

Dr. BABASAHEB AMBEDKAR
MARATHWADA
UNIVERSITY, Aurangabad.
B.Sc. III Year Practical
Examination
Question Papers
Subject : Physics
Paper Nos. : XI, XII

Dr. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY
 B.Sc. III Year Practical Examination
 PHYSICS
 PAPER – XI

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1) Surface tension by Ferguson method

Determine the radius of bore of capillary tube. Adjust capillary tube monometer, microscope and lamp in the required position. Determine S .T. using the formula

$$T = \frac{h\rho rg}{2}$$

Given: Density of monometer liquid $\rho = \frac{\text{_____}}{\text{Cm}^3}$ gm

Scheme of Marking

Sr. NO	Head of distribution of marks	Maximum Marks	Marks obtained
1	Experimental setup & determination of h	35	
2	Determination of r	25	
3	Calculation (10) Answer and units (05)	15	
4	Oral	15	
5	Record Book	10	
Total		100	

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2) Oscillating disc

Determine the coefficient of viscosity of the given liquid by oscillating disc method using the

Formula:
$$\eta = \frac{16I^2}{\pi\rho T(r^4 + 2r^3d)^2} \left[\left(\frac{\lambda - \lambda_0}{\pi} \right) + \left(\frac{\lambda - \lambda_0}{\pi} \right)^2 \right]^2$$

Scheme of marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Correct measurement of I (M I)	20	
2	Observation & measurement of λ & λ_0	35	
3	Calculation (15) Answer and units (05)	20	
4	Oral	15	
5	Record Book	10	
Total		100	

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3) Y' by Koenig method

Determine the Young's Modulus of the martial of the given bar by Koenig method ,use the formula

$$Y = \frac{3W l^2 (2D+a)}{2bd^3x}$$

Where W= Mg

b - Breadth of bar

d - Thickness of bar

a - Distance of mirror for knife edge

D - Distance between Scale and Remote Mirror.

l - Distance between Knife edge.

X - Change in the scale reading for M gms. Weight.

Scheme of marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Correct measurement of D, a, b, d	10	
2	Proper tabular form with required number of observation	40	
3	Graph	10	
4	Calculation (10) Answer and units (05)	15	
5	Oral	15	
6	Record Book	10	
Total		100	

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4) Diffraction at cylindrical obstacle

Obtain the diffraction pattern using cylindrical obstacle. Calculate wavelength of monochromatic light by the relation

$$\lambda = \frac{d\beta}{D}$$

All the symbol s have usual meaning

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Adjustment of diffraction pattern	20	
2	Proper tabular form and observation	40	
3	Calculation (10) answers and unit (05)	15	
4	Oral	15	
5	Record Book	10	
Total		100	

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5) λ by Bi-Prison

- 1 Obtain sharp well defined interference fringes using given apparatus
- 2 Adjust colinearity properly .
- 3 Measure fringe width x .
- 4 Measure d_1 and d_2 using suitable convex lebs .
- 5 Measure distance between experience and slit =D=
- 6 Calculate wavelength λ using the formula.

$$\lambda = X \frac{\sqrt{d_1 d_2}}{D} = \frac{x.d}{D}$$

Scheme of marking

Sr. No	Different heads of distribution of marks.	Max. Marks	Marks obtained.
1	Sharp well defined fringes.	20	
2	Measurement of fringe width	30	
3	Calculation(10)and Result (15)	25	
4	Oral .	15	
5	Record Book.	10	
Total		100	

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6) Polarimeter

Determination the specific rotation of sugar solution by polarimeter using 20% ,10%; 5%,and 2.5% sugar solution. Use the relation

$$[s]_{\lambda}^t = \frac{\theta}{lC}$$

Where θ =Rotation of degree.

l = length of tube in decimeter

C = Concentration in gm\cc

Scheme of marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Systematic adjustment and L. C of polarimeter.	20	
2	Proper tabular form and required observation.	40	
3	Calculation and result	15	
4	Oral	15	
5	Record Book	10	
	Total	100	

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7) REDBERG'S CONSTANT

Determine Rydberg's constant by using spectrometer

$$\text{Formula: } \frac{1}{\lambda} = R_H \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right) \text{ OR } R_H = \frac{n_2^2 n_1^2}{\lambda (n_2^2 - n_1^2)}$$

For H α (n₁=2,n₂=3) For H β (n₁=2,n₂=4)

