2.3.1 Student centric methods, such as experiential learning, participative learning and problem solving methodologies are used for enhancing learning experiences

Through

Sr. No.	*Supportive Documents*
1	*Experiential Learning*
2	*Participative Learning*
3	*Problem Solving Methodologies*

1. Experiential Learning

B.Sc. (Semester I)

Department of Physics

Practical Manuals

By

Prof. J. I. Thakur

Dr. V. U. Rahangdale

List of Practicals (103)

1) To determine Young's modulus (Y) of given material by cantilever.
2) To determine Young's modulus(Y) of given material by bending of beam.
3) To determine Modulus of rigidity (η) of given wire by Torsional pendulum.
4) To determine Modulus of rigidity (η) of given wire by statical method (Berton's apparatus).
5) To determine Surface tension of water by capillary rise method.
6) To determine Surface tension of mercury by Quincke's method.
7) To determine the value of inductance of coil by phasor diagram (three voltage) method.
8) To determine the value of Capacitor by phasor diagram (three voltage) method.
9) Study of frequency response of series LCR circuit and determine resonant frequency and quality factor-Q.
10) Study of Transformer and determine it's parameters (Lp,Ls,M,k,n).
11) To verify KCL.
12) To determine Young's modulus (Y) of given material by vibration method.
13) To study decay of current in CR circuit.
14) To determine frequency of A.C. mains by Sonometer.
15) To calculate low resistance by potentiometer.

Experiment No . 1

Aim:- To determine Young's modulus(Y) of the material of beam by using cantilever.

Apparatus:- A thin beam clamped at one end, some weight, traveling microscope, meter scale, vernier caliper, Screw gauge etc.

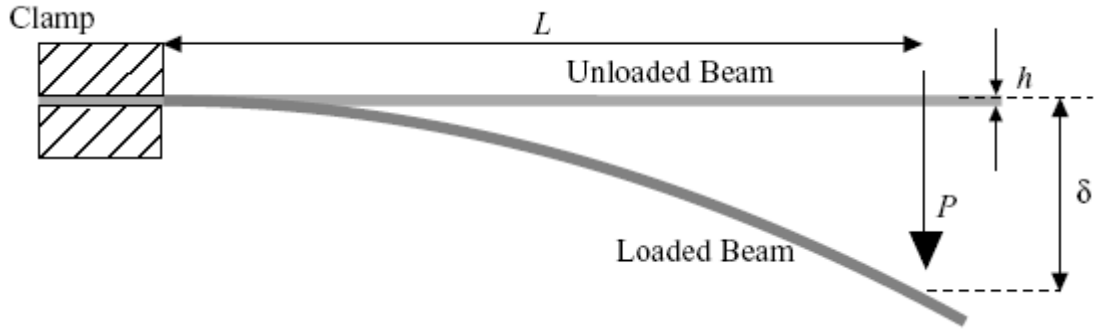
Formula:-

$$Y = \frac{4(m_2 - m_1) \times g \times l^3}{bd^3\delta}$$

Where,

Y = Young's modulus of the material of beam.
$(m_2 - m_1)$ = Mass consider for calculation.
g = Acceleration due to gravity
l = Length of the beam.
d = Thickness of the beam.
b = breadth of the beam.
δ = Depression of the free end due to mass $(m_2 - m_1)$

Diagram:-



Observation:-

l) Length of the beam (l) = …..cm

2) Observation for breadth of beam :-

Least count of Vernier caliper = 0.01 cm

S. No.	M.S.R. (cm)	V.S.R. X L.C.	T.R.= (MSR+VSR x L.C) (cm)	Mean b (cm)
1				
2				
3				

3) Observation for thickness of beam :-

Least count of screw gauge = 0.001 cm or 0.01mm

S. No.	M.S.R. (mm)	C.S.R. X L.C.	T.R.= (MSR+VSR x L.C) (mm)	Mean d (mm)	Mean d (cm)
1					
2					
3					

4) Observation for depression **(δ)** :-

Least count of traveling microscope = 0.001 cm

S. No.	Load (gm)	Reading of microscope						Mean T.R. (cm) $d=d_1+d_2/2$	Depression **(δ)** for ($m_2 - m_1$ = 100 gm) cm	Mean **(δ)** cm
		Load increasing d_1			Load Decreasing d_2					
		M.S.R. cm	V.S.R.	T.R. cm	M.S.R. cm	V.S.R.	T.R. cm			
1	50									
2	100									
3	150									
4	200									
5	250									
6	300									

Procedure:-

1) Fix a sharp and fine pin at the free end of the cantilever, focus the traveling microscope on the tip of the pin such that tip just coincide with the crosswire. Note the reading of vertical scale of the microscope.
2) Keep the weight of 50 gm. In the pan and slide the microscope parallel to itself (in vertical direction) to get pin as in step 1. Note the reading of vertical scale.
3) Add one more weight of 50 gm. In the pan. Adjust the micrometer to get in the pin as step 1 again and note the reading.
4) Repeat step no. 3 to get 6 or 8 reading.
5) Remove the weight one by one and take the reading of the microscope every time.
   Focusing the tip of the pin of the crossing of crosswire.
6) Measure the length of beam by the meter scale.
7) Measure the breadth of the beam by vernier caliper different places.
8) Measure the thickness of the beam by screw gauge.

Result:-

The Young's modulus of material of the beam by using cantilever is found to be …… dyne/cm^2.

Precaution:-

1) The beam should be rigid.
2) Keep weight carefully.

Experiment No. 2

Aim:- To determine Young's modulus(Y) of given material by bending of beam.

Apparatus :- Beam, two knife edges with the clamps, hanger to suspend load, meter scale, vernier calipers, screw gauge, spherometer etc.

Formula :-

$$Y = \frac{(m_2 - m_1)\, g l^3}{4bd^3 \delta}$$

Where ,

Y = Young's modulus of material of beam .
l = Length of the beam.
d = Thickness of the beam.
g = Acceleration due to gravity.
δ = Depression at midpoint of the beam due to mass $(m_2 - m_1)$.

Diagram :-

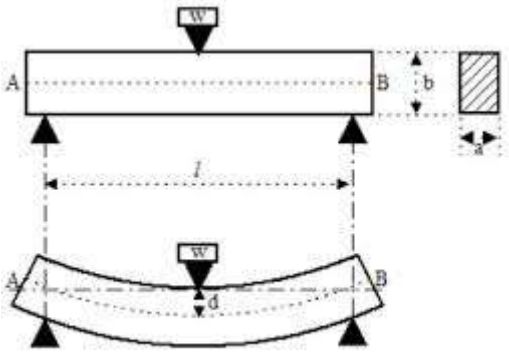


Fig. 2. Deflection of a simple beam.

Observation :-

1) Length of the beam (l) = …… cm.
2) Least count of screw gauge= 0.001 cm..
3) Least count of Vernier calipers= 0.01 cm.
4) Least count of Spherometer = 0.001 cm. or 0.01 mm
5) Thickness of the beam :-

Sr . No	M.S.R. (mm)	C.S.R. X L.C.	T.R. (mm)	Mean d (mm)	d (cm)
1					
2					
3					

6) Breadth of beam:-

Sr . No	M.S.R. (cm)	C.S.R. X L.C.	T.R. (cm)	Mean b (cm)
1				
2				
3				

7) Depression of the beam:-

S. No.	Load (gm)	Position of Spherometer						Mean T.R. reading mm	Depression δ for (m_2-m_1 = 1000 gm) mm	Mean **δ** cm
		Load Increasing			Load decreasing					
		M.S.R.	V.S.R.	T.R.	M.S.R.	V.S.R.	T.R.			
1	0									
2	500									
3	1000									
4	1500									
5	2000									
6	2500									

Procedure :-

1) Adjust the given bar (beam) in horizontal position on two knife edges.
2) Measure the length of the beam i.e. distance between two knife edges by meter scale.
3) Measure the breath and thickness of the beam with the help of vernier caliper and screw gauge resp.
4) Suspend the hanger at the centre of the beam. Take the reading of the spherometer for no load.
5) Insert a load of 500gm. In the hanger and allow the beam to depress. Note the reading of spherometer for 500gm. Increase the load in equal step of 500gm. And note reading every time.
6) Decrees the load in same equal steps and note the reading every time.

Result:-

Young's modulus of the material of beam is found to be …….. dyne/cm^2.

Precaution :-

1) The load should not be increase beyond elastic limit of the beam.
2) Thickness and breath of the beam measure accurately.
3) The beam should placed horizontally.
4) The knife edges should be sharped.

Experiment No. 03

Aim:- To determine Young's modulus(Y) of the material of beam by vibration method.

Apparatus :- An experimental beam, telescope, stop watch, weight box, meter scale, screw gauge.

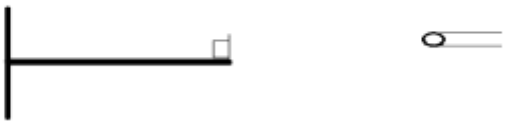
Formula :-

$$Y = \frac{16\pi^2}{bd^3} \cdot \frac{L^3}{T^2} \cdot \left(m + \frac{33M}{140}\right)$$

where,

Y - Young's modulus of the material of the beam.
l - Length of vibrating part of the beam.
b - Breadth of the beam.
d - thickness of the beam.
m - Mass attached to the free end of the beam.
T – Periodic time of vibration of the beam for the mass m.
M – Mass of the vibrating part of the beam.

Diagram:-



Observations:-

1) Length of vibrating part of the beam (L) = ……. Cm
2) To find thickness of beam (d) :-
   Least count of screw gauge :- 1mm/100 = 0.01 mm

Sr . No	M.S.R. (mm)	C.S.R. X L.C.	T.R. (mm)	Mean d (mm)	d (cm)
1					
2					
3					

3) To find breadth of beam (d) :-
   Least count of venier caliper :- 0.1cm/10 = 0.01 cm

Sr . No	M.S.R. (cm)	C.S.R. X L.C. (cm)	T.R. (cm)	Mean b (cm)
1				
2				
3				

4) To find out period of oscillation (T) :-

Sr . No	Mass attached	Time for 20 oscillation			Time period T= t/20 sec	T^2
		t_1	t_2	Mean 't' sec		
1						
2						
3						

5) Mass per unit length of the beam (m) =M_1/x = 33.5/4.78 gm/cm.
   M = mass per unit length x length of the beam = m x L

Procedure :-

1) Fix one end of the beam rigidly with the clamp to the table. Fix a pin in a vertical position to the free end .

2) Fix a small mass to the free end rigidly to carry mass.

3) Now focus the telescope from distance of about 2 to 3 meters on the tip of pin so that tip coincides with the horizontal wire of the crosswire.

4) Set the beam into vertical vibration by pushing the mass slightly downward and then release it.

5) Measure time for 20 oscillations with the help of stopwatch. Repeat this step at least two or three times.

Result:-

Young's modulus of the material of beam is found to be …….. dyne/cm^2.

Precaution :-

1) The load should not be increase beyond elastic limit of the beam.
2) Thickness and breath of the beam measure accurately.
3) The beam should place horizontal.
4) Reading of time period should be taken carefully.

Experiment No . 4

Aim:- To determine Modulus of Rigidity (**η**) of the given wire by Torsional pendulum.

Apparatus :- Torsional pendulum, Auxiliary body, Stop watch, screw gauge, vernier caliper, meter scale, weight box, physical balance etc.

Formula :-

$$\eta = \frac{8\pi I L}{(T2-To2)\, r4}$$

Where,

I = Moment of inertia of auxiliary body.

L = Length of experimental wire.

r = Radius of experimental wire.

$\mathbf{T_0}$ = Periodic time of oscillation when only disc is oscillating.

T = Periodic time of oscillation when disc and auxiliary body both are oscillating together .

Diagram:-

Observation:-

1) Length of experimental wire (L) = ……. Cm
2) To find radius of experimental wire (r) :-

Least count of screw gauge: 1mm/100 = 0.01mm

S. No.	M.S.R.	C.S.R. X L.C.	T.R. (mm)	d (mm)	r (mm)	r (cm)
1						
2						
3						

3) To find inner and outer radius of the Ring :-

Least count of Vernier caliper: 0.1cm/10 = 0.01 cm

S. No.	For outer Radius				For inner Radius			
	M.S.R. (cm)	V.S.R. x L.C.	T.R. (cm)	Radius R_1 (cm)	M.S.R. (cm)	C.S.R. x L.C.	T.R. (cm)	Radius R_2 (cm)
1								

4) To find Time period of oscillation T & T_0 :-

S. No.	Time for 10 torsional oscillation of disc									
	Without Ring					With Ring				
	t_1	t_2	t_3	Mean t sec	T_0 = t/10 sec	t_1	t_2	t_3	Mean t sec	T = t/10 sec
1										

5) Mass of the Ring = …440 gm.

Procedure :-

1) Rigidly fix one end of the experimental wire in the upper chuck and other end of the wire to the lower chuck on the disc.
2) Turn or rotate the disc through a small angle in horizontal plane and release. It will perform torsional oscillations.
3) Record time for 10 oscillation at least three time and calculate the mean.
4) Place the auxiliary body on the disc. Determine the time for 10 oscillation at least three times and calculate them.
5) Measure the diameter of the wire with screw gauge at different points along the length of the wire and find the mean.
6) Measure the inner as well as outer diameter of auxiliary body with the help of vernier caliper.
7) Measure the length (L) of experimental wire.

Calculations:- To find Moment of Inertia (I)

$$I = MR^2/2 \qquad \& \qquad \text{Radius of Ring} \ , \ R = R_1+R_2$$

$$\eta = \frac{8\pi I L}{(T2-To2)\, r4}$$

Result:-

Modulus of Rigidity of material of given wire is found to be ……. Dyne /cm^2

Precaution :-

1) The disc should oscillate in a horizontal plane only.
2) There should be tensional motion of pendulum only. Pendulum motion should be avoided.
3) The amplitude of oscillation should be small.
4) The wire must be uniform.
5) The support should be rigid.

Experiment No. 5

Aim:- To determine Modulus of Rigidity (**η**) of the material of the rod by statical method (By horizontal Bartons' Apparatus).

Apparatus :- Bartons' Apparatus, given rod , weight box , vernier calipers, meter scale, screw gauge etc.

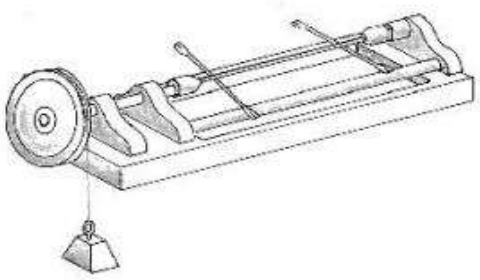
Formula:-

$$\eta = \frac{360\ m\ g\ R\ (l_2-l_1)}{\Pi\ r^4\ (\theta_2-\theta_1)}$$

Where,

m= mass suspended from one of the pulley.
g= Acceleration due to gravity.
R= Radius of the pulley.
r = Radius of the Rod.
$(\theta_2-\theta_1)$= Twisting angle of Rod for mass 'm'.
(l_2-l_1) = Length of Rod (Distance between two pointer).

Diagram:-



Observations:-

1) To find radius of experimental Rod (r) :-

Least count of screw gauge : 1mm/100 = 0.01mm

Sr. No.	M.S.R. (mm)	C.S.R. x L.C	T.R.(mm)	d (mm)	r (mm)	r (cm)
1						
2						
3						

2) Circumference of the pulley : 2πR = …… cm

Hence , Radius of the pulley R = ……. Cm

3) To find angle of twist at pointer P_1:-

Distance of point P_1 from a fixed end of rod (l_1) :-…… cm

Sr. No.	Load Suspended gm	Reading of pointer when load is suspended on						Mean Angle **α**	Angle of Twist for 250 gm θ_1	Mean θ_1
		One side of Pulley			Other side of Pulley					
		Load		$(\alpha_1+\alpha_2)$ …… 2	Load		$(\alpha_1+\alpha_2)$ …… 2			
		Increasing α_1	Decreasing α_2		Increasing α_1	Decreasing α_2				
1	0									
2	250									
3	500									
4	750									
5	1000									
6	1250									

To find out angle of twist at pointer P_2:-

Distance of point P_2 from a fixed end of rod (l_2) :- ……cm.

Sr. No.	Load Suspended gm	Reading of pointer when load is suspended on						Mean Angle β	Angle of Twist for 250 gm Θ_2	Mean Θ_2
		One side of Pulley			Other side of Pulley					
		Load		$\frac{\beta_1+\beta_2}{2}$			$\frac{\beta_1+\beta_2}{2}$			
		Increasing	Decreasing		Increasing	Decreasing				
1	0									
2	250									
3	500									
4	750									
5	1000									
6	1250									

Calculations:- Radius of Pulley R = Circumference /2π

$$\eta = \frac{360\ m\ g\ R\ (l_2-l_1)}{\Pi\ ^2r^4(\theta_2-\theta_1)}$$

Procedure:-

1) Hang the number of hucks on one side of the pulley to carry the load.
2) Clamp the pointer P_1 at 30-35 cm and pointer P_2 at 60-65 cm from the fixed end of the rod.
3) Measure the distance of the pointer P_1 and P_2 from the fixed end of the rod. Note it as l_1 & l_2.
4) Gently hang a load of 250gm to one of the huck and allow the pulley to settle down after its initial rotation. Note that the new position of the pointer.
5) Till the maximum possible to load is reached every time, note the position of the pointer.
6) Now decrease the load in step of 250 gm and again record the position of the pointer.
7) Repeat same steps for other side of the pulley so that the rod is now twisted in opposite direction. And record the respective readings.
8) Measure the diameter of the rod by screw gauge.
9) To find out the diameter of the pulley. Measure the circumference with the help of thread and then calculate its diameter.

Result:- The modulus of rigidity'**η**' of the material of the rod is found to be …… dyne /cm^2.

Precaution :-

1)The experimental rod should be very tightly clamped.
2) As the radius of the rod appears in fourth power in the formula should be carefully measured.
3) The rod must be uniformed.
4) The load should not be exceed.

Experiment No. 6

Aim:- To determine Surface Tension of water by capillary rise method .

Apparatus:- Capillary Tube , Travelling Microscope, Thermometer, Beaker filled with water etc.

Formula:- $$T = \frac{r \rho g(h + r/3)}{2}$$

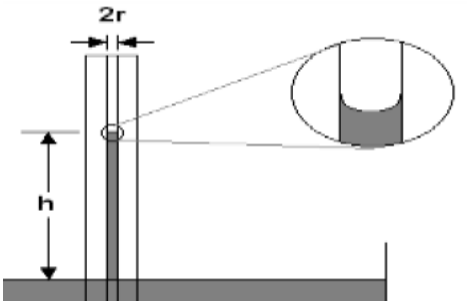
Where,

r = Radius of capillary tube

ρ = density of water

h = height of water level in capillary

Diagram:-



Observations:-

1) Least count of traveling microscope = 0.05cm/50=0.001 cm
2) To find out length of water column in capillary (h)-

Sr. No.	Position of microscope when focused on						Difference $h=(h_2-h_1)$ cm	Mean h cm
	Upper water level in capillary tube (h_1)			Lower water level (water surface in beaker)(h_2)				
	M.S.R.cm	V.S.R.	T.R.cm	M.S.R.cm	V.S.R.	T.R.cm		
1								
2								
3								

3) Inner Radius of Capillary tube = 0.0425cm

Procedure:-

1) Hang the capillary tube to the stand with the help of rod.
2) Dip the capillary tube partially in the water in beaker, so that water level will rise in capillary tube . Adjust the traveling microscope so that juts horizontal cross wire just touches the lower water level (water surface in beaker). Note the position of the microscope on the vertical scale(h_2).
3) Move the microscope upward and adjust the horizontal cross wire so that it touches the upper level of water in capillary. Take reading of microscope(h_1).
4) Find the difference between h_1 and h_2.
5) Find the radius of capillary tube using traveling microscope.
6) By using formula find the surface tension of water.

Calculations:- :- $$T = \frac{r \rho g(h + r/3)}{2}$$

Result: -

The surface tension of water is found to be …….. dyne/cm^2 at ---------^{o}C.

Precaution:-

1) Tube should be vertical.
2) Backlash error of traveling microscope should be avoided.

Experiment No. 7

Aim:- To determine Surface Tension of mercury by Quinck's method.

Apparatus:- A plane glass plate with three leveling screw, mercury, traveling microscope, thermometer, sprit level etc.

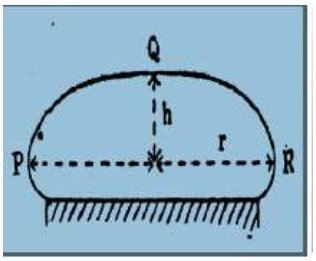
Formula :-

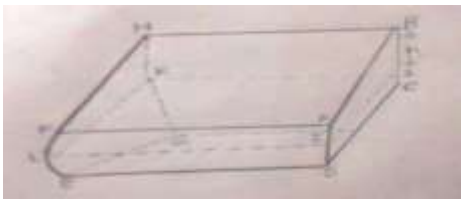
$$T = (\rho g h^2) / 2$$

Where,

T - Surface tension of mercury.
ρ - density of mercury.(13.6 gm/cm^3)
h - distance between the top surface and the horizontal plane of maximum area.

Diagram :-





Observations :-

To find difference (h) :-
Least count of travelling microscope = 0.005/50 = 0.001 cm

Drop No.	Position of microscope when focused on						Difference $h=(h_2-h_1)$ cm	Mean h cm
	Most protruding point on it one side. (h_1)			Top of the drop (h_2)				
	M.S.R.cm	V.S.R.	T.R.cm	M.S.R.cm	V.S.R.	T.R.cm		
1								
2								

Procedure :-

1) Clean the glass plate carefully and level it with the help of leveling screw and sprit level.
2) Place a large drop of mercury over the glass plate so that its top surface is flat.
3) Focus the microscope on mercury drop such that the vertical cross wire is tangential to the side way of the drop and horizontal wire passes through most protruding point of the drop (point 1). Note the position of the microscope on the vertical scale (h_1)
4) Slide the microscope sideway as well as upward to focus it on the top of the surface of the drop. Adjust the horizontal crosswire the ,microscope such that it become tangent to the top of mercury drop (point 2) and note the position of the microscope on the vertical scale (h_2)
5) Change the side of the drop by adding or removing some mercury and repeat step 3 and 4.

Result :- The surface tension of mercury is found to be …… dyne / cm^2 at ---------^{o}C.

Precaution :-

1) The glass plate should be cleaned properly to avoid contamination of mercury.
2) The glass plate should be leveled properly to avoid wastage of mercury.
3) The drop of the mercury should be large to ensure that flat top.

Experiment No.8

Aim:- To determine the value of inductance of coil by phasor diadram using three voltage method.

Apparatus:-Step down transformer, high (R.B.), inductance coil, A.C. volt meter, connecting wire etc.

Formula:-

$$L = \frac{V_L}{V_R} \times \frac{R}{2\pi F}$$

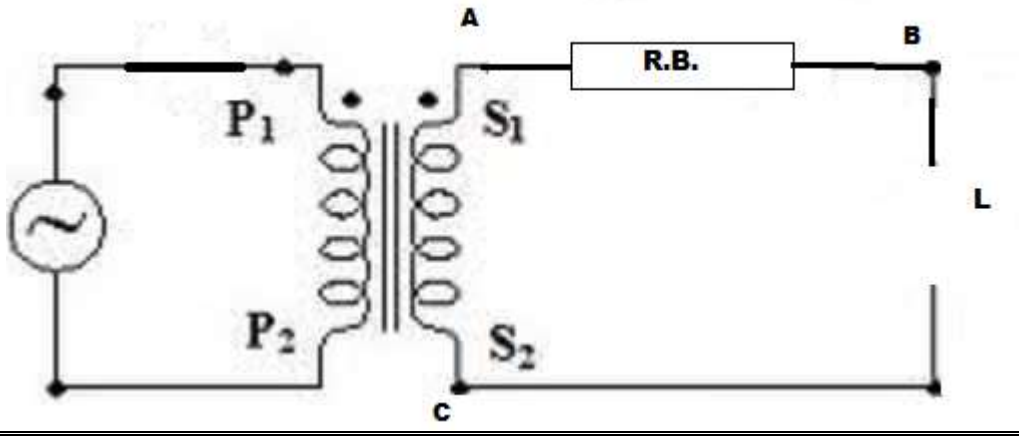
Where, R = Resistance from R.B.

V_R = Voltage cross R.B.

V_L = Voltage across inductance.(from phasor diagram)

F = Frequency of A.C. mains. (50 Hz)

Diagram:-



ObservationTable:-

Sr. No.	Resistance R Ω	$V_T = V_{AC}$ V	$V_R = V_{AB}$ V	$V_L' = V_{BC}$ V	V_L from graph	$L = \frac{V_L}{V_R} \times \frac{R}{2\pi F}$ H	Mean (L) H
1	50						
2	100						
3	150						
4	200						
5	250						
6	300						
7	350						
8	400						

Procedure:-

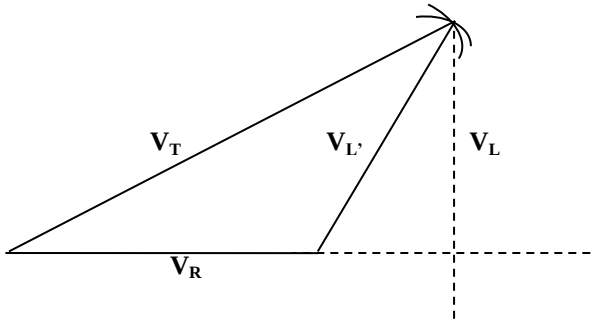
1) Make the connection as shown in fig.
2) Take the resistance from R.B. and measure the voltage across points A&B i.e. V_R, across A&C. i.e. V_T, and across point B&C i.e. $V_{L'}$.
3) Then draw the phasor diagram from getting V_L.

4) Calculate the L by using Formula and then calculate the mean of L.

Calculation :

$$L = \frac{VL}{VR} \; X \; \frac{R}{2\pi F}$$

Phasor diagram:-



Result:-The value of inductance of coil by phasor diagram using three voltage method is found to be _____mH.

Precaution:-

1) All theconnections should be tight.
2) Voltage Should not be exceeds than the rated value of device.
3) Measure the voltages V_R,$V_{L'}$, and V_T on same scale of voltmeter.
4) The magnitudes of V_R and $V_{L'}$ should not differ by large margin.

Experiment No. 9

Aim:- To determine the value of Capacitor by phasor diagram using three voltage method.

Apparatus:- Step down transformer, high (R.B), Capacitor, , A.C. volt meter, connecting wire etc.

Formula :-

$$C = \frac{V_R}{V_c} \times \frac{1}{2\pi f R}$$

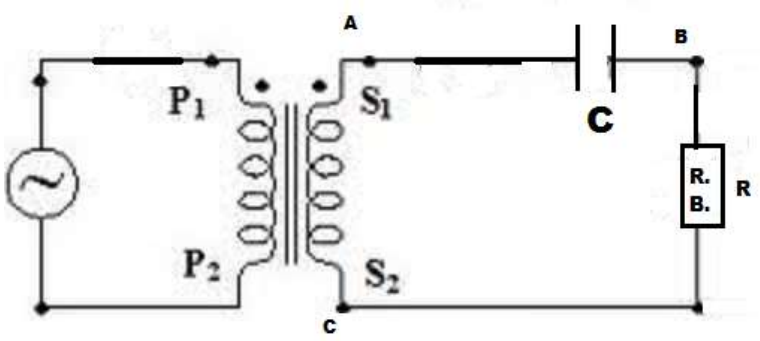
Where, R = Resistance from R.B.

V_R = Voltage cross R.B.

V_c = Voltage across Capacitor.(from phasor diagram)

F = Frequency of A.C. mains. (50 Hz)

Diagram :-



Observation Table:-

Sr. No.	Resistance R Ω	$V_T = V_{AC}$ V	$V_R = V_{AB}$ V	$V_c' = V_{BC}$ V	V_c from graph	$C = \frac{V_R}{V_c} \times \frac{1}{2\pi fR}$ μ F	Mean (C) μ F
1	2000						
2	3000						
3	4000						
4	5000						
5	6000						
6	7000						
7							
8							

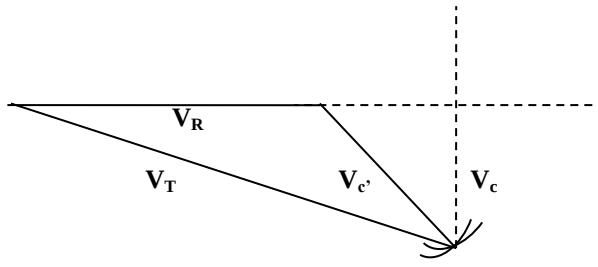
Procedure:-

1) Connect the various components as shown in fig. where the step-down transformer used should have a current rating about 500 mA, and output voltage of 6 to 8 V. Capacitor C is normally 0.47 μF. paper capacitor at 20 volt. The resistance box used should also have provision for few kilo ohms.
2) Chose the circuit and measure the three voltages $V_{C'}$, V_T, V_R across the points A&B, across B&C and across A&C respectively. The voltmeter used should have very high input Impedance.
3) To obtain various sets take three different value of resistance from the resistance box.
4) Now draw phasor diagram and find out Vc.
5) Lastly calculate C by using formula given above.

Calculation :-

$$C = \frac{V_R}{V_c} \times \frac{1}{2\pi fR}$$

Phasor diagram:-



Result :- The value of Capacitor by phasor diagram using three voltage method is found to be _____ μF.

Precaution :-

1) While taking out various resistance from the resistance box see that, it's not too small, otherwise current may be drawn from the transformer, which in some cases may be more than its rating. Hence, see that the transformer does not get heated during the experiment.
2) The voltmeter used, should necessarily have high input impedance.

Experiment No. 10

Aim:-**To study decay of current in C.R. circuit.**

Apparatus:-Resistance, Capacitor, micro ammeter, D.C. Power supply key, stop watch, connecting wire etc.

Formula:-The Time constant for R.C. circuit ,

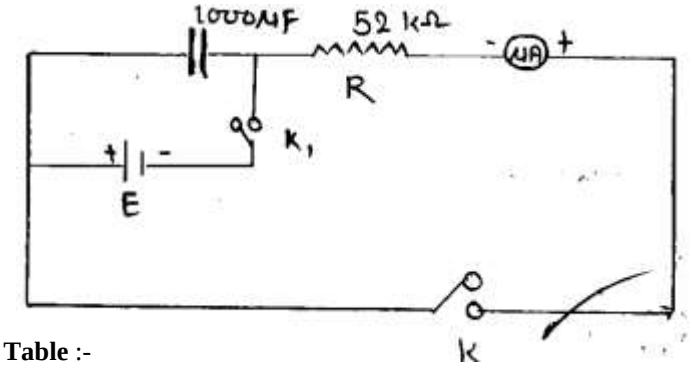
$$t = R \times C$$

Where,

R - Resistance.

C - Capacitance.

Diagram:-



Observation Table :-

Sr. No.	Time in sec.	Discharging current (I) in μA
1	0	
2	5	
3	10	
4	15	
5	20	
6	25	
7	30	
8	35	
9	40	
10	45	
11	50	
12	55	
13	60	
14	65	
15	70	
16	75	
17	80	
18	85	
19	90	
20	95	
21	100	

Procedure:-

1) Make the connection as shown in fig.
2) Close the key K_1 and open K_2 to charged capacitor C.
3) Once capacitor is a fully charged open key K_1 and closed K_2, start immediately the stop watch and for regular interval of time(i.e. 5 sec) record the discharging current by micrometer.
4) In this case note down discharging current for each 5 sec.
5) Plot the graph between current I along Y-axis and Time ‘t’ along X-axis .
6) Find the R.C. time constant from graph and calculation.

Calculation:- $I = 0.3679 \times I_{max}$

Time constant for R-C ckt,

$t = R \times C$ sec.(from calculation)

= _____sec.(from graph)

Result:-Time constant of R.C. circuit is found to be _____sec.(from calculation)
and Time constant of R.C. circuit is found to be _____sec.(from graph.)

Precaution:-

1) Connection should be tight.
2) Avoid the out of scale deflection at micrometer .
3) Power given to the R.C. circuit should be regulated.
4) The value of resistance R must be known accurately.
5) The capacitor of R.C. circuit should be constant.

Experiment No. 11

Aim:-Study of frequency response of the LCR circuit and determine resonant frequency and quality factor (Q).
Apparatus:-Inductance, capacitor, resistor, resistance, millimeter, audio frequency oscillator and connecting wire.

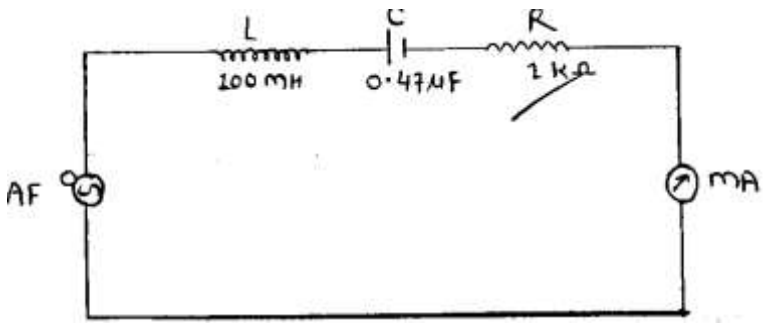
Formula:-

Resonant frequency F_r, $$F_r = \frac{1}{2\pi\sqrt{LC}}$$

Quality Factor Q, $$Q = \frac{F_r}{F_2 - F_1}$$ (From graph) $$Q = \frac{1}{2\pi F_r . CR}$$ (From calculation)

Where, L = Inductance
C = Capacitor
F_1 & F_2 = Lower cut of frequency and upper cut of frequency.

Diagram:-



Observations:-

1) Inductance L= 100 mH
2) Capacitance C= 0.47 µF
3) Resistance R = 1 K Ω

Observation table:-

Sr. No.	Frequency H_Z	Current mA	Sr. No.	Frequency H_Z	Current mA
1	100		16	850	
2	150		17	900	
3	200		18	950	
4	250		19	1000	
5	300		20	1500	
6	350		21	2000	
7	400		22	2500	
8	450		23	3000	
9	500		24	3500	
10	550		25	4000	
11	600		26	4500	
12	650		27	5000	
13	700		28	5500	
14	750		29	6000	
15	800		30	6500	

Calculation:-

$$F_r = \frac{1}{2\pi\sqrt{LC}}$$

$$Q = \frac{1}{2\pi F_r . CR}$$

Procedure:-

1) Make the connection in circuit as shown in fig.
2) Record the current with the help of milliameter by changing the frequency from audio frequency oscillator.
3) Draw the graph between current I along Y-axis and frequency f along X-axis and find the resonance frequency. Also find the lower cut of frequency F_1 and upper out of frequency F_2 by taking 0.707of maximum current I_o.

Result :-

A) The resonance frequency is found to be _____(from calculation)
B) The resonance frequency is found to be _____(from graph.)
C) The Quality factor is found to be _____ (from calculation)
D) The Quality factor is found to be _____ (from graph.)

Precautions:-

1) For obtaining sharp resonance the ratio L/C should be as high as possible.
2) Input voltage applied to the ckt should be kept constant throughout expt.
3) Connection should be tight.
4) Use audio oscillator of low output impedance.

Experiment No.12

Aim:-**Study of transformer & Determine it's parameters (L_P, L_S, M, k, n.)**

Apparatus:-Step down transformer, resistance box, experimental transformer, A.C. voltage and connecting wire.

Formula:-

For primary inductance

$$LP = \frac{VL}{VR} \times \frac{R}{2\pi F}$$

For Secondary inductance

$$Ls = \frac{VL}{VR} \times \frac{R}{2\pi F}$$

For Mutual inductance

$$M = \frac{LX - LY}{4}$$

For turn Ratio n

$$n = \sqrt{\frac{Ls}{LP}}$$

For Coefficient (k)

$$k = \frac{M}{\sqrt{LX - LY}}$$

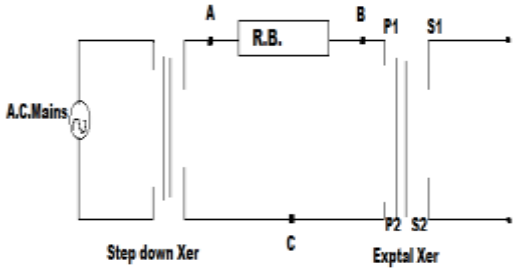
Where,

L_S& L_P = Inductance of primary and secondary.

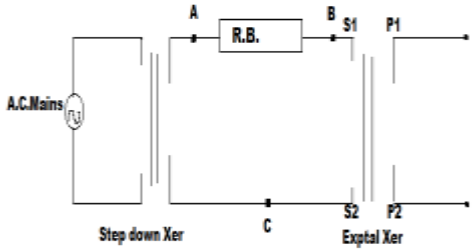
L_x& L_y = Inductance of coil for the series added & opposes.

Combination of L_P and L_S same sense unit series added combination of L_P and L_S opposite source respectively.

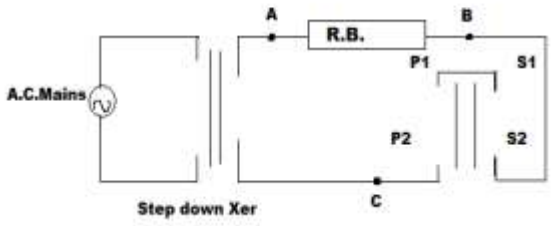
Diagram:-**A)ForPrimaryInductance (L_P)**



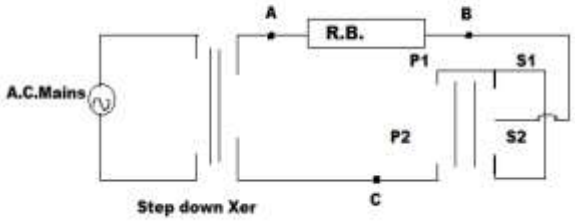
B) For Secondary Inductanc(L_S)



C) For Mutual Inductance (L_X)



D) For Mutual Inductance (L_Y)



Observation Table:- **1)For Primary Coil L_p :-**

Sr. No.	Resistance from R.B. Ω	$V_T = V_{AC}$ V	$V_R = V_{AB}$ V	$V'_L = V_B$ V	From phasor Diagram (V_L) V	$L_P = \frac{R}{2\pi F} \times \frac{V_L}{V_R}$	Mean L_P (H)

1	1000						
2	2000						
3	3000						

2)For secondary Coil L_s:

Sr. No.	Resistance from R.B. Ω	$V_T = V_{AC}$ V	$V_R = V_{AB}$ V	$V'_L = V_{AC}$ V	From phasor Diagram (V_L) V	$L_S = \frac{R}{2\pi F} \times \frac{V_L}{V_R}$	Mean L_S (H)
1	10						
2	20						
3	30						

3)For L_x :-

Sr. No.	Resistance from R.B. Ω	$V_T = V_{AC}$ V	$V_R = V_{AB}$ V	$V'_L = V_{BC}$ V	From phasor Diagram (V_L)	$L_S = \frac{R}{2\pi F} \times \frac{V_L}{V_R}$	Mean L_x (H)
1	1000						
2	2000						
3	3000						

4)For L_y :-

Sr. No.	Resistance from R.B. Ω	$V_T = V_{AC}$ V	$V_R = V_{AB}$ V	$V'_L = V_{BC}$ V	From phasor Diagram (V_L)	$L_S = \frac{R}{2\pi F} \frac{V_L}{V_R}$	Mean L_Y (H)
1	1000						
2	2000						
3	3000						

Calculation:-

1) For Primary Induction:-

2) $$LP = \frac{VL}{VR} \times \frac{R}{2\pi F}$$

2) For secondary Inductance :-

$$Ls = \frac{VL}{VR} \times \frac{R}{2\pi F}$$

3) **For Mutual Inductance**:-

$$Lx = \frac{VL}{VR} \times \frac{R}{2\pi F} \qquad LY = \frac{VL}{VR} \times \frac{R}{2\pi F} \qquad M = \frac{Lx - LY}{4}$$

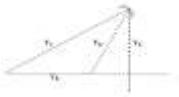
4) For Coupling Coefficient (k)

k $$= \frac{M}{\sqrt{Lx - LY}}$$

5) Turns ratio (n)

n $$= \sqrt{\frac{Ls}{Lp}}$$

Phasor Diagram:-



Procedure:-

A**) For Measurement of L_P**:-Make the connection as shown in fig(A).Take the suitable resistance from R.B.Measure potential across the point A and C (V_T), point A and B (V_R) and point B and C($V_{L'}$).Draw the phasor diagram to find V_L.Calculate the L_P using formula.Take different readings for different values of R.

B) **For Measurement of Ls**:-Make the connection as shown in fig(B).Take suitable resistance from R.B. say 10, 20, 30, 40.Measure the voltage between A & C (V_T), point A & B (V_R) and point B & C ($V_{L'}$) . Draw the phasor diagram and calculate L_s using formula.Take different readings for different values of R.

C) **For Mutual Inductance M**:-

Make the connection as shown in fig(C&D).For Lx connect B-S_2S_1-P_1P_2-C & For Ly connect B-S_1S_2-P_1P_2-C. Take suitable resistance from R.B. Measure the voltage between points A & C (V_T) , A & B (V_R) ,B & C ($V_{L'}$). Draw the phasor diagram and calculate Lx and Ly from formula.

Result:-

1) Primary inductance of the coil L_P = _____.
2) Secondary Inductance of the Coil L_S =_____.
3) Mutual Inductance of the coil M = _____.
4) Turn ratio of the coil n = _____.
5) Coefficient of the coil k =_____.

Precaution:-

1)The Connection must be tight.2)Don't measure the voltage beyond the reading and voltmeter.
3)Avoid the out of scale defection of voltmeter.4)The Value of resistance R must be known accurately.

Experiment No. 13

Aim:-To determine the frequency of A.C. mains by Sonometer.

Apparatus:-Sonometer with bridges, hanger with weight, horseshoe magnet, step down transformer meter scale, Balance and weight box.

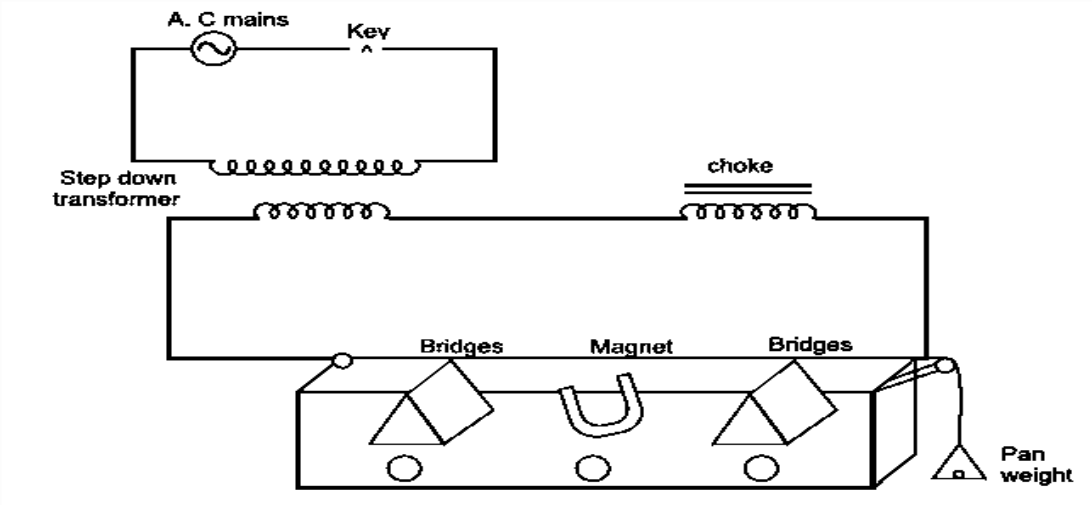
Formula:- $\mathbf{n = 1/2L \sqrt{T/m}}$

$\mathbf{= \sqrt{T/4L^2m}}$

Where,

n = Frequency of A. C. mains.
L = Length of Sonometer wire between the bridges vibrating in unison with the applied frequency.
T = Tension in the sonometer.
m = Mass per unit length of the sonomter wire.

Diagram:-



Observationtable:-

Sr. No.	Tension(T) m x g	Resonating length cm			Mean (L) cm	L^2	$\frac{T}{L^2}$	Mean $\frac{T}{L^2}$
		1	2	3				
1	500gm x 980							
2	1000gm x 980							
3	1500gm x 980							
4	2000gm x 980							
5	2500gm x 980							

Calculation:- $\mathbf{n = 1/2L \sqrt{T/m}}$

$$= \sqrt{T/4L^2m}$$

Procedure:-

1) Arrange the sonometer so that the wire is under tension by putting weight in the pan.

2) Adjust the position of the horse-shoes magnet in the middle of the wire so that the sonometer wire passes between the two poles of the magnet.

3) Make the connection as shown in the fig. and allow the current to pass through the wire.(Connect the secondary terminals of the transformers to the two ends of the metal wire through a limiting register and connect the primary to the A.C. mains.)

4) Adjust the position of two sharp bridges retaining the magnet midway between them so resonance occurs (maximum loudness of sound). Measure the length of the wire between the bridges repeat this two times.

5) Change the tension and the repeat it for 4-5 tensions by adding 500mg in each step.

6) Take the specimen of the wire find its mass by weighting and measure its length. This will give the value of (m) mass per unit length.

Result:-The frequency of A.C. mains is found to be _____.

Precaution:-

1) The sonometer wire should be of uniform cross section.

2) Sonometer wire and clamp for holding the magnet should be of non-magnetic material.

3) The magnet should be midway between the two bridge.

4) The bridge should have sharp edges.

5) Tension includes weights and weight of the hanger.

6) Tension should not be stretch the wire beyond the elastic limit.

Experiment No. 14

Aim:-**Determination of value of low resistance by using potentiometer.**

Apparatus:- Potentiometer, power supply, rheostate ,plug key, two way key, resistance box, low resistance, galvanometer ,connecting wire etc.

Formula:- $r = \left(\frac{L_2}{L_1} - 1\right) R$

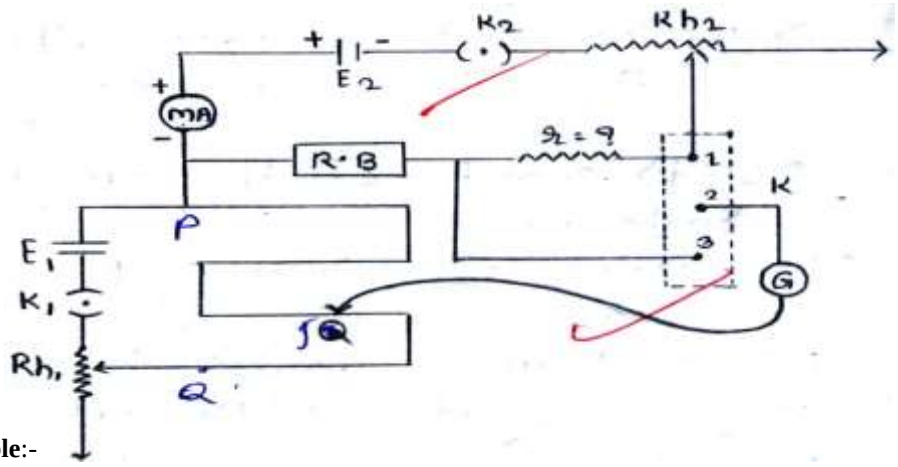
Where, r = Unknown resistance.

R = Known resistance .

L_1= Balancing length of potentiometer wire when P.D. across R is balanced.

L_2= Balancing length of potentiometer wire when P.D. across (R+ r) is balance.

Diagram:-



ObservationTable:-

Sr. No.	Resistance in R.B. Ω	Current in milliammeter (mA)	Length of potentiometer wire correspond to						$r = \left(\frac{L_2}{L_1} - 1\right) R$ Ω
			P.D. across(R+ r) L_2			P.D. across R L_1			
			1	2	Mean L_2	1	2	Mean L_1	
1									
2									
3									
4									
5									
6									
7									

Calculation:- $r = \left(\frac{L_2}{L_1} - 1\right) R$

Procedure:-

1) Make the connection as shown in fig.

2) Adjust the current in the milliameter to its maximum value.
3) Closed the gap between the points 1 and 2 of two way key of K and keep other gap between points two and three open. Take the direction of deflection of galvanometer. When the jockey is near the terminal Q of potentiometer obtained the null point. Measure the balancing length corresponds to P.D. across R=r.
4) Without changing the current in the milliameter closed the gap between 2 & 3 and keep the gap between terminals 1 & 2 open. Again get the position of null point with the help of rheostatand measure the balancing length L1 corresponding to P.D. across R.
5) Repeat the same procedure for different value of resistance in R.B.

Result:-The value of low resistance is found to be _____.

Precaution:-

1) Check connection as shown in fig.
2) All connection as should be tight.
3) The length of wire should be measured from +ve end point to will null point obtained in each case.

Experiment No. 15

Aim: Verification of Kirchhoff's current Law (KCL) using mesh and nodal analysis of given circuit.

Apparatus: DC regulated power supply(0-5V), four resistances (5Ω, 10Ω, 22Ω and 33Ω),

voltmeter(0- 5V),Ammeter(0-500mA), connecting wires etc.

Formula: $i_1 = \frac{Vs}{(R1+R2)}$ **&** $i_2 = \frac{Vs}{(R3+R4)}$

Total Current, $i = i_1+i_2$

Circuit Diagram:

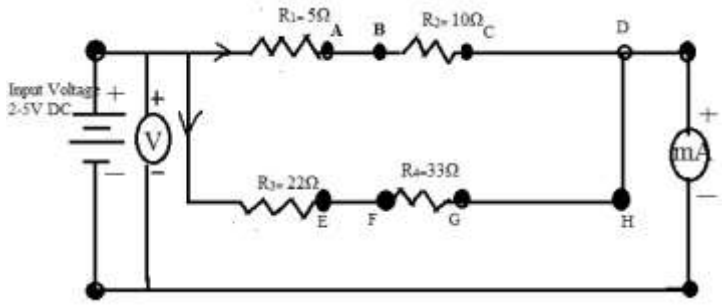


Fig: Circuit diagram for verification of Kirchhoff's Current law.

Observation Table:

1) For calculating current i_1 : R_1=5Ω, R_2=10Ω

Sr. No.	Applied Voltage (Vs)	$\mathbf{i_{1observed}}$ mA	$\mathbf{i_{1calculated}} = \frac{Vs}{(R1+R2)}$X1000 mA
1	2.5V		
2	3.5V		
3	4.5V		

2) For calculating current i_2 : R_3=22Ω, R_4=33Ω

Sr. No.	Applied Voltage (Vs)	$\mathbf{i_{2observed}}$ mA	$\mathbf{i_{2calculated}} = \frac{Vs}{(R3+R4)}$X1000mA
1	2.5V		
2	3.5V		
3	4.5V		

3) For total current i

Sr. No.	Applied Voltage (Vs)	$\mathbf{i_{1observed}}$ mA	$\mathbf{i=i_1+i_2}$ from above table (mA)

1	2.5V		
2	3.5V		
3	4.5V		

Procedure:

For Calculation of i_1 current

1) Connect the circuit as shown in figure.
2) Set output voltage 2.5 volts and connect the input through patch cord.
3) Short the A and B or C and D point through patch cord. E and F or G and H will be open.
4) Switch on the instrument and note down the current in mA.

   Apply Kirchhoffs second law to the closed mesh ABCD and calculate

   $i_1=V/(R_1+R_2)X1000$ mA
5) Do the same for 3.5V and 4.5 V.

For Calculation of i_2 current

1) Connect the circuit as shown in figure.
2) Set output voltage 2.5 volts and connect the input through patch cord.
3) Short the E and F or G and H point through patch cord. A and B or C and D will be open.
4) Switch on the instrument and note down the current in mA.

   Apply Kirchhoffs second law to the closed mesh EFGH and calculate

   $i_2=V/(R_3+R_4)X1000$ mA
5) Do the same for 3.5V and 4.5 V.

Calculation of Total Current i

Connect the point A and B or C and D or E and F or G and H

Total Current $i=i_1+i_2$

Result: Observed and calculated values of currents are nearly equal. Hence Kirchhoff's current law is verified.

Precautions:

1) Connections should be tight.

2) Measure the voltage current accurately.

Laboratories for conducting the experiments

DEPARTMENT OF BOTANY

DEPARTMENT OF CHEMISTRY

DEPARTMENT OF PHYSICS

DEPARTMENT OF ZOOLOGY

2. Participative Learning

DEPARTMENT OF BOTANY & ZOOLOGY

PARTICIPATIVE LEARNING (2016-21)

SESSION-2016-17

© Dr. B.G. Suryawanshi & Dr. V.I. Rane demonstrating the explored plants *Gloriosa superba* to the B.Sc.Sem- I students at Gangulpara waterfall Dist.-Balaghat (M.P.).

© Scientists demonstrating the developmental stages of *Silkworm* to B.Sc. Sem-VI students at Tasar Silk Centre Dawadipar, Dist-Bhandara (M.S.)

SESSION-2018-19

© Dr. V.I. Rane demonstrating the explored plant *Lygodium flexuosum to* B.Sc. Sem-I studentys at Laugur forest Dist.-Balaghat (M.P.)

© Shri. Mate sir (forest officer) demonstrating the germination process of forest seeds in detail to B.Sc. Sem-VI students at FDCM, Nursary Murdoli District-Gondia (M.S.).

© Live experimental classes conducted in College Garden, Dr. V.I. Rane sir & Dr. Megha Rahangdale madam are with students for demonstration.

© Live experimental classes conducted in College Garden, Dr. B.G. Suryawanshi sir with students for demonstration.

SESSION-2019-20

© Dr. B.G. Suryawanshi demonstrating the kind of *Bryophytes* to the B.Sc.Sem- I students at Laugur hills Dist.-Balaghat (M.P.).

© Dr. B.G. Suryawanshi demonstrating the kind of fossils to the B.Sc.Sem- VI students at National Fossil Park Ghughwa Dist.-Dindori (M.P.).

3. Problems Solving Methodologies

Jagat Arts, Commerce and I. H. Patel Science College, Goregaon
RTM Nagpur University Assignment Winter -2018
Problem Solving Method
Medium- English and Marathi
Department of: commerce

Class: B.Com 5th Semester **Subject: Financial Accounting**

Bath No. A

Sr. No.	Name of Students
1	MR AKASH TULSHIDAS KUMBHARE
2	MR ALKASH BABULAL BIJEWAR
3	KU ANJALI VIJAY KAR
4	MR ASHOK DULICHAND THAKRE
5	KU BHARTI CHHANNILAL RAHANGDALE
6	MR DIPAK MAHENDRA THAKRE
7	MR DIPAK ROSHANLAL THAKRE
8	MR GANESH HIVRAJ CHAVHAN
9	MR GANESH TIKARAM FUNDE
10	KU GAYATREE PITAMLAL PATLE
11	KU HASINA KHUDABAKS CHHAWARE
12	KU HINA SURESH PATLE
13	KU KAVITA LEKHARAM YEDE
14	KU MADHURI SURAJLAL GIRHEPUNJE
15	KU MAMTA DILCHAND PATLE
16	MR MAUSAM DEVANAND BHALEKAR
17	MR MORESHWAR HOLRAJ KATRE
18	KU NAGMAANJUM MO.SALIM SHEIKH
19	KU NIKITA MANIKCHAND PATLE
20	KU PAYAL MADHUKAR UDAPURE
21	KU PUJA HIRALAL BISEN
22	MR RAHUL YOGESHWAR BISEN
23	MR RAJESH SURESH RAUT

24	KU RAVINA PRAVIN KOHALE
25	KU ROSHANI DALIKRAM RAHANGDALE
26	KU SAIMAANJUM MO.SALIM SHEIKH
27	MR SANDIP KOMRAJ THAKRE
28	MR SANJAY MANOHAR CHOUHAN
29	MR SARGAM RAMKRUSHANA RAHANGDALE
30	MR SATISH RAJKUMAR ANMOLE
31	KU SATYAWATI DIGESHWAR YELE

Subject Teacher

(Dr. R.M.Gahane)

Associate Professor
Jagat Arts, Commerce & Indiraben
Hariharbhai Patel Science College
Goregaon Dist. Gondia

Problems for Assignment

Bath No. A

Problem 1. Given below the Balance Sheets of two companies as on 31/3/2017

Liabilities	Alpha	Beta	Assets	Alpha	Beta
Share Capital (Shares of Rs. 10 fully paid)	7,50,00	1,95,000	Goodwill	75,000	25,000
			Freehold Property	2,00,000	90,000
Share premium	2,250	---	Machinery	1,75,000	50,000
General reserve	50,000	---	Stock	3,41,000	81,000
Profit and Loss A/c	82,825	---	Debtors	1,29,250	47,500
8% Debentures	1,75,000		Bank	1,68,000	----
10% Debentures	----	35,000	Profit & Loss A/c	----	68,000
Bank overdraft	----	3,000			
Sundry Creditors	28,925	1,28,000			
	10,89,000	3,61,500		10,89,000	3,61,500

The two companies decided to amalgamate their business as on the date of Balance Sheets and new company called Gama Ltd. Was formed with an authorized capital of Rs. 12,50,000 in shares of Rs. 10 each. The terms of amalgamation were:-

Alpha Co.

(a) 6 shares of Rs. 10 each fully paid in the new company in exchange 5 shares in Alpha Co. and Rs. 5,000 in cash.

(b) The debenture holders were to be allotted such debentures in new co. bearing at 7% p.a. as would bring the same amount of interest.

Beta Co.

a) One share of Rs. 10 each fully paid in the new co. in exchange for 3 shares in Beta co. and Rs. 2,500 in cash.

b) The debenture holders would be allotted such debentures i8n the new co. bearing interest at 7% p.a. would bring the same amount of interest

The new co. took over all the assets and liabilities of both the companies.

Calculate the Purchase consideration; pass journal entries in the books of new company

Problem No. 2 **The following** is the Balance Sheet of Shriram Co. Limited as at 31st March 2017

Liabilities	Rs.	Assets	Rs.
Share Capital :		Goodwill	15,500
15,000 Equity Shares of Rs. 10 each	1,50,000	Stock	27,000
Sundry creditors	54,000	Land &Building	85,000
		Plant Machinery	40,000
		Debtors	22,500
		P&L A/c	14,000
Total	2,04,000	Total	2,04,000

The Meeting of Shareholders and Creditors resolved as follows:

1. That the company be taken into voluntary liquidation and a new company be formed with a nominal capital of Rs. 2,00,000 divide into shares of Rs. 10 each ,to take over Shriram Company.
2. That the item of goodwill will be written off and machinery be value at 20% less in the books of the new company.

3. That the 15,000 shares of Rs. 10 each be issue to the shareholders in Shriram Company at Rs. 7.50 per share paid up. The shareholders to pay the balance of Rs. 2,50 per share in cash.
4. The creditors of the company to be satisfied by the payment to them of half the amount in cash and by the issue of 6% Debentures as to the other half.
5. Show the journal entries in the books of Shriram Company and the opening entries in the books of new Purchasing company and prepare the opening Balance Sheet of new company. **16**

Problem No.3 From the following particulars draw up:
a) Capital Account and b) General Balance Sheet as on 31st March 2017

Authorized Capital; 8,000 shares of Rs. 100 each
Issued capital 4,000 shares of Rs. 10 each fully paid up, out of these 500 shares issued during the year.

Particulars	Rs.
8% Debentures	2,00,000
Sundry Creditors	50,000
Reserve Fund	1,00,000
Sundry debtors	90,000
Cash at Bank	50,000
Reserve fund Investment (At cost) (Market value Rs. 1,10,000)	1,00,000
Stores in hand	60,000
Fixed assets: Expenditure up to 31st March, 2016:	
Machinery	3,00,000
Transformers and Mains	1,50,000
Service connections	50,000
Addition during the year:	
Transformers and Mains	50,000
Service connections	20,000
Depreciation fund:	
Machinery	45,000
Transformers and Mains	20,000
Service connection	15,000
Net Revenue Account (Cr. Balance)	40,000

Problem No. 4 The following is the **Balance sheet of Girnor Company as on 31st March 2017**

Liabilities	Amount	Assets	Amount
Share Capital (10,000 Equity Shares of Rs. 10 each)	1,00,000	Land and Building	55,000
		Plant and Machinery	65,000
		Trade Marks	10,000
General Reserve	20,000	Stock	24,000
P/L Account	16,000	Debtors	44,000
Unsecured Creditors	30,000	Cash at Bank	26,000
Sundry Creditors	49,000	Preliminary Expenses	6,000
Workmen's Saving A/c	15,000		
Total	2,30,000	Total	2,30,000

Plant and Machinery is worth Rs. 60,000 and Land and Buildings have been valued at Rs. 1,20,000 by7 an independent value Rs. 4,000 of the debts are bad. Goodwill may be taken to be worth Rs. 80,000

Find out the Intrinsic Value of share.

Problem N0. 5. The following Balance Sheet of Balaji Co. as on 31st March 2017

Liabilities	Amount	Assets	Amount
Equity Share Capital (6,000 shares of Rs. 100 each)	6,00,000	Cash at Bank	50,000
		Sundry Debtors	80,000
		Stock	1,20,000
5%Debentures (5,000 debentures of Rs. 100 each)	5,00,000	Investments	1,00,000
		Land and Buildings	4,10,000
		Furniture	60,000
General Reserve	70,000	Goodwill	70,000
Profit and Loss A/c	20,000	Plant and Machinery	3,40,000
Sundry Creditors	30,000		
Other Liabilities	10,000		
Total	12,30,000	Total	12,30,000

All the Assets were independently valued at Rs. 14,00,000

The Company earned net profits for the last five years as follows:-

Rs. 80,000 Rs.84,000 Rs.92,000, Rs.88,000 Rs.96,000

It was decided to set aside 15% of the net profits towards General Reserve and a fair Investment return may be taken at 10%

Find Out: - 1. Net Assets Valuation Method and

2. Yield Value Method.

Subject Teacher

RM

(Dr. R M Gahane)

Associat Professor

Jagat Arts, Commerce & Indiraben Hariharbhai Patel Science College

Goregaon Dist. Gondia

Home - Assignment (2019-2020)

B. Sc. Part-II/ semester-IV

Mathematics (Paper- I & II)

Home – Assignment for Maths-I

(A) Solve $\frac{dx}{mz-ny} = \frac{dy}{nx-lz} = \frac{dz}{ly-mx}$

(B) Find the general solution of $p + q = 5z + tan(y - x)$

(C) Solve the DE: $(D^2 + DD' - D'^2)z = e^{x-y}$

(D) Solve $x^2 \frac{\partial^2 z}{\partial x^2} + 2xy \frac{\partial^2 z}{\partial x \partial y} + y^2 \frac{\partial^2 z}{\partial y^2}$=xy

(E) Discuss Euler's equation of motion

.....END.....

Home – Assignment for Maths-II

(A) Obtain Differential equation of a particle performing Simple harmonic motion.

(B) Prove that the equation of velocity of a pendulum in a SHM is $v^2 = 4\pi^2(a^2 - x^2)$

(C) Obtain Lagrangian and Lagrange's equations of motions for a particle moving in space

(D) Discuss the reduction of a two body problem into a one body problem

(E) State and prove Kepler's Second Law of Planetary motion

.....END.....

Head
Department of Mathematics
J.A.C. & I.C.P.Sc. College
GOREGAON

Home - Assignment (2018-2019)

B. Sc. Part-I / semester-IV

Mathematics (Paper- I & II)

Home – Assignment for Maths-I

(A) Discuss the solutions of $pqz = p + q$ by Jacobi's method

(B) Find the general solution of $p + 3q = 5z + tan(y - 3x)$

(C) Solve the DE: $(D^2 + DD' -)z = ye^{x-y}$

(D) Solve $x^2 \frac{\partial^2 z}{\partial x^2} + 2xy \frac{\partial^2 z}{\partial x \partial y} + y^2 \frac{\partial^2 z}{\partial y^2} = 0$

(E) Discuss Euler-Poisson Equations

.....END.....

Home – Assignment for Maths-II

(A) Obtain the equations of Velocities and accelerations for a particle moving in a plane

(B) Prove that the equation of velocity of a pendulum in a SHM is $v^2 = 4\pi^2(a^2 - x^2)$

(C) Obtain Lagrangian and Lagrange's equations of motions for a spherical Pendulum

(D) Discuss the reduction of a two body problem into a one body problem

(E) State and prove Kepler's First Law of Planetary motion

.....END.....

Head
Department of Mathematics
J.A.C. & [illegible] College
GONEGAON

Home - Assignment (2017-2018)

B. Sc. Part-I / semester-IV

Mathematics (Paper- I & II)

Home – Assignment for Maths-I

(A) Discuss the solutions of $pqz = p + q$ by charpit's method

(B) Form the differential equation of $f(x + y + z, z^2 - 2xy) = 0$

(C) Solve the DE: $(D^2 + DD' - D')z = e^{x-y}$

(D) Solve $x^2 \frac{\partial^2 z}{\partial x^2} - xy \frac{\partial^2 z}{\partial x \partial y} - y^2 \frac{\partial^2 z}{\partial y^2} = 0$

(E) Discuss Euler-Poisson Equations

.....END.....

Home – Assignment for Maths-II

(A) Obtain the equations of Velocities and accelerations for a particle moving in a plane

(B) Prove that the equation of velocity of a pendulum in a SHM is $v = 2\pi\sqrt{a^2 - x^2}$

(C) Obtain Lagrangian and Lagrange's equations of motions for a double pendulum

(D) Discuss the reduction of a two body problem into a one body problem

(E) State and prove Kepler's Third Law

.....END.....

Head
Department of Mathematics
J.A.C. & I.C.S. College
GOREGAON

Home - Assignment (2016-2017)

B. Sc. Part-I / semester-IV

Mathematics (Paper- I & II)

Home – Assignment for Maths-I

(A) Discuss the methods of solving the differential equations $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$

(B) Form the differential equation of $f(x^2 + y^2 + z^2, z^2 - 2xy) = 0$

(C) Solve the DE: $(D^2 - D')z = xe^{x+y}$

(D) Solve $x^2 \frac{\partial^2 z}{\partial x^2} - y^2 \frac{\partial^2 z}{\partial y^2} = 0$

(E) Discuss the Brachistochrone Problem

.....END.....

Home – Assignment for Maths-II

(A) State and prove Lami's Theorem

(B) Solve the SHM differential equation

(C) Obtain Lagrangian and Lagrange's equations of motions for a simple pendulum

(D) Discuss the reduction of a two body problem into a one body problem

(E) State and Prove Virial Theorem

.....END.....

Head
Department of Mathematics
J.A.C. Arts & Sc. College
GOREGAON

Home - Assignment (2018-2019)

B. Sc. Part-I / semester-II

Mathematics (Paper- I & II)

Home – Assignment for Maths-I

(A) Solve the Differential Equation: $\frac{dy}{dx} - xy = x^2$

(B) Solve the Differential Equation:x $\frac{d^2y}{dx^2} + y = x^2y$

(C) Solve the difference equation: $y_{n+2} + y_{n+1} + y_n = n$

(D) Using variation parameter method, solve $\frac{d^2y}{dx^2} - \frac{dy}{dx} - y = 0$

(E) Solve the homogenous DE: $\frac{dy}{dx} = \frac{2x - y}{x + 2y}$

.....END.....

Home – Assignment for Maths-II

(A) State and prove Gauss's Theorem .

(B) Discuss the convergence of $\int_0^{\infty} \frac{sinxcosx}{1-tanx} dx$

(C) Evaluate $\int_0^{\infty} \frac{x^{m-1}+x^{n-1}}{(1+x)^{m+n}} dx$

(D) Evaluate the surface integral over the surface S:

$\iint (x^2 + 2x + 6) ds; S: 0 \leq x \leq 3; 0 \leq y \leq 2$

(E) Find the divergence and curl of $\vec{F} = x^3yi + 2xy^2j + 3x^2y^2k$.

.....END.....

Head
Department of Mathematics
J.A.C. [illegible]

Home - Assignment (2017-2018)

B. Sc. Part-I / semester-II

Mathematics (Paper- I & II)

Home – Assignment for Maths-I

(A) Solve the Differential Equation: $x^2 \frac{dy}{dx} + xy = x^3$

(B) Solve the Differential Equation: $\frac{d^2y}{dx^2} + y = x$

(C) Solve the difference equation: $y_{n+2} + 3y_{n+1} - 4y_n = n + 1$

(D) Using variation parameter method, solve $\frac{d^2y}{dx^2} - y = 0$

(E) Solve the homogenous DE: $\frac{dy}{dx} = \frac{x-y}{x+y}$

....................................END....................................

Home – Assignment for Maths-II

(A) State and prove Stake's Theorem in plane.

(B) Discuss the convergence of $\int_0^{\infty} \frac{sinxcos}{1-tanx}$dx

(C) Evaluate $\int_0^{\infty} \frac{x^{m-1}}{(1+x)^{m+n}} dx$

(D) Evaluate the surface integral over the surface S:

$\iint (x^2 + 2x + 6)ds; S: 0 \leq x \leq 1; 0 \leq y \leq 2$

(E) Find the curl of $\vec{F} = x^3yi + 2xy^2j + 3x^2y^2k$.

....................................END....................................

Head

Department of Mathematics

J.A.C. [illegible] College

[illegible]

Home - Assignment (2016-2017)

B. Sc. Part-I / semester-II

Mathematics (Paper- I & II)

Home – Assignment for Maths-I

(A) Solve the Differential Equation: $x^2\frac{dy}{dx} - 2xy = x^4$

(B) Solve the Differential Equation: $\frac{d^2y}{dx^2} - 4y = x^2$

(C) Solve the difference equation: $y_{n+2} - 3y_{n+1} + 4y_n = n$

(D) Using variation parameter method, solve $\frac{d^2y}{dx^2} + y = 0$

(E) Solve the homogenous DE: $\frac{dy}{dx} = \frac{x+y}{x-y}$

.....END.....

Home – Assignment for Maths-II

(A) State and prove Green's Theorem in plane.

(B) Discuss the convergence of $\int_0^{\infty} \frac{\sin x}{1+\sin x \cos x} dx$

(C) Evaluate $\int_0^1 x^{m-1}(1-x)^{n-1}\,dx$

(D) Evaluate the surface integral over the surface S:

$\iint (3x^2 - 2x + 7)ds; S: 0 \le x \le 1; 0 \le y \le 1$

(E) Find the curl of $\vec{F} = 3x^2yi + xy^2j - 5x^2y^2k$.

.....END.....

Head
Department of Mathematics
J.A.C. & Late P.Sc College
GOREGAON