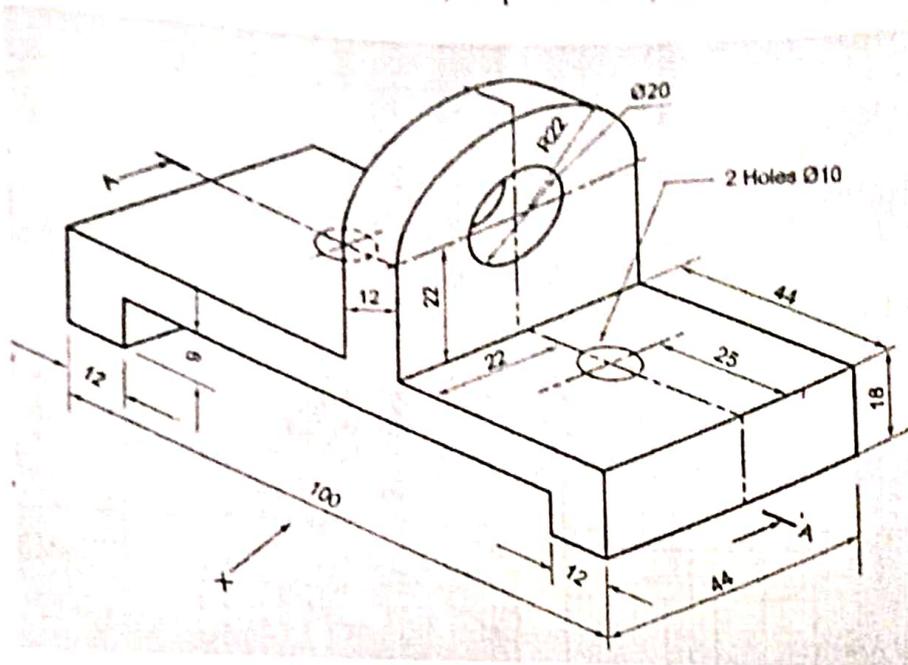
L4/L5 / L6	CO5	15

OR

6. Figure shows a pictorial view of an object. By using first angle method of projections, draw;
   i) Front View. ii) Left hand side view.
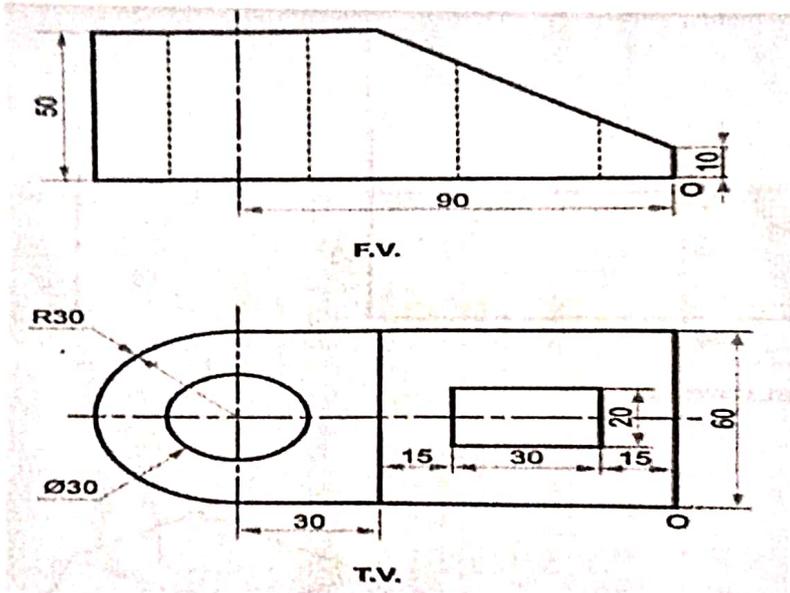   iii) Top View. iv) Dimentions.

L4/L5 /L6	CO5	15

7. Figure shows Orthographic view of an object.
Draw the Isometric view. Take O as origin.
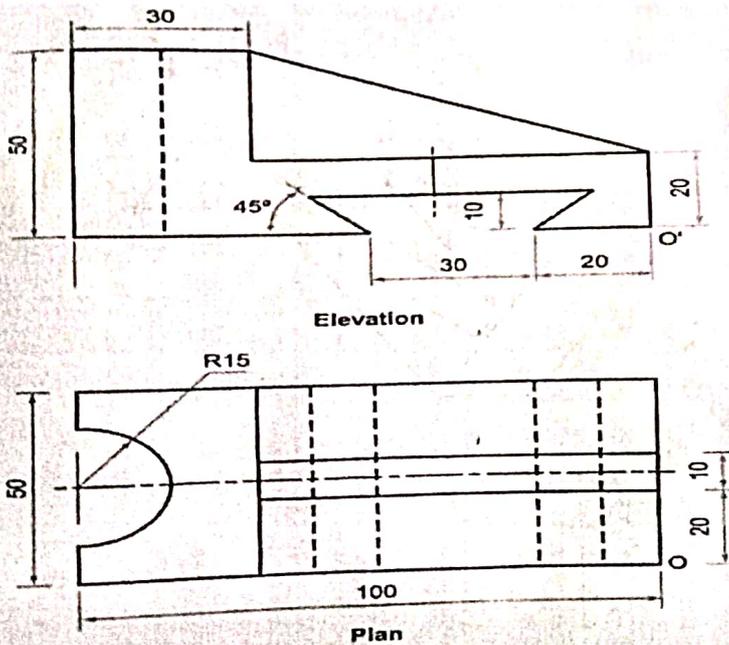Give the basic dimensions.

F.V.

T.V.

| | L5/L6 | CO6 | 15 |

OR

8. Figure shows Orthographic view of an object.
Draw the Isometric view. Take O as origin.
Give the basic dimensions.

Elevation

Plan

| | L5/L6 | CO6 | 15 |

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Name. Akanksha Jharia

Student Enrollment number. No.: sof 232010003

Printed Pages:2

School of Engineering and Technology

Practice Exam –	ODD Semester	Month- December 2023

Programme: First Year B. Tech. (All)   [Semester-I]   [Batch:2023-27]
Course Title: Engineering Chemistry   Marks: 60
Course Code: CHM101   Time:(2.5 Hrs)

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

Q.No		QUESTION	CO	Marks
Q.1		**Solve anyone (a or b)**		7
	i)	What is Indicator electrode? Draw neat labeled diagram of Glass electrode and give its representation.	CO1	4
	ii)	Define reference electrode? Draw neat labelled diagram of calomel electrode and give its representation.	CO1	4
b)	i)	Write a note on Li ion battery. State its advantages	CO1	3
	ii)	Explain the titration curve for conductometric titration of HCl and NaOH.	CO1	4
Q.2		**Solve anyone (a or b)**		8
a)	i)	Define corrosion. Explain wet corrosion with O2 absorption mechanism.	CO2	4
	ii)	Define electroplating. Explain electroplating process with neat labeled diagram and applications.	CO2	4
b)	i)	What are anodic and cathodic Protection methods? Which is more protective in nature? Explain with suitable example?	CO2	4
	ii)	Define Following Terms Cementation b) Powder Coating c) Galvanizing d) Tinning	CO2	4
Q.3		**Solve anyone (a or b)**		7
a)	i)	What is conducting polymer? Give the structural requirement of it. Give applications of polyacetylene.	CO3	3
	ii)	Define biopolymers. Add a note on properties and types of lignin based bioplastics.	CO3	4
b)	i)	What are nanomaterials. Give classification and properties of nanomaterials	CO3	3
	ii)	Differentiate between addition and Condensation Polymerisation	CO3	4
Q.4		**Solve anyone (a or b)**		8
a)	i)	What is Electro dialysis of water? Explain this process with application.	CO4	4
	ii)	50 ml of water sample required 5.7 ml of 0.025N H2SO4 to reach the phenolphthalein end point and 8.8 ml of the same acid for methyl orange end point. Calculate types and amount of alkalinities present in water sample.	CO4.	4
b)	i)	Explain the formation of scale in boiler, give disadvantages and removal methods of it	CO4	4