R_H =Redberg's constant λ =Wavelength For H α ,H β lines

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Proper setting of spectrometer	25	
2	Observation in proper tabular form Graph ,calculation ,Results with Units	50	
3	Oral	15	
4	Record Book	10	
Total Marks (A+B)		100	

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8) PLANK'S CONSTANT 'h'

Using photocell , determine the value of plank's constant

Formula:
$$h = \frac{e(V_2 - V_1)}{c(\lambda_1 - \lambda_2)}$$

Where the letters have their usual meanings

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Circuit diagram and connection ,proper tabular form.	25	
2	Observation ,Graph ,calculation ,Results with Units	50	
3	Oral	15	
4	Record Book	10	
Total		100	

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9) EDSAR'S 'A' PATTERN

Determine the wavelength of monochromatic light by using Edsar's A pattern

Formula: $\lambda = \frac{L\delta}{nD}$

Where ,
n=order of pattern
L=Distance between two lines of A' δ = Grating element =2.54 \ 2000
D= Distance between 'A' and grating

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Proper setup of apparatus measurement of horizontal width (L)of Letter 'A'	25	
2	Observation ,in proper tabular form Graph ,calculation ,Results with Units	50	
3	Oral	15	
4	Record Book	10	
Total		100	

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10) Temperature of flame

Estimate the temperature of flame by using the method of reversal of spectral lines using the flame of NaCl solution and white light source by the formula

$$t = \frac{R_t(1 + \alpha \theta) - R_0}{R_0 \alpha}$$

Where all symbols have usual meaning

Given: Temp coefficient of resistance of filament wire =-----/ C⁰

Scheme of marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Adjustment of spectrometer.	15	
2	Observation ,in proper tabular form Graph ,calculation ,Results with Units	40	
3	Calculation , Answers and unit	20	
4	Oral	15	
5	Record Book	10	
Total		100	

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11) Calibration of Bridge Wire

Calibrate the bridge wire using Carey- Foster'd bridge and plot the necessary graph .

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Circuit diagram and connection	15	
2	Proper tabular form and required observation	45	
3	Graph	15	
4	Oral	15	
5	Record Book	10	
Total		100	

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12) Velocity of Sound in free air

To measure velocity of sound in free air

Formula : $V = n \lambda$

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Experimental Arrangement	15	
2	Proper tabular form and required observation	50	
3	Calculation, Answerer & Units	10	
4	Oral	15	
5	Record Book	10	
Total		100	

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13) Calculate Reydberg's constantly by using Excel

Determine the value of Reydberg's constant by using excel facility when data of Reydberg's constant experimental is provided.

$$\text{Formula :- } \frac{1}{\lambda} = R_H \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right) \text{ OR } R_H = \frac{n_1^2 n_2^2}{\lambda (n_2^2 - n_1^2)}$$

For H_α(n₁=2,n₂=3) for H_β(n₁=2, n₂=4)
RH =Reydberg's constant λ=Wavelength for H_α, H_β lines

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Creation of Table from given data	25	
2	Calculation of the parameters required for graph ,plotting of the graph using chart wizard and calculation of Rydberg's constants	50	
3	Oral	15	
4	Record Book	10	
Total		100	

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14)I-H curve & e/m by using Excel

Determine the value of Hysteresis loss,e/m by using excel facility when data of I-H curve experiment is provided

Formula :-

Hysteresis Loss = Area of I-H curve

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Creation of Table from given data	25	
2	Calculation of the parameters required for graph ,plotting of the graph using chart wizard and calculation of area from the graph and hence calculate Hysteresis Loss, e/m	50	
3	Oral	15	
4	Record Book	10	
Total Marks		100	

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1) Energy band gap.

Determine the energy band gap for material of given thermister.

Formula :-

$$E_g = \frac{2.303 \times 2k \times \log R_t}{\frac{1}{T}} = 2.303 \times 2k \times \text{slope}$$

Where ,

K=Boltzman constant

T=Absolute temperature

Rt=Risistance of thermistor at t0 C

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Circuit .diagram ,proper connection	25	
2	Observation in proper tabular form, Calculation ,graph& result with unit	50	
3	Oral	15	
4	Record Book	10	
Total		100	

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2) Characteristics of JEET

Aim : Study drain and transfer characteristics of JEET and determine the transistor parameters such as r_d , μ and g_m

Formula :-

$$(a) r_d = \left(\frac{\Delta V_{Ds}}{\Delta I_D} \right)_{V_{Gs}} \quad (b) g_m = \left(\frac{\Delta I_D}{\Delta V_{Gs}} \right)_{V_{Ds}} \quad (c) \mu = