ENGINEERING PHYSICS LAB / E. P LAB

(Any TEN experiments compulsory)

1. Dispersive power of the material of a prism – Spectrometer
2. Determination of wavelength of a source – Diffraction Grating.
3. Newton's Rings - Radius of curvature of plano convex lens.
4. Melde's experiment – Transverse and longitudinal modes.
5. Time constant of an R-C circuit.
6. L-C-R circuit.
7. Magnetic field along the axis of current carrying coil – Stewart and Gees method.
8. Study the characteristics of LED and LASER sources.
9. Bending losses of fibres & Evaluation of numerical aperture of a given fibre.
10. Energy gap of a material of p-n junction.
11. Determine the rigidity modulus of a material - Torsional pendulum.
12. Wavelength of light –diffraction grating - using laser.
13. VI Charcteristics of a solar cell

EXPERIMENT 1

TORSIONAL PEDULUM RIGIDITY MODULUS

AIM: To determine the modulus of rigidity (η) of the material of the given wire using a torsional pendulum.

APPARATUS:- A circular brass disc provided with a chuck and nut at its centre, steel wire, another chuck and nut fixed to a wall bracket or rigid clamp, stop watch, meter scale, screw gauge, vernier calipers.

FORMULA:-

$$\eta = \frac{4\pi MR^2}{a^4} \times (l/T^2) \quad \text{dyne/cm}^2$$

where, M = mass of the disc
R = radius of the disc
A = radius of the wire
l = length of the wire
T = time period

OBSERVATIONS:-

1) To determine radius of the disc by using vernier calipers

$$\text{Least count of vernier} = \frac{\text{(1 M.S.D.)}}{\text{(NO. OF VERNIER DIVISIONS)}} = \_\_\_\_\_ \text{ cm}$$

Observation Table:-

Sr.No.	a=M.S.R (cm)	V.C.	b=V.C.x L.C. (cm)	D= a+b (cm)
1				
2				

Avg D=
Hence radius R= D/2_____cm

II) **To determine radius of the wire using screw gage**

1) Least count = $\frac{\text{pitch of the screw}}{\text{no. of head scale divisions}}$

= _____ mm

OBSERVATION TABLE

Sr.No.	a=P.S.R.	H.S.R.	b=H.S.R.XL	D = a+b

	mm	O.H.S.R	C.H.S.R.	.C. (mm)	(mm)
1					
2					
3					

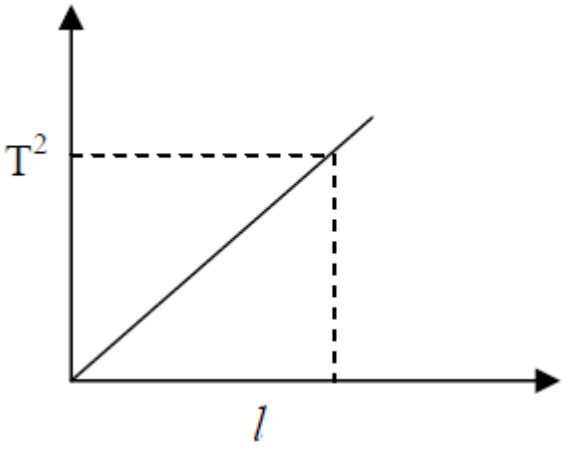
Avg d =
Radius a = _____mm
Radius a = _____cm

III) To determine l/T^2

Sr.No.	Length of the wire (l)cm	Time taken for 10 oscillations (t) sec			T=t/10 (sec)	l/T^2 (cm/sec^2)
		Trial 1	Trial 2	Avg		
1						
2						
3						
4						
5						

Avg =

Model Graph:



Slope = T^2 / l

Hence

$$\eta = \frac{4\pi MR^2}{a4} \times \frac{1}{\text{Slope}} \text{ dyne/cm}^2$$

1) Torsional Pendulum :

(1) Define Rigidity of modulus ?

Ans : When tangential surface forces are applied on a body , the successive layers of the material are moved or sheared.This type of strain is called shearing strain. “The ratio of tangential stress to shearing strain is called Rigidity of modulus”

Rigidity of modulus= Tangential stress / shearing strain.

Tangential stress = Force/Area.

Shearing strain= θ

(2) Define Moment Of Inertia ?
Ans : It is the measure of the inertia of a body in rotatory motion.

It depends upon the axis of rotation, mass of the body and also on the distribution of the mass about the axis.

(3) What is the meaning in calling this a pendulum ?
Ans : The disc is making oscillations around a vertical axis passing through its centre of mass and hence the arrangement is called a torsional pendulum.

(4) Difference between simple pendulum and torsional pendulum ?
Ans : In a simple pendulum the Simple harmonic motion is due to the restoring force which is the component of the weight of the bob.

In a torsional pendulum the Simple harmonic motion is due to the restoring couple araising out of torsion and shearing strain.

(5) What is S.H.M ?

Ans : A body is said to have a S.H.M , if its acceleration is always directed towards a fixed point on its path and is proportional to its displacement from the fixed point.

(6)what is Young’s modulus ?

Ans : It is the ratio of longitudinal stress to the longitudinal strain.

(7) Define Time Period ?

Ans : Time taken for one complete oscillation.

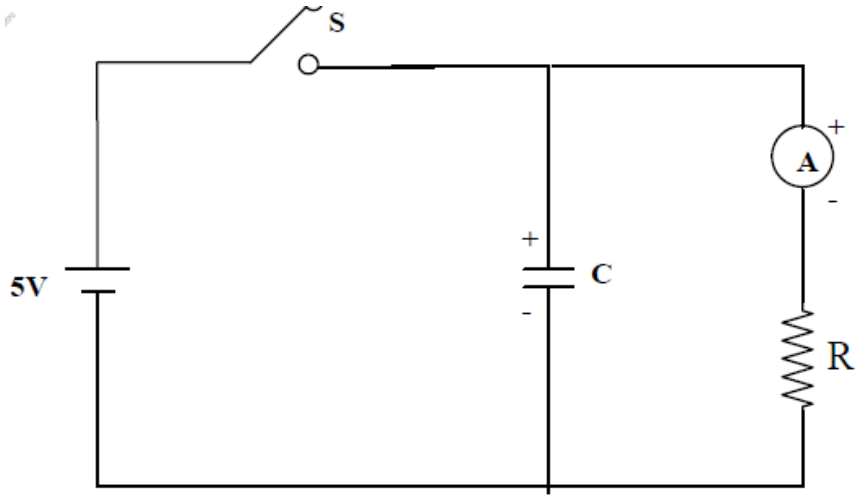
EXPERIMENT 2
R C TIME CONSTANT

AIM: To study the exponential decay of current in a circuit containing resistance and capacitance and to determine the R.C time constant.