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	ii)	50 ml of water sample requires 12 ml of 0.01 M EDTA during titration, whereas 50 ml of boiled water sample requires 3.5 ml same EDTA in titration. Calculate total, temporary and permanent hardness of water.	CO4	4
Q.5		**Solve anyone (a or b)**		15
a)	i)	What is biodiesel? Explain the reaction with conditions involved. Give advantages and disadvantages.	CO5	3
	ii)	Draw neat labeled diagram and explain working of Boy's gas calorimeter to determine GCV of fuel. State formula of GCV and NCV.	CO5	4
	iii)	What are fuel cells? Explain working of H_2O_2 fuel cell with figure and cell reactions.	CO5	4
	iv)	The following observations were noted in Boy's gas calorimeter experiment - volume of gas burnt at STP = 0.1 m3. Mass of cooling water used = 2.5 kg. Rise in temperature of circulating water = 5.1°C, Mass of steam condensed = 0.05 kg. Find GCV and NCV of the fuel	CO5	4
b)	i)	Explain the difficulties in storage and transportation of H2 gas.	CO5	3
	ii)	What is Bioethanol? Give preparation and advantages of bioethanol.	CO5	4
	iii)	What is Bio waste? Write a note on its classification and analysis.	CO5	4
	iv)	When 1.2 g of a fuel contains 80% carbon, 10 % hydrogen, 5 % sulphur and remaining ash, is burnt in Bomb calorimeter, the temperature of water rises from 22.4°C to 26.9°C. If the calorimeter contains 500 gm of water and its water equivalent is 160 gm. Calculate GCV and NCV.	CO5	4
Q.6		**Solve anyone (a or b)**		15
a)	i)	State and explain the Lambert's law	CO6	3
	ii)	Explain different types of electronic transitions that occur in an organic molecule after absorbing UV radiations with suitable example.	CO6	4
	iii)	Give principle of IR spectroscopy. Calculate possible number of fundamental vibrations in CO_2, CH_4, and H_2O.	CO6	4
	iv)	Explain the following terms with suitable example: Chromophore Auxochrome Bathochromic shift and Hypsochromic Shift	CO6	4
b)	i)	State and explain the Beer's law.	CO6	3
	ii)	Give principle of IR spectroscopy. Explain functional group region and finger print region in IR spectrum.	CO6	4
	iii)	Explain the principle, instrumentation of UV- Visible spectrophotometer with the help of block diagram.	CO6	4
	iv)	Define the following terms : a)Wavelength b) Frequency c) Wave number d) Amplitude	CO6	4

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Student Name. *Akanksha Jharia*

Enrollment No.: *Sof 23201010003*   Roll no. *5*

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School of Engineering and Technology

Practice Test	ODD Semester	Month- December 2023

Programme: First Year B. Tech. (All)   [Semester-I]   [Batch:2023-24]

Course Title: Basic Electrical Engineering
Course Code: ELE101

Max Marks: 60
Time: 2.5 hour

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

QUESTION	BTL	CO	Max Marks
Q 01 Attempt *ANY THREE*			
a) State and explain Kirchhoff's Laws (KCL and KVL)	KL2	CO1	[5]
b) Solve i) Convert the Delta network in fig. (a) to an equivalent star network fig. (b) Given: R_{ab}=25 ohm, R_{bc}=15 ohm, R_{ca}=10 ohm; Find R_A, R_B, R_C		CO1	[5]
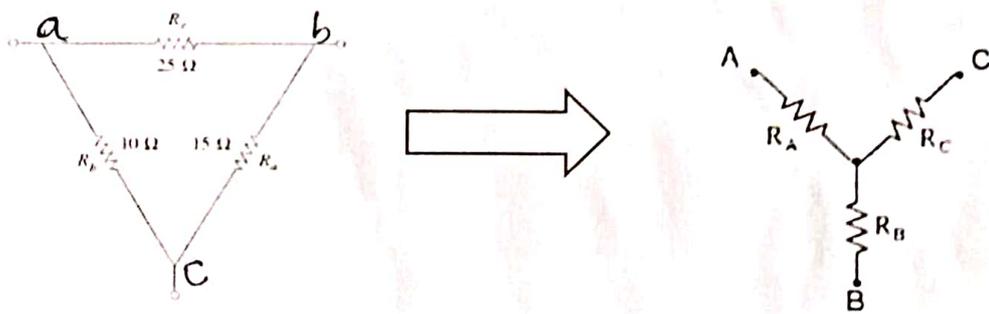
ii) Convert the STAR network in fig. (a) to an equivalent DELTA network fig. (b)
Given: R1=1.67 ohm, R2=5 ohm, R3=2.5 ohm; Find R_{12}, R_{23}, R_{31} KL3
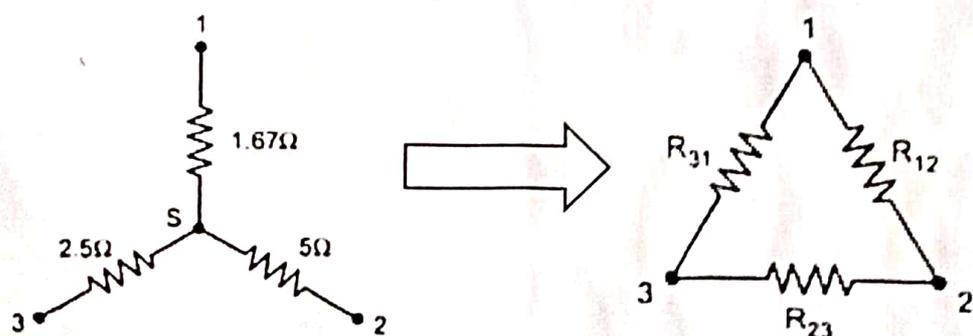
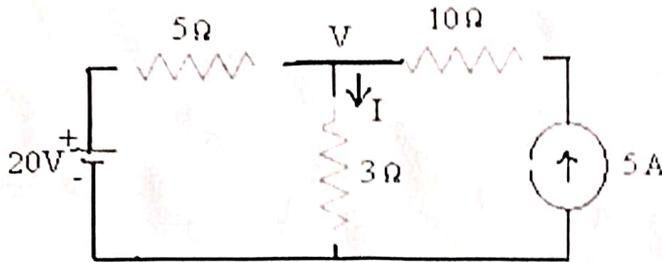|			
c) State and Explain: Maximum Power Transfer theorem.	KL2	CO2	[5]

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	d) By using the superposition theorem, find current I in the circuit shown below.	KL3	CO2	[5]
Q 2	Attempt *ANY THREE*			[5]
	a) Derive the expression for energy stored in magnetic field.	KL2	CO3	[5]
	b) Compare Magnetic and Electric circuit with similarities and dissimilarities	KL3	CO3	[5]
	c) Define RMS Value and Derive the equation for RMS value	KL2	CO4	[5]
	d) A coil has an inductance of **20mH** and resistance of **5Ω**. It is connected across a supply voltage **v=50 Sin(314t)**.Obtain the similar expression for the supply current.	KL3	CO4	[5]
Q 03	Attempt *ANY THREE*			
	a) Explain three phase star connected AC system with i) Circuit diagram, ii) Phasor diagram, ii) STATE the relation between I_{Line} & I_{phase} and V_{Line} & V_{phase}	KL2	CO5	[5]
	b) Three coils, each having a resistance of 8 ohm and an inductance of **0.02 H**, are connected in delta to a three-phase, **400 V, 50 Hz** supply. Calculate (i) Phase Current & Line current, and (ii) Power absorbed (Watt)	KL3	CO5	[5]
	c) A **100 kVA**, single phase transformer has iron loss of **600 W** and copper loss of **1.5 kW** at full load. Calculate the efficiency at i) full load and 0.8 pf lag; ii) half load and unity pf	KL3	CO5	[5]
	d) Derive EMF equation of single phase transformer	KL2	CO5	[5]
Q 04	Attempt *ANY THREE*			
	a) State are the various components of DC generator. What are their functions?	KL2	CO6	[5]
	b) Elaborate on the working principle of a three-phase induction motor.	KL2	CO6	[5]
	c) Explain the working principle of a Miniature Circuit Breaker (MCB)	KL2	CO6	[5]
	d) Explain the working principle of an ELCB to detect the earth faults and prevent electric shocks	KL2	CO6	[5]

Student Name: Abanksha Itaria

Enrollment No.: SOE 2320 1D 10003

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Practice Examination

School of Engineering and Technology
ODD Semester

Programme: First Year B. Tech. (All)   [Semester-I]

Course Title: Linear Algebra and Differential Calculus

Course Code: MTH 101

Month- December -2023

[Batch:2023-24]

Max Marks: 60
Time: $2\frac{1}{2}$ hrs

Instructions:

1. Questions 1,2,3,4 are compulsory.
2. Attempt [Q. 5 or Q. 6] and [Q. 7 or Q. 8]
3. Assume missing data suitably, if any.

(Attempt all question)

Q. No	QUESTION	BTL	CO	Max Marks
Q. 1.	**Solve any One**			
a)	Investigate the values of λ and μ so that the system of equations	BTL3	CO1	7

$$x + 2y + z = 8$$
$$2x + 2y + 2z = 13$$
$$3x + 4y + \lambda z = \mu$$

has (i) No Solution (ii) Unique Solution (iii) An infinite number of solutions. Hence find the infinitely many solution.

b) i)	Find the rank by reducing the matrix $A = \begin{bmatrix} 1 & 1 & -1 & 1 \\ 1 & -1 & 2 & -1 \\ 3 & 1 & 0 & 1 \end{bmatrix}$ to Echelon Form.	BTL3	CO1	3
ii)	Examine for linear dependence or independence of vectors $\{(1,2,4),(2,-1,3),(0,1,2)\}$ If dependent find the relation between them.	BTL3	CO1	4
Q. 2.	**Solve any One**			
a)	Find Eigen values and corresponding Eigen vector of the matrix $A = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ Obtain the Eigen values of A^{-1} and A^2.	BTL3	CO2	8

b) **i)** Find the modal matrix P which diagonalizes the matrix. $A = \begin{bmatrix} 5 & 3 \\ 3 & 5 \end{bmatrix}$ BTL3   CO2

ii) Using Cayley-Hamilton theorem find A^{-1} of the matrix $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ BTL3   CO2

Q. 3.   **Solve any One** $a<1,\ b<1$ and $a<b$

a) Prove that if $0 < a < b < 1$ then $\dfrac{a-b}{\sqrt{1-b^2}} < \cos^{-1}b - \cos^{-1}a < \dfrac{a-b}{\sqrt{1-a^2}}$.   BTL3   CO3   8

And hence show that $-\dfrac{1}{\sqrt{15}} < \cos^{-1}\left(\dfrac{1}{4}\right) < -\dfrac{1}{4}$. $\dfrac{\pi}{3} - \dfrac{1}{2} < cos^{-1}$

b) **i)** Expand $x^3 - 2x^2 + 3x + 1$ in ascending power of $(x + 1)$ BTL3   CO3

ii) If $\lim\limits_{x \to 0} \dfrac{\sin(5x)+a\sin x}{\tan^3 x}$ is finite. Find the value of a and Hence Find limit.   BTL3   CO3   4

Q. 4.   **Solve any One**

a) Find the first two Harmonic of the Fourier series for y from following   BTL3   CO4   7
data:

x	0	$\dfrac{\pi}{3}$	$\dfrac{2\pi}{3}$	π	$\dfrac{4\pi}{3}$	$\dfrac{5\pi}{3}$	2π
y	1.0	1.4	1.9	1.7	1.5	1.2	1.0

b) **i)** Find the half range Fourier sine series for the function $f(x) = x^2$ $0 \le x \le \pi$ BTL3   CO4   3

ii) Test the convergence of the series $\dfrac{1}{3} + \dfrac{2^3}{3^2} + \dfrac{3^3}{3^3} + \dfrac{4^3}{3^4} + \cdots$ BTL3   CO4   4

Q. 5.   **a)** If $u = \dfrac{1}{\sqrt{x^2 + y^2 + z^2}}$ then find the value of $\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} + \dfrac{\partial^2 u}{\partial z^2}$ BTL3   CO5

b) If $U = \sin\left(\dfrac{xy}{x^2+y^2}\right) + \sqrt{x^2 + y^2}$ then show that   BTL3   CO5

$x\dfrac{\partial U}{\partial x} + y\dfrac{\partial U}{\partial y} = \sqrt{x^2 + y^2}$

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c) If $z = f(x, y)$ and $x = u + v, y = uv$ then show that

$$(u - v)\frac{\partial z}{\partial x} = u\frac{\partial z}{\partial u} - v\frac{\partial z}{\partial v}$$
　　　　　　　　　　　　　　　　　　　　　　　BTL3　CO5　5

OR

Q. 6. a) If $x^2 = au + bv$, $y^2 = au - bv$, where a, b are constants then show　BTL3　CO5　5

that $\left(\dfrac{\partial u}{\partial x}\right)_y \cdot \left(\dfrac{\partial x}{\partial u}\right)_v = \left(\dfrac{\partial v}{\partial y}\right)_x \cdot \left(\dfrac{\partial y}{\partial v}\right)_u$

b) If $u = \sin^{-1}\left[\dfrac{x + y}{\sqrt{x} + \sqrt{y}}\right]$ then show that　　　BTL3　CO5　5

$$x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial xy} + y^2\frac{\partial^2 u}{\partial y^2} = \frac{1}{4}\left[\tan^3 u - \tan u\right]$$

c) If $u = f(2x - 3y, 3y - 4z, 4z - 2x)$, then find the value of $\dfrac{1}{2}\dfrac{\partial u}{\partial x} + \dfrac{1}{3}\dfrac{\partial u}{\partial y} + \dfrac{1}{4}\dfrac{\partial u}{\partial z}$.　BTL3　CO5　5

Q. 7. a) If $x = uv$, $y = \dfrac{u}{v}$ then find $\dfrac{\partial(u,v)}{\partial(x,y)}$　　　BTL3　CO6　5

b) In Calculating the volume of a Right Circular Cone errors of 2% & 1%　BTL3　CO6　5
are made in measuring the height & radius of base respectively. Find the
error in the Calculated Volume.

c) Find the extreme values of $f(x, y) = x^2 + y^2 + 6x + 12$　BTL3　CO6　5

OR

Q. 8. a) Examine $u = \dfrac{x + y}{1 - xy}$, $v = \tan^{-1} x + \tan^{-1} y$ for functional dependence and　BTL3　CO6　5
if dependent find the relation.

b) The Focal length of a Mirror from the formula $\dfrac{1}{v} - \dfrac{1}{u} = \dfrac{2}{f}$ Find the　BTL3　CO6　5
percentage error in f If u & v are both in error by 2% each.

c) Find the extreme values of $f(x, y) = 5 - 2x - 6y - x^2 - y^2$　BTL3　CO6　5