

# Dr. Babasaheb Ambedkar Marathwada University

FACULTY OF SCIENCE

B.Sc. II Year Practical Examination

PHYSICS

PAPER-VII

Time 3 Hours

Marks: 100

Batch No.

Date.....

## Expt. No.1

### Spectral Density Distribution:-

Draw and connect the circuit, for different values of  $I$  note down  $\theta$ . Calculate  $R_t$ ,  $t$  and  $T$  using formulae plot a graph  $\log_{10} \theta$  against  $\frac{1}{T}$ . Find out slope and hence  $\lambda$

$$\text{Formula: } R_0 = \frac{R_{\text{room temp.}}}{1 + \alpha t_{\text{room}}}$$

$R_{\text{room temp.}}$  - Resistance of filament of bulb at  $^{\circ}\text{C}$   
 $\alpha = 5.21 \times 10^{-3} / ^{\circ}\text{C}$  (For tungsten wire)

Resistance of filament of bulb at temp  $t$   $^{\circ}\text{C}$   $R_t = \frac{V_t}{I_t}$  Ohms.

Temp. of filament  $t = \frac{R_t - R_0}{R_0 \alpha}$

Wavelength of light used

$$\lambda = \frac{hc}{2.303 K} \times \frac{1}{\text{Slope}}$$

$h = 6.63 \times 10^{-34} \text{ J}$ ,  $K = 1.38 \times 10^{-23} \text{ J/K}$

$C = 3 \times 10^8 \text{ m/s}$ .

P.T.O

**Scheme of Marking:-**

<b>Sr. No.</b>	<b>Different heads of distribution of Marks</b>	<b>Max. Marks</b>	<b>Mark Obtained</b>
i.	Circuit diagram (15) and connections (15)	30	
ii.	Proper tabular form with observations	25	
iii.	Calculation (10) graph (5) Answer with unit (5)	20	
iv.	Oral	15	
v.	Record Book	10	
	<b>Total</b>	<b>100</b>	

Signature of Examiner

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## Expt. No .2 Comparison of Capacities by Desauty's Method:-

- 1) Draw the circuit diagram and get checked by the examiner.
- 2) Keep suitable resistance in the resistance box  $R_1$  and note deflection and adjust the resistance in resistance box  $R_2$  to get null deflection
- 3) Take at least five readings and compare the capacities of given condensers

by formula 
$$\frac{C_1}{C_2} = \frac{R_2}{R_1}$$

- 4) Keep  $R_1$  fixed and by varying the resistance  $R_2$  measure the deflection, plot a graph between resistance  $R_2$  on y-axis and deflection on x-axis,

Calculate  $\frac{C_1}{C_2}$  from graph.

## Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i.	Circuit diagram and connection	15	
ii.	Proper tabular form, required number of observations and graph	45	
iii.	Calculations and answer with unit	15	
iv.	Oral	15	
v.	Record Book	10	
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### Expt. No .3 Thermal Conductivity by Forbe's method:-

Determine the coefficient of thermal conductivity of the given bar using the formula.

$$K = \frac{\rho S}{\left(\frac{d\theta}{dx}\right)_{x=x_p}} \int_{x_p}^{\text{end c}} \frac{d\theta}{dt} dx$$

where  $\int_{x_p}^{\text{end c}} \frac{d\theta}{dt} dx$  ----- represents the area under the curve  
between x and  $\frac{d\theta}{dt}$

Show the steady state to the examiner.

given

i) Specific heat  $s =$  Cal/gm °C.

ii) density  $\rho =$  gm/cm<sup>3</sup>

**P.T.O.**

**Scheme of Marking:-**

<b>Sr. No.</b>	<b>Different heads of distribution of Marks</b>	<b>Max. Marks</b>	<b>Mark Obtained</b>
i.	Proper adjustment of experimental setup and observations	40	
ii.	graphs	20	
iii.	Calculations, Answer with Units	15	
iv.	Oral	15	
v.	Record Book	10	
	<b>Total</b>	<b>100</b>	

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## Expt. No.4

### Stefan's constant :-

Draw the circuit diagram and note down deflection of galvanometer for different temperatures. Calculate Stefan's constant using the formula

$$\sigma = \frac{Jms}{A(T_1^4 - T_2^4)} \left( \frac{dT}{dt} \right)$$

given  $J = 4.2 \times 10^7$  erg/cal.

$s = \dots\dots\dots$  cal/gm.°C

Where m-mass of silver disc,

A-area of disc,

s-specific heat of disc.

### Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i.	Circuit diagram and Connections	15	
ii.	Proper tabular form and observations	30	
iii.	Graphs	15	
iv.	Calculations and answer with units	15	
v.	Oral	15	
vi.	Record Book	10	
	<b>Total</b>	<b>100</b>	

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## Expt. No.5

### Frequency of AC mains by Sonometer :-

- i Make experimental arrangement with proper connections
- ii Find out radius of the given wire.
- iii Determine the freq. of AC mains by using the formula.

$$n = \frac{1}{2\ell} \sqrt{\frac{T}{M}}$$

$\ell$  - Vibrating length of the wire

T - Tension in the wire

m - mass per unit length of sonometer wire.

given m = ..... gm./cm.

### Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Circuit diagram and Connections	15	
ii	Observations with proper observation table	40	
iii	Calculations and answer with unit	20	
iv	Oral	15	
v	Record Book	10	
	<b>Total</b>	<b>100</b>	

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## Expt. No.6

### Quineke's Tube:-

- i Obtain the condition of maximum and minimum sound
- ii Measure the longer and shorter distance between the two openings and determine the differences between them.
- iii Determine the wavelength and calculate velocity of sound for each Observation.

Formula -  $v = n\lambda$

### Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Proper experimental arrangement	35	
ii	Proper tabular form and observations	25	
iii	Calculations and answer with unit	15	
iv	Oral	15	
v	Record Book	10	
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## Expt. No.7

### Helmholtz Resonator :-

Estimate that freq. of a resonator varies inversely as the square root of its volume and determine the neck correction of the resonator using the

Formula

$$\text{formula } n = \frac{v}{2\pi} \left( \frac{a}{\ell V} \right)^{\frac{1}{2}}$$

where

**V** - volume of resonator

**a** - area of cross section of resonator neck.

**ℓ** - length of the neck.

**v** - velocity sound in air.

plot a graph between  $\frac{1}{n^2}$  on x-axis and V on Y- axis

and find out neck correction from graph

### Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Adjustment of Resonator	35	
ii	Observations	25	
iii	Calculations , graph and Result	15	
iv	Oral	15	
v	Record Book	10	
	<b>Total</b>	<b>100</b>	

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**Expt. No.8**

**Self inductance by Owen's Bridge :-**

Find out the self inductance of the given coil in terms of standard resistance and capacitance.

**Scheme of Marking:-**

<b>Sr. No.</b>	<b>Different heads of distribution of Marks</b>	<b>Max. Marks</b>	<b>Mark Obtained</b>
i	Circuit diagram and connections	15	
ii	Tabular form with required observations and adjustment of balance point	45	
iii	Calculations, Answer with Unit	15	
iv	Oral	15	
v	Record Book	10	
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## Expt. No.9

### Low resistance by potentiometer:-

- 1) Draw the Circuit diagram and get it checked by the examiner
- 2) Keep suitable resistance in the resistance box and measure the balancing length  $l_1$  and  $l_2$
- 3) Take at least five readings.
- 4) Measure the low resistance of a given wire by using the formula.

$$r = R \left( \frac{l_2}{l_1} - 1 \right)$$

### Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Circuit diagram and connection	15	
ii	Proper adjustment , tabular form with required observations	45	
iii	Calculations, Answer with Units	15	
iv	Oral	15	
v	Record Book	10	
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## Expt. No.10

$\frac{e}{m}$  by Thomson's Method:-

Determine charge to mass ratio of an electron by using Thomson's method

$$\text{Formula : } \frac{e}{m} = \frac{\left( \frac{P}{2} + L \right) PV y \times 10^8}{D \left[ \frac{1}{2} \ell^2 \bar{H} + \int_0^{\ell} h (\ell - x) dx \right]^2}$$

## Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Proper setup of Cathode ray tube, and Readings for Voltage, Deflection	25	
ii	Observations, Graph, Calculations, result with unit	50	
iii	Oral	15	
iv	Record Book	10	
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**Expt. No.11**

**To prepare a mark list:-**

Write down the programme get it checked form the examiner, draw the flow chart. Run the program and take its printout

**Scheme of Marking:-**

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Flow Chart	30	
ii	Programme	30	
iii	Printout	15	
iv	Oral	15	
v	Record Book	10	
	<b>Total</b>	<b>100</b>	

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## Expt. No.12

### Calculation of days between two dates of a year:-

Write down the programme get it checked form the examiner, draw the flow chart. Run the program and take its printout

### Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Flow Chart	30	
ii	Programme	30	
iii	Printout	15	
iv	Oral	15	
v	Record Book	10	
	<b>Total</b>	<b>100</b>	

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## Expt. No.13

### Sum of sine and cosine series:-

Write down the programme get it checked form the examiner , draw the flow chart. Run the program and take its printout

### Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Flow Chart	30	
ii	Programme	30	
iii	Printout	15	
iv	Oral	15	
v	Record Book	10	
	<b>Total</b>	<b>100</b>	

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## Expt. No.14

### Convert a given Integer into binary and octal system:-

Write down the programme get it checked form the examiner, draw the flow chart. Run the programme and take its printout

### Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Flow Chart	30	
ii	Programme	30	
iii	Printout	15	
iv	Oral	15	
v	Record Book	10	
	<b>Total</b>	<b>100</b>	

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**Expt. No.1**

**I-H CURVE :-**

Draw a circuit diagram and determine the hysteresis loss for a given specimen in the form of rod.

**Scheme of Marking:-**

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Circuit diagram, connections and Setting up of apparatus of I-H curve	25	
ii	Observation in proper tabular form, graph of $I - \tan\theta$ , calculations of Area of loop as hysteresis loss.	50	
iii	Oral	15	
iv	Record Book	10	
	<b>Total</b>	<b>100</b>	

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## Expt. No.2

### Absolute Value of $B_H$ and $B_V$ Using Earth Inductor :-

Draw a circuit diagram, make the connections and determine the absolute value of  $B_H$  and  $B_V$  using Earth Inductor by setting in the correct Positions. Use the relations.

$$B_H = \frac{K \theta_H R}{2 NA}, \quad B_V = \frac{K \theta_V R}{2 NA}$$

$$K = \frac{EC}{(P+Q)} \frac{P}{\theta}$$

where,

N - No of turns in the earth inductor,

A - area of coil

$\theta_H$  - deflection in B.G. for horizontal position

$\theta_V$  - deflection in B.G. for vertical position

### Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Circuit diagram, connections	15	
ii	Proper tabular form and required observations	45	
iii	Calculation and Answer with unit	15	
iv	Oral	15	
v	Record Book	10	
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**Expt. No.3**

**Field along the Axis of a coil :-**

- 1) Draw the circuit diagram and get it checked by the examiner
- 2) Verify that the magnetic field changes with distance along the axis of a coil
- 3) Plot a graph between  $\tan\theta$  (y-axis) and distance (x- axis)

Formula - i) 
$$F = \frac{2 \pi n i r^2}{10 (r^2 + x^2)^{3/2}}$$

ii) 
$$F = H \tan\theta$$

Where, n - Number of turns in the coil

i - Current

r - Radius of the coil

**Scheme of Marking:-**

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Circuit diagram, connections	15	
ii	Proper tabular form and required observations and graph	45	
iii	Calculation and Answer with unit	15	
iv	Oral	15	
v	Record Book	10	
	<b>Total</b>	<b>100</b>	

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**Expt. No.4**

**Absolute Capacity of a condenser by ballestic Galvanometer :-**

Draw the necessary circuit diagram, make the connections and determine the absolute value of given condenser by using ballestic Galvanometer

$$\text{Formula } C = \frac{T}{2\pi} \frac{R}{S} \frac{1}{P} \frac{\theta}{\Phi}$$

Where,  $\theta$  is the corrected throw &  $\Phi$  is the steady deflection in B.G.

**Scheme of Marking:-**

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Circuit diagram, connections	15	
ii	Proper tabular form and required observations	45	
iii	Calculations and Answer with unit	15	
iv	Oral	15	
v	Record Book	10	
	<b>Total</b>	<b>100</b>	

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## Expt. No.5

### High Resistance by leakage Through condenser :-

Draw the necessary circuit diagram, make the connections and get it checked by examiner

Part I: Determine the resistance of condenser by allowing the charge to leak through condenser by taking the time of leakage as 10,15,20,25,30 seconds.

Plot the graph  $t$  and  $\log \frac{\theta_0}{\theta_1}$  find the slope of the graph

$$\text{Self leakage resistance } r = \frac{t}{C \cdot 2.303 \log \frac{\theta_0}{\theta_1}}$$

Part II: Combined resistance  $R^1$  -Similarly allow the charge to leak through combination. Plot the graph between  $t$  and  $\log \frac{\theta_0}{\theta_2}$  . Find the Slope of the graph.

$$\text{Combined resistance } R^1 = \frac{t}{C \cdot 2.303 \log \frac{\theta_0}{\theta_2}}$$

for high resistance R

use the Formula  $\frac{1}{R} = \frac{1}{R^1} - \frac{1}{r}$

**P.T.O**

**Scheme of Marking:-**

<b>Sr. No.</b>	<b>Different heads of distribution of Marks</b>	<b>Max. Marks</b>	<b>Mark Obtained</b>
i	Circuit diagram, connections	10	
ii	Observations for self and combinations	40	
iii	Graph	15	
iv	Calculation and Answer with unit	10	
v	Oral	15	
vi	Record Book	10	
	<b>Total</b>	<b>100</b>	

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## Expt. No.6

### $\lambda$ by Newton's ring:-

1. Obtain clearly visible Newton's rings with given apparatus.
2. Measure diameter of ten bright rings and note their numbers.
3. Calculate wave length of the given source by the formula.

$$\lambda = \frac{D_n^2 - D_m^2}{4R(n - m)}$$

Where R is the radius of curvature of plano convex lens.

given R = ..... cm.

4. Plot graph and verify result from graph.

### Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Tabular form and observations.	30	
ii	Calculations and Result with unit	35	
iii	Graph	10	
iv	Oral	15	
v	Record Book	10	
	<b>Total</b>	<b>100</b>	

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**Expt. No.7**

**Resolving power of Prism:-**

1. Adjust the scheuster's method, level the prism table and adjust the prism in angle of minimum deviation position.
2. Calculate the angle of prism and refractive index for each colour.
3. Measure the Critical width and calculate effective base width of prism.
4. Plot the graph between  $\mu$  and  $\frac{1}{\lambda^2}$
5. Calculate the R.P. of prism.

Use formula

i)  $\mu = \frac{\sin (A+ \delta_m)/2}{\sin (A/2)}$

ii)  $t = \frac{2a \sin (A/2)}{\cos (A+ \delta_m)/2}$

iii) R.P. of Prism =  $\frac{2 \beta}{\lambda} t$

**Scheme of Marking:-**

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Scheusters method arrangement	15	
ii	Observations	30	
iii	Adjustment of Critical width.	15	
iv	Graph and Calculation of R.P.	15	
v	Oral	15	
vi	Record Book	10	
	<b>Total</b>	<b>100</b>	

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**Expt. No.8**

**Study of CRO :-**

Determine the frequency using CRO by taking five different frequencies from frequency generator and also find voltage sensitivity (A.C. or D.C.). Show the adjustment to the examiner.

**Scheme of Marking:-**

<b>Sr. No.</b>	<b>Different heads of distribution of Marks</b>	<b>Max. Marks</b>	<b>Mark Obtained</b>
i	Circuit diagram and connection	15	
ii	Proper tabular form and required observations for frequency and voltage sensitivity	45	
iii	Calculations Answer, Units	15	
iv	Oral	15	
v	Record Book	10	
	<b>Total</b>	<b>100</b>	

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## Expt. No.9

### Common Emitter Amplifier:-

Draw the circuit diagram, make the connections & study its gain frequency response.

### Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Circuit diagram & proper Connections	25	
ii	Observation in proper tabular form, Calculation ,graph and result with unit	50	
iii	Oral	15	
iv	Record Book	10	
	<b>Total</b>	<b>100</b>	

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## **Expt. No.10**

### **Full-wave rectifier with $\pi$ - filter :-**

Draw the circuit diagram of Full-wave rectifier with  $\pi$  - filter and calculate its efficiency and ripple factor.

### **Scheme of Marking:-**

<b>Sr. No.</b>	<b>Different heads of distribution of Marks</b>	<b>Max. Marks</b>	<b>Mark Obtained</b>
i	Circuit diagram & proper Connections	25	
ii	Observation in proper tabular form, calculations, graph and result with unit	50	
iii	Oral	15	
iv	Record Book	10	
	<b>Total</b>	<b>100</b>	

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FACULTY OF SCIENCE

B.Sc. II Year Practical Examination

PHYSICS

PAPER-VIII

Time 3 Hours

Marks: 100

Batch No.

Date.....

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## Expt. No.11

### Viscosity of liquid using searle's Viscometer:-

- 1) Adjust the searle's viscometer in a proper position.
- 2) Measure the diameter of drum and solid cylinder also measure the outer and inner diameter of hollow tube.
- 3) Adjust the suitable length of cylinder in liquid.
- 4) By adjusting the number of turns on drum measure the time period for unwinding of turns.
- 5) Plot the graph between length on x-axis and time period of rotation on y-axis

use the formula :

$$\eta = \frac{mgd (b^2 - a^2)}{8\pi^2 a^2 b^2} \left( \frac{t}{\ell + k} \right)$$

Where,

d - diameter of drum

a - radius of solid inner cylinder

b - radius of outer cylinder

t - Periodic time

$\ell$  - length of cylinder in given liquid

m - mass in pan.

**Scheme of Marking:-**

<b>Sr. No.</b>	<b>Different heads of distribution of Marks</b>	<b>Max. Marks</b>	<b>Mark Obtained</b>
i	Adjustment of searles Viscometer, and measurement of d,a,b,	15	
ii	Proper tabular form and required no. of observations	35	
iii	Calculations and result with unit	15	
iv	Graph	10	
v	Oral	15	
vi	Record Book	10	
	<b>Total</b>	<b>100</b>	

Signature of Examiner

1) \_\_\_\_\_

2) \_\_\_\_\_

# Dr. Babasaheb Ambedkar Marathwada University

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## Expt. No.12

### Growth and Decay of current in R - C Circuit :-

Draw the circuit diagram of R - C Circuit make the connections and get checked by the examiner . Take suitable set of readings and plot graphs for growth and decay of current through R-C Circuit .

### Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Circuit diagram & proper Connections	25	
ii	Observation in proper tabular form, calculations and graph, result with unit	50	
iii	Oral	15	
iv	Record Book	10	
	<b>Total</b>	<b>100</b>	

Signature of Examiner

1) \_\_\_\_\_

2) \_\_\_\_\_

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## Expt. No.13

### Surface Tension By Ripples Method :-

- 1) Take the experimental liquid in trough & adjust the length of dipper.
- 2) Produce the ripples on water surface by passing the suitable current in tuning fork.
- 3) Calculate the wavelength of ripples produced.
- 4) Calculate the S.T. by using the formula.

$$T = \frac{\lambda^2 \rho}{4\pi^2} (2n^2 \lambda \pi - g)$$

Where,  $\lambda$  – wavelength of ripples produced

$\rho$  – density of liquid

$n$  - frequency of the fork

$g$  - acceleration due to gravity.

Given frequency of the tuning fork

$n = \dots\dots\dots$ Hz

$g = \dots\dots\dots$  cm/s<sup>2</sup>

### Scheme of Marking:-

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Proper tabular form and required number of observations	50	
ii	Calculation, Answer and Units	25	
iii	Oral	15	
iv	Record Book	10	
	<b>Total</b>	<b>100</b>	

Signature of Examiner

1) \_\_\_\_\_

2) \_\_\_\_\_

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**Expt. No.14**

**Mutual Inductance by Carey-Foster's bridge:-**

Draw the circuit diagram, make the connections and get it checked by examiner. By keeping  $R_1$  at a fixed value adjust  $R_2$  to get the null point. Repeat the experiment for at least five different values of  $R_1$

Use the formula

$$M = C R_1 (R_2 + S)$$

Given :  $C =$  \_\_\_\_\_  $\mu F$

Resistance of secondary Coil  $S =$  \_\_\_\_\_ Ohm.

**Scheme of Marking:-**

Sr. No.	Different heads of distribution of Marks	Max. Marks	Mark Obtained
i	Circuit diagram & proper Connections	15	
ii	Proper tabular form and required number of observations	35	
iii	Adjustment of Null Point	10	
iv	Calculations and Answer with Unit	15	
v	Oral	15	
vi	Record Book	10	
	<b>Total</b>	<b>100</b>	

Signature of Examiner

1) \_\_\_\_\_

2) \_\_\_\_\_