APPARATUS: Battery eliminator (source of Emf), Electrolytic capacitor, Resistors, stop clock, connecting wires or R.C circuit kit.

FORMULA: Time constant = RC
Where R= Resistance
C= Capacitance

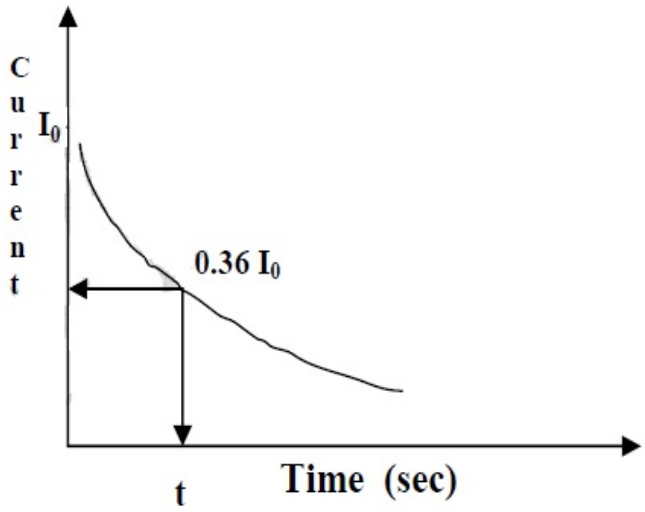
CIRUIT DIAGRAM



OBSERVATION TABLE:

Sr.No.	R_1=_____Ω C_1=_____F	
	Time (sec)	Current (μA)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

MODEL GRAPH



RESULT:

The exponential decay of current in a circuit containing resistance and capacitance is studied. R.C time constant is calculated.

Viva Questions

(1) What is the purpose of Capacitors ?

Ans : Capacitors are used to store electrical energy.

(**2)** What the resistor will do ?

Ans : It will oppose the charge.

(3) What is the purpose of Inductors ?

Ans : Inductors are also used to store electrical energy but in capacitors the energy is stored in electric fields and in inductors the energy is stored in magnetic fields.

(4) What is Time constant ?

Ans : Time required to get 36% of the current.

(**5)** What is capacitance ?

Ans : The electric charge on the surface of the body is directly proportional to the potential of the body. ie q α v → C=q/v

(6) Define potential ?

Ans : The electric potential at a point in the electric field is defined as "the work done in bringing a unit positive charge from infinite distance towards electric field "

is known as electric potential at that point. ie, V = w/q.

(7) What u meant by capacity of a conductor ?

Ans : The ability of a conductor to hold electric charge is called the capacity of a conductor.

EXPERIMENT 3
MELDE'S EXPERIMENT

AIM:
To determine the frequency of a vibrating bar, or tuning fork using Melde's arrangement

APPARATUS:
Electrically maintained tuning fork, A stand with clamp and pulley, A light weight pan, A weight box, Analytical Balance, A battery with eliminator and connecting wires etc.

FORMULA:

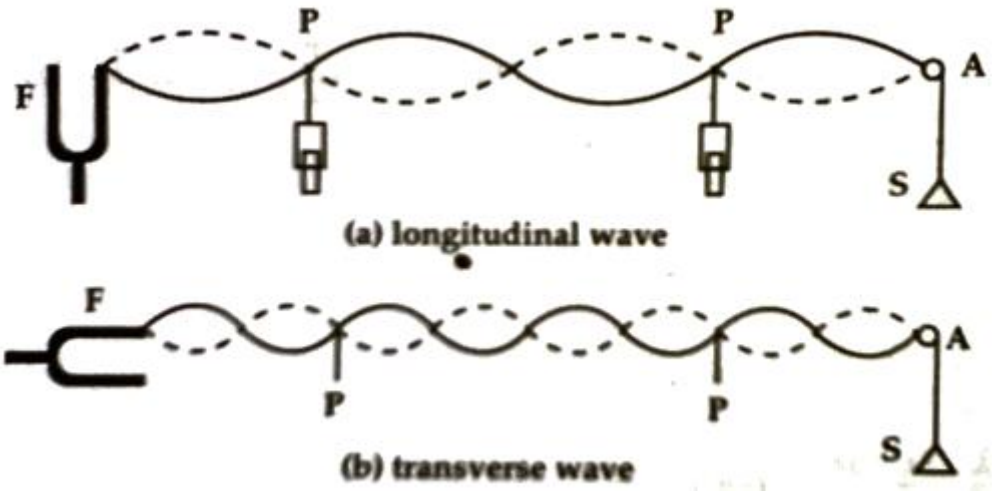
(1) For longitudinal mode

$$\eta = \frac{1}{l}\sqrt{T/m}$$

(2) For transverse mode

$$\eta = \frac{1}{2l}\sqrt{T/m}$$

Where,
η = frequency of a given vibrating bar
l = length of each loop
T= Tension in the string
m= mass per uni length of a string



OBSERVATIONS:

Mass of the pan, P =…… gm
Mass of the string (thread), A = -------gm
Length of the (thread) string, B = -----cm
Linear density of the thread, m = (A/B) = -------- gm/cm

OBSERVATION TABLE:
For longitudinal arrangement

Sr. No	Load applied in the pan M (gm)	Tension T=(M+P) g dyne	No. of loops x	Length of x Loops d cm	Length of each loop l = d/x	$\sqrt{T}$	$\frac{1}{l}\sqrt{T/m}$
1							
2							
3							
4							
5							
6							

Mean frequency = ---------- Hz

For transverse arrangement

Sr. No	Load applied in the pan M (gm)	Tension T=(M+P) g dyne	No. of loops x	Length of x Loops d cm	Length of each loop l = d/x	$\sqrt{T}$	$\frac{1}{2l}\sqrt{T/m}$
1							
2							
3							
4							
5							
6							

Mean frequency= ---------- Hz

RESULT:

The frequency of a given vibrating bar
In longitudinal mode is _____Hz
In transverse mode is _____Hz

Viva Questions

(1) What do u mean by Frequency ?
Ans : Number of vibrations per second.

(2) Define Resonance ?
Ans : Vibrating a body with its natural frequency under the influence of another vibrating body is called resonance.

(3) What u meant by Progressive wave ?
Ans : A disturbance created in an elastic medium propogates outwards in an elastic medium in the form of a wave, is called progressive wave.

(4) How many types of progressive waves are there ?
Ans : progressive waves are of two types and they are (1)transverse waves and (2)longitudinal waves.

The type of wave is based on how the particles of the elastic medium vibrate with respect to the direction of propogation of the wave.

Progressive waves always travels in the forward direction only and gets never returned back.

(5) Difference between transverse wave and longitudinal wave ?
Ans : In a transverse wave the particle vibrate perpendicularly where as in longitudinal wave the particle vibrate parallelly with respect to the direction of propogation of a wave.

(6) What u meant by standing wave ?
Ans : standing waves means superposition of propogating waves that have same amplitudes and frequencies but traveling in opposite directions.

The term standing or stationary refers to the fact that the nodes and antinodes of the wave remain fixed in position.

(7) In our experiment which type of wave passing along the thread ?
Ans : In both the modes only transverse wave will passing along the thread.

(8) Why the frequency is different in longitudinal mode when compared with the transverse mode ?
Ans : In longitudinal mode , for one complete vibration of the source the string completes only half vibration where as in transverse mode the string completes one complete oscillation for one complete vibration.

EXPERIMENT NO. 4

ENERGY GAP OF A SEMI CONDUCTOR

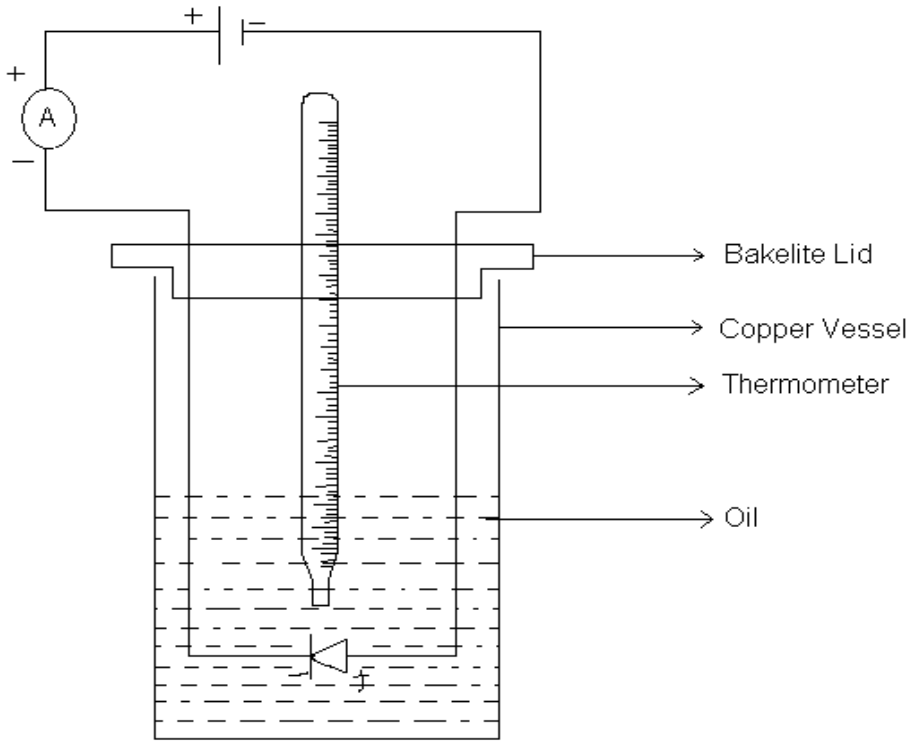
AIM:- To determine the energy gap of a semiconductor diode.

APPARATUS:- Germanium diode, Thermometer, Copper Vessel, Micro ammeter, Heater and connecting wires

FORMULA: The energy gap of the semiconductor diode is

$$E_g = \frac{\text{slope of line}}{5.306} \text{ eV}$$

CIRCUIT DIAGRAM :

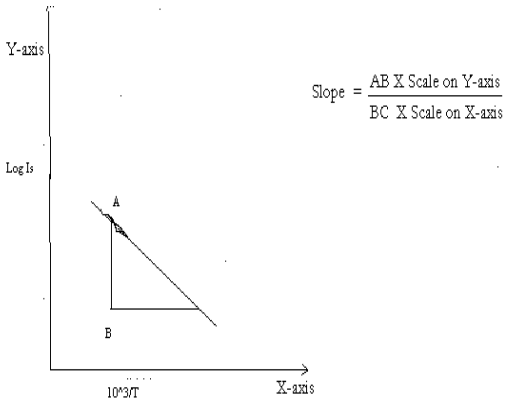


OBSERVATION TABLE:

Sr. No.	Temperature (^{0}C)	T= t+273 (^{0}K)	Current(I_s) (μA)	log I_s	10^3/T
1					
2					
3					
4					
5					
6					
7					
8					

MODEL *GRAPH:*

A graph is plotted between 10^3 /T (K) on X-axis and log I_s on Y-axis is a straight line



RESULT:

The energy gap of a p-n junction diode is _____eV

Energy Gap Of A Semi Conductor :

(1) What is diode ?

Ans : The diode consists of two electrodes one is cathode and another is anode. The cathode emits electrons and the anode will attracts the emitted electrons when it is supplied by positive potential.

(1) What is energy gap ?

Ans : The gap between conduction band and the valency band is called Energy Gap.To move

the electrons from the valency band to conduction band the supplied external voltage must be equal to energy gap.

(2) What is valency band ?
Ans : The range of energy which is possessed by vaency electrons is known as valency band.Here the electrons which are situated at outer most orbits are called valency electrons.The valency band consists of valency electrons which are having highest energy.

(3) What is conduction band ?
Ans : The range of energies possessed by a conducting electrons is known as conduction band.the conduction electrons are responsible for the conduction of current in a conducting material. So , these electrons are called as conduction electrons.

(4) How many types of solid materials are there and what are those materials?
Ans : Based on the energy gap the solid materials are classified into 3 types they are : conductors , insulators and semi conductors.

(5) what is a conductor ?
Ans : Those substances whose atoms have their outermost orbits incomplete are known as conductors(ex:Sodium , $1s^2\ 2s^2\ 2p^6\ 3s^1$).In these conductors the valency electrons are very closely bounded to the nucleus and hence they can easilymove from valenvy band to conduction band.so, the energy gap is very less or zero.

(6) what is insulator ?
Ans : Those substances which have more and more energy gap between valency and conduction band they are called insulators.In these materials the valency electrons are very lightly bounded to nucleus.

(7) What are Semi conductors ?
Ans : Those substances which have conductivity and resistivity properties in between conductors and insulators are called semi conductors.(ex : Si , Ge).Energy gap of these semiconductors lies between 0.5 to 1.1 eV.(Foe Ge it is 0.5 – 0.7eV).

(9) How many types of semi conductors are there ?

Ans : Two types of semi conductors are there (1) Intrinsic or pure semi conductors.(2) Extrinsic or impure semi conductors.

(10) What is intrinsic semi conductor ?

Ans : Intrinsic semi conductor is a pure semiconductor.In these semi conductors if the temperature increases then the conductivity is also increases.At higher temperatures due to collisions some electrons absorb energy and raises to conduction band then in their places in valency band holes are created.

In intrinsic semiconductor number of holes are equal to number of electrons.

(11) What u meant by Fermi energy level ?

Ans : The average energy of charge carriers is calculated by Fermi energy level.

In pure semi conductors Fermi energy level is at the centre of the valency and conduction bands.

In P-type semi conductors(extrinsic/impure semiconductor) Fermi energy level is near

to the valency band.

In N-type semi conductors(extrinsic/impure semiconductor) Fermi energy level is near to the conduction band.

(12) What is Doping and Dopant?

Ans : The process of adding impurities to a pure semi conductor is called doping .And the material added as a impurity is called as Dopant.

(**13)**What u meant by Extrinsic or impure semi conductor ?

Ans : A pure semiconductor after doping is called extrinsic or impure semi conductor.We can add either trivalent or pentavalent impurities.

(14) What is P-type semi conductor ?

Ans : If we add trivalent impurities such as Aluminium to a pure semi conductor then that is called P-type semi conductor.

(15) Why P-type semi conductor is called Acceptor impurity ?

Ans : Because 3 electrons of trivalent atom makes covalent bonds with Semiconductors such as Si or Ge and there is a need of one more electron in Si or Ge because Si or Ge has 4 electrons in their outermost orbits.

(16) What is N-type semi conductor ?

Ans : If we add pentavalent impurities such as Arsinic to a pure semi conductor then that is called N-type semi conductor.

(17) Why N-type semi conductor is called Donar impurity ?

Ans : Because 4 electrons of pentavalent atom makes covalent bonds with Semiconductors such as Si or Ge which have 4 electrons in their outermost orbits and hence there is one free electron in pentavaent atom.

(18) What is P-N junction diode ?

Ans : If P-type and N-type semi conductors are combined to each other then that is called P-N junction diode.That means If we dopped trivalent impurities to one end of the pure semi conductor and pentavalent impurities to other end of the pure semiconductor then that is called P-N junction diode.

(19) What you meant by Forward Biasing ?

Ans : When a battery positive terminal is connected to P-terminal and battery negative terminal is connected to N-terminal then that is said to be in forward bias mode. Here the P-holes are repelled by the positive terminal of the battery and N-electrons are repelled by the negative terminal of the battery and hence both holes and electrons moves towards the junction and then this causes the depletion layer decreases.

This Forward Biasing is also called as low resistance connection .In this bias the current is mainly due to majority charge carriers.

(20) What you meant by Reverse Biasing ?

Ans : When a battery positive terminal is connected to N-terminal and battery negative terminal is connected to P-terminal then that is said to be in reverse bias mode. Here the P-holes are attracted by the negative polarity of the battery and N-electrons are attracted by the positive polarity of the battery and hence both holes and electrons move away from the junction and then this causes the depletion layer increases.

This Forward Biasing is also called as High resistance connection .In this bias the current is mainly due to minority charge carriers.In this mode very small current flows across the junction.

EXPERIMENT: 5

Magnetic field along the axis of a coil (Stewart & Gees method)

AIM: To study the variation of magnetic field along the axis of a circular coil carrying current and To verify the Biot –Savart's law.

APPARATUS: Stewart and Gees type of tangent galvanometer, Rheostat, Ammeter,

Deflection Magnetometer, Battery eliminator, 4way & 2 way key and connecting wires.

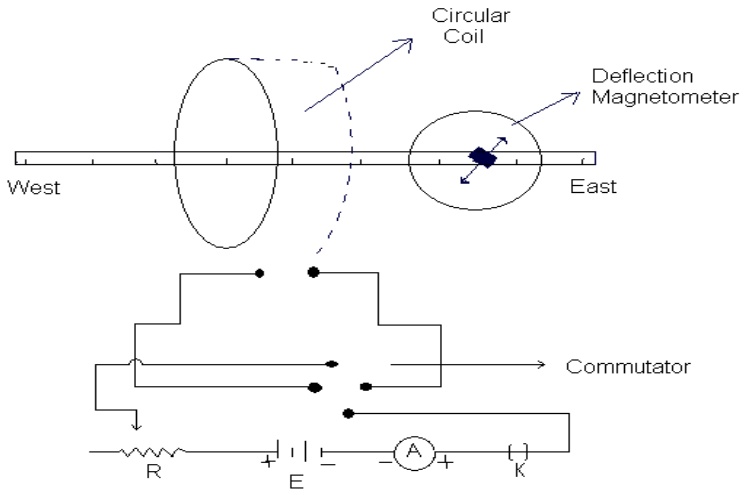
FORMULA: According to Biot-Savart's law the magnetic field (B) at a point on the axis of a circular coil carrying current i. is given by

$$B = \frac{\mu_o n i a^2}{2(x^2+a^2)^{3/2}} \text{ Tesla.}$$

Where μ_o=Permeability of free space=$4\pi \times 10^{-7}$ H/m^2
n=No. of turns of the coil
a=Radius of the coil
x=Distance from centre of coil

$B = B_e \tan\theta$ **Tesla**. Where B_e= earth's magnetic field= 0.38×10^{-4} tesla

CIRCUIT DIAGRAM:-



Observations/Calculations:

Parameters and constants

1) No of turns of the coil, n = _____
2) Radius of the coil, a = 10 cm
3) Current in the coil, i = _____
4) Permeability of air, $\mu_0 = 4\pi \times 10^{-7}\ N/A^2$
5) Earth's magnetic field, 0.38×10^{-4} tesla

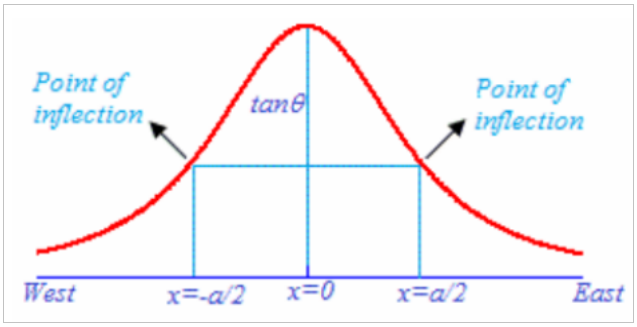
Observation table:

Distance From the Center of coil	Deflection in East direction				Mean θ_E	Deflection in West direction				Mean θ_W	$\theta = \frac{\theta_E+\theta_W}{2}$	Tanθ
	θ1	θ2	θ3	θ4		θ1	θ2	θ3	θ4			

Calculation:

From the graph of B(x) vs. log (R^2+X^2), find the slope and intercept from regression analysis. Slope should be -1.5 according to Biot-Savart law, and intercept value should match with the value calculated using μ_0 , n, i, and x

MODEL GRAPH:



Result:

The variation of magnetic field due to a circular coil carrying current along both sides on its axis is studied using a graph.

Viva Questions

1. What is magnetic field of electric current?

A. When current flows through a wire magnetic field is produced around it.

2. Where does the field become maximum when current flows through the circular coil?

A.At the centre of the circular coil the field is maximum.

3. What happens to the magnetic field if you go away from the centre of the coil?

A. Field decreases on either side of the coil.

4. What is tangent law?

A. When a magnetic needle is placed between two mutually perpendicular uniform magnetic fields. Needle is deflected making an angle Θ with the deflecting field. B=BH tan Θ

5. Why do you set the plane of the coil in the direction of BH?

A.To satisfy tangent law.

6. What are the initial adjustment in the experiment?

A) Plane of the coil must be set parallel to BH B) Aluminium pointer should read 0-0

7.Why do you take two deflections Θ1 and Θ2?

A. To eliminate eccentric error i.e. centre of the magnetic needle may not be exactly at the centre of the circular degree scale._____

*Exper*iment 6

LED AND LASER DIODE CHARACTERISTICS

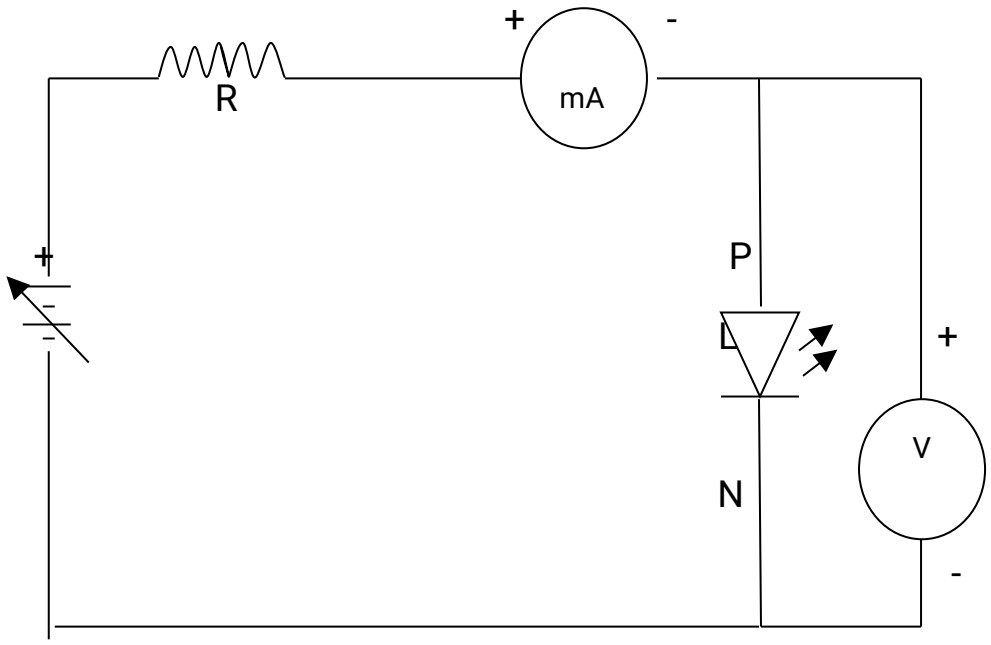
AIM: T o study V/I and L/I characteristics of Light Emitting Diode (LED).

APPARATUS:

1. Light emitting diode
2. Variable Supply for Light emitting diode
3. Digital Optical power meter to measure optical power of Light emitting diode
4. Digital Voltmeter to measure voltage across Light emitting diode
5. DC Digital Ammeter to measure Light emitting diode Current

CIRCUIT DIAGRAM:

V/I AND L/I CHARACTERISTICS OF LED



V/I

OBSERVATION TABLE:

1) For V/I characteristics of LED

Sr. No.	LED Voltage V (volt)	LED Current I (Ma)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

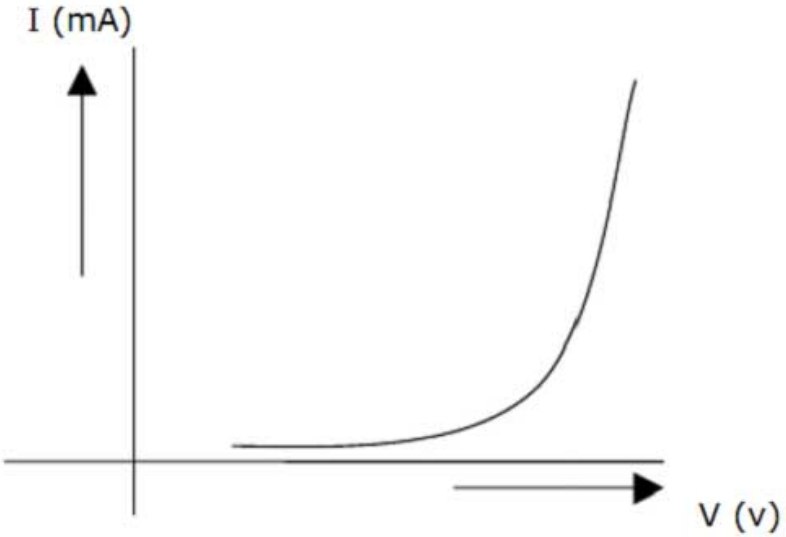
2) For L/I characteristics of LED

Sr. No.	LED Current I (mA)	Luminous intensity L (mcd)
1		
2		
3		
4		
5		

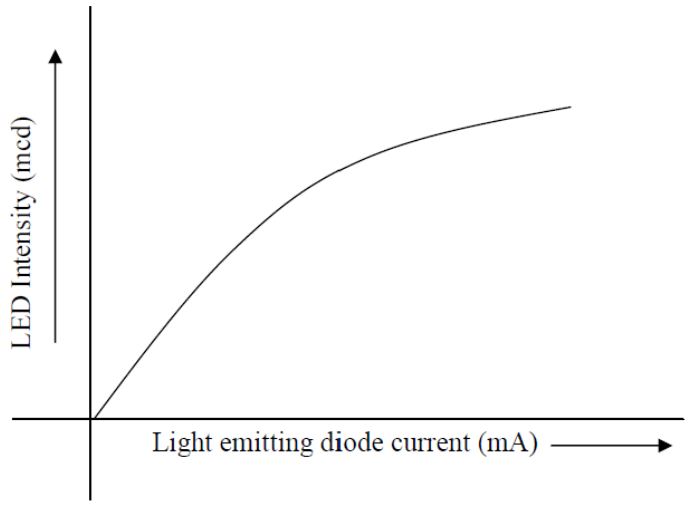
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

MODEL GRAPH:

V/I characteristics of LED



L/I characteristics of LED

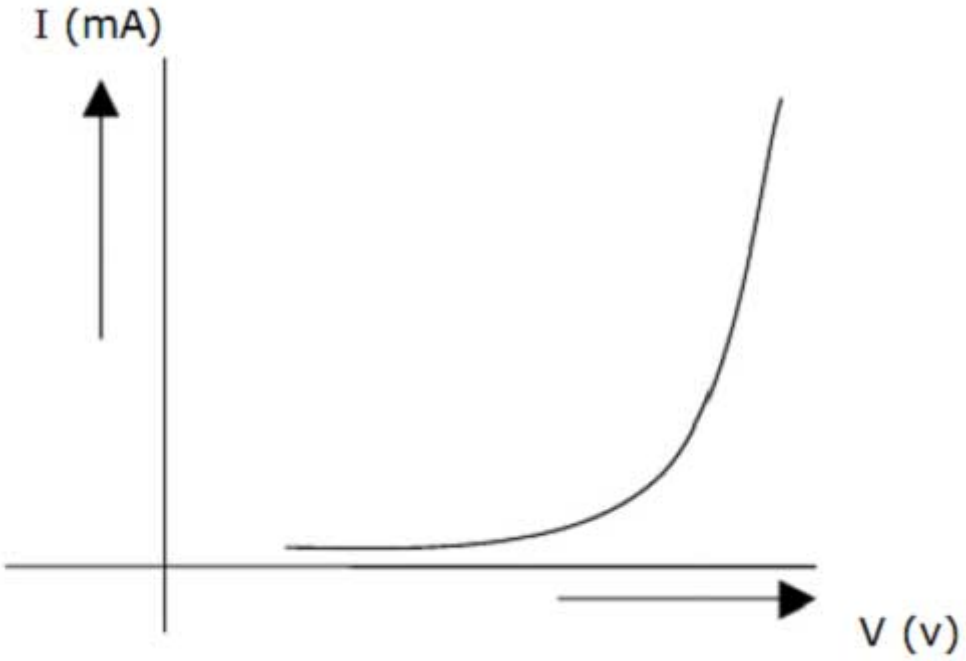


CHARACTERISTICS OF LASER

3) For V/I characteristics of LASER

Sr. No.	LED Voltage V (volt)	LED Current I (Ma)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

MODEL GRAPH:



RESULT:

1.V/I and L/I characteristics of LED is studied.

2.L/I characteristics of LASER diode is studied.

*Exper*iment 7

BENDING LOSSES OF FIBERS AND EVALUATION OF NUMERICAL APERTURE OF A GIVEN FIBER

AIM: To study bending losses of fibers and to evaluate numerical aperture of a given fiber

APPARATUS: Optical fiber kit (transmission and receiving kit), NA jig, mandrel, optical fiber cable of different lengths, connecting wires

FORMULA:
(1) The numerical aperture is given by

$$N.A. = \sin\theta = \frac{D}{(4L^2 + D^2)^{1/2}}$$

Where, D is the diameter of the circle
L is the distance of the screen

(2) dBm=10*log (Power meter reading in mW/1mW)
OR
dBm=10*log (Power meter reading in μW/1000)

OBSERVATION TABLE:-

Table 1- To determine the NA of optical fiber

Sr. No.	Distance of the screen (L) (cm)	Diameter of the circle (D) (mm)	N.A.	Acceptance angle (θ)
1				
2				
3				
4				

Table 2:-
To determine bending losses in optical fiber (for 1m cable)

SR NO	Power meter reading Po1 in μW	Mandrel Turns	Power meter reading Po2 in μW	Power meter reading Po1 in dBm	Power meter reading Po2 in dBm	Losses in dBm Po1-Po2
1						
2						
3						

RESULT:

1.Numerical aperature of a given fibre is _____

2.Acceptance angle is _____

3.Bending losses of given fibre is _____

Viva Questions

1. What is the principle of fibre optic communication?

A. The total internal reflection of light rays along the length of the fibre is the principle in light s propagation in fibre optical communication.

2. What is Numerical Aperture?

A. Numerical Aperture (NA) is a measure of how much light can be collected by an optical system such as an optical fibre or a microscope lens. The NA is a, which indicates the size of a cone of lightθrelated to the acceptance angle that can be accepted by the fibre.

3. What is Acceptance angle?

A. It is the maximum angle that a light ray can make at the face of the optical fibre during entry which allows it to suffer total internal reflection along the length of the fibre.

4. A single mode fibre has low intermodal dispersion than multimode.

A. In both single and multimode fibres the refractive indices will be in step by step. Since a single mode has less dispersion than multimode, the single mode step index fibre also has low intermodal dispersion compared to multimode step index fibre.

5. How does the refractive index vary in Graded Index fibre?

A. The refractive index of the core is maximum along the fibre axis and it gradually decreases. Here the refractive index varies radially from the axis of the fibre. Hence it is called graded index fibre.

*EXPE*RIMENT 8

WAVELENGTH OF LIGHT – DIFFRACTION GRATING – USING LASER

AIM: To determine the wavelength of a given source of laser using a plane transmission grating by normal incident method.

APPARATUS:
Plane diffraction grating, laser source, a meter scale , graph sheet

FORMULA:

$$\lambda = \frac{2.54 \sin\theta}{nN}$$

Where λ is wavelength of light.
N Lines per inch on the plane diffraction grating
n is order of diffraction light.

OBERVATIONS:

Number of lines on the grating N=_____ lines/inch

The distance between grating and the screen D = _____cm

OBSERVATION TABLE:

To determine the wavelength of laser light

Sr. no.	Order of diffraction n	The distance between grating and the screen D (cm)	Distance from central maximum (cm)			$\sin\theta = d/(d^2+D^2)^{½}$	$\lambda = \frac{2.54 \sin\theta}{nN}$
			On left d_1	On right d_2	Mean d		
1							
2							

RESULT:

The wavelength of laser beam = _____ nm.

Viva Questions

1) Define Diffraction?

Ans: The phenomenon of bending of light waves around the edges of obstacles and their spreading into the geometrical shadow of the obstacle is called diffraction of light.

2) Mention the two types of diffraction?
Ans: i) Fresnel diffraction
ii)Fraunhofer diffraction

3) What is the type of diffraction in the diffraction grating experiment?
Ans: Fraunhofer diffraction is involved because the source and the screen are effectively at infinite distance.

4) What is grating?
Ans: A grating is a plane glass plate on which a large number of opaque rulings are drawn at equidistance with a diamond head.

*EXPE*RIMENT 9

NEWTON'S RINGS

Aim: To determine the radius of curvature of a given Plano convex lens

Apparatus: Traveling microscope, sodium vapour lamp, plano-convex lens, plane glass plate,
Magnifying lens.

Formula:

$$R = \frac{\text{Slope}}{4\lambda} \text{ cm}$$

Observations and results
1. Least count of vernier of traveling microscope = _____mm
2. Wave length of light = _____ m

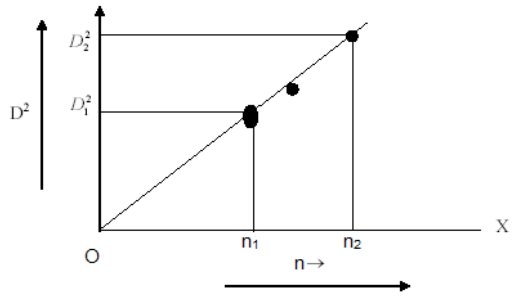
Table 1:
Measurement of diameter of the ring

Sr. No.	Oder of the ring (m)	Microscope Reading						D= a-b (mm)	D(cm)	$D^2(cm^2)$
		On left side			On right side					
		M.S.R.	V.C.	TOTAL (a)	M.S.R	V.C.	TOTAL (b)			
1										
2										
3										
4										
5										
6										

Calculations:
Plot the graph of D^2 vs. m and draw the straight line of best fit.

Model graph:

Plot the graph of D^2 Vs n and draw the straight line of best fit



From the slope of the graph, calculate the radius of curvature R of the plano convex lens

as

$$R = (slope) \times \frac{1}{4\lambda} =$$ _____ cm.

Results:

The radius of cuvature of a given plano convex lens is found to be _____cm.

Newton's Rings :

(1) What is the basic principle of newton's rings experiment ?
Ans : The basic principle of newtons rings experiment is Interference phenominan.

(2) Define Interference phenomena?

Ans : The phenominan of Newton's rings is an illustration of the interference of light waves reflected from the opposite surfaces of a thin film of variable thickness.

(3) Why the rings are circular ?

Ans : The path difference along the circle is constant that's why the rings are circular in this experiment.

(4) What are Newton's Rings ?

Ans : Alternate dark and bright rings with central dark spot are called newton's rings.

(5) Why it is necessary for the light to fall normally on plano convex lens ?

Ans : For interference.

(6) What is constructive interference and destructive interference ?

Ans : When two light waves interfere at each other such that the resultant intensity at a

point increase due to the interference of two waves is called Constructive interference.

If the resultant intensity is minimum then that is called Destructive Interference.

(7) What is the purpose of glass plate incline at 45^0 in this experiment ?

Ans : For normal incidence of light wave.

(8) Why the centre of the rings is dark ?

Ans : Because the plano convex lens and the plane lens both are in contact and at that particular place the centre dark ring will appear.

(9) Which light do u use in this experiment ?

Ans : Monochromatic light. Example : Sodium light.

(10) What will happen if we use White light in this experiment ?

Ans : Coloured fringes will form.

(11) If u replace yellow light with green light ,is there any difference in the formation of rings ?

Ans : No ,because both are Monochromatic lights only.

*EXPE*RIMENT 10

I-V CHARACTERISTIC OF SOLAR CELL

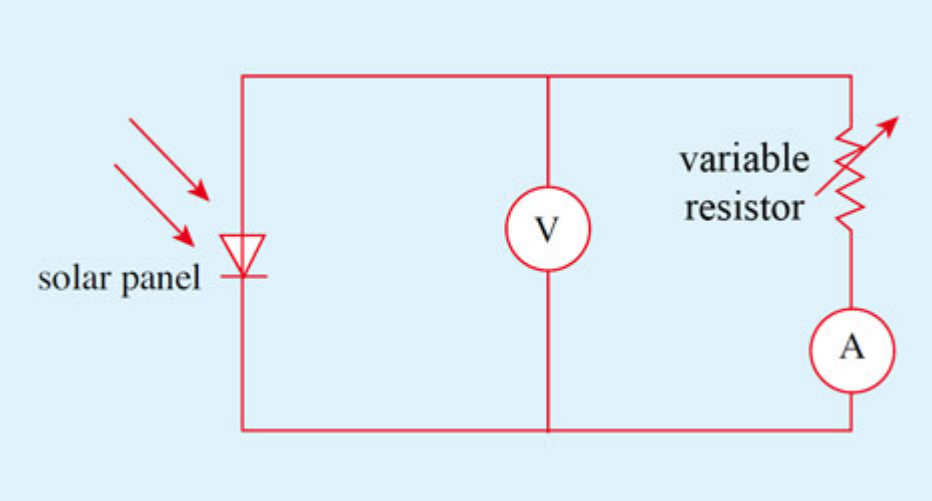
Aim:

To study the characteristics of a solar cell

Apparatus:

Solar cell, rheostat, ammeter, voltmeter, illumination source and connecting wires.

CIRCUIT DIAGRAM:

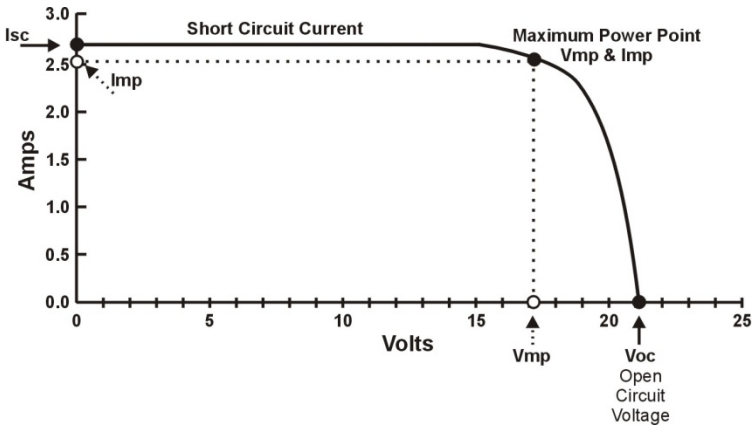


OBSERVATION TABLE:

SR.NO.	VOLTAGE (mV)	CURRENT (mA)	POWER P=VI
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

11			
12			
13			
14			

Model graph:



RESULT:

V/I Charecteristics of solar cell is studied.

EXPERIMENT 11

Resonance in LCR circuit

Aim: To study resonance effect in series and parallel LCR circuit and quality factor. *This experiments also enables study of forced damped oscillation.*

Apparatus: A signal generator, inductor, capacitor, ammeter, resistors, AC milli voltmeter.

Formula: **1)** Resonant frequency

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

Where L = inductance of the coil

C = Capacitance of the capacitor

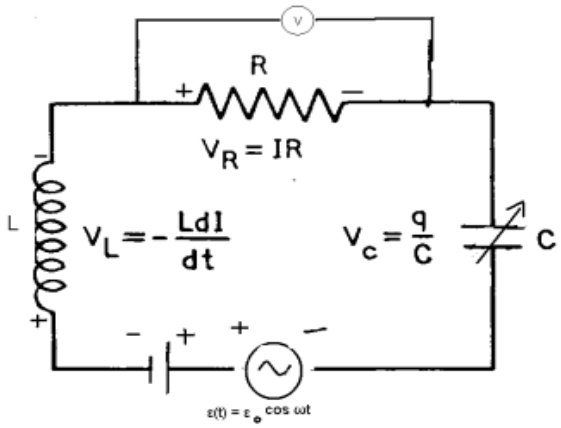
Quality factor

$$Q = \frac{f_r}{\Delta f}$$

Where $\Delta f = f_1 - f_2$

f_r = the resonant frequency of the series or parallel resonant circuit.

. Circuit Diagram; Series LCR circuit :



I.2. Parallel LCR circuit: Circuit Diagram;

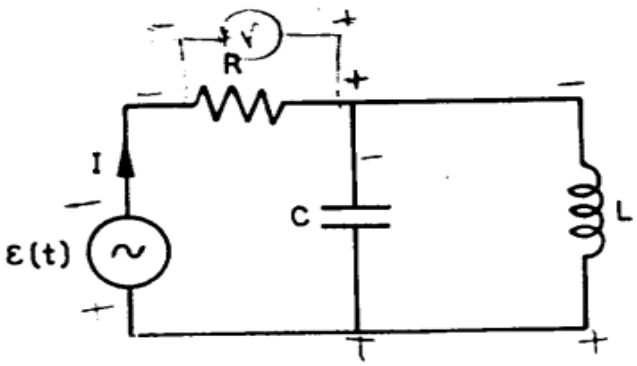


Fig 3

Observations :

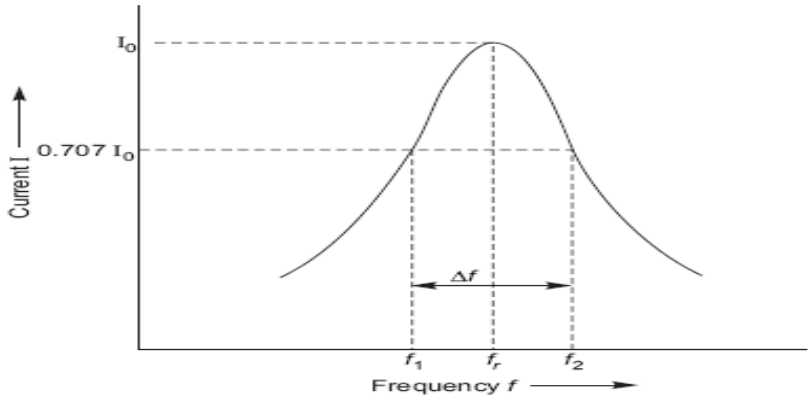
For Series LCR Circuit.

S.No.	L = _____ mH C = _____μF. R= _____Ω	
	Frequency (υ) kHz	Current (mA)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

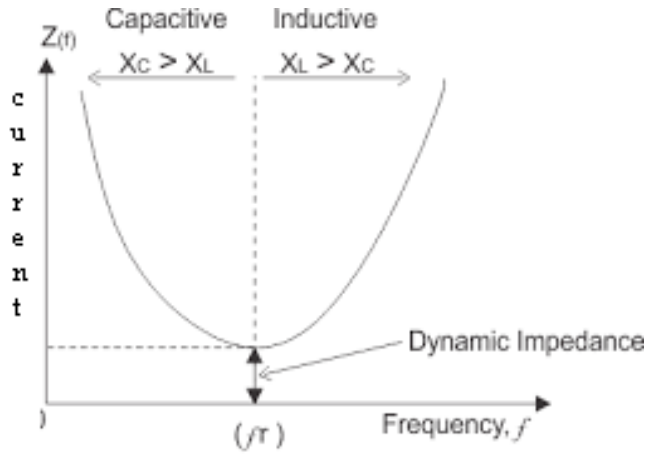
Part B: Parallel LCR Circuit.

S.No.	L = _____ mH C = _____μF. R= _____Ω	
	Frequency (υ) kHz	Current(mA)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Model graph:



Frequency verses current graph for series LCR circuit



Frequency verses current graph for parallel LCR circuit

Result:

For a Series resonance circuit:

1)The resonant frequency f_r = _____Hz
2) Quality factor calculated to be Q =_____.

For a Parallel resonance circuit:

1)The resonant frequency f_r = _____Hz
2) Quality factor calculated to be Q =_____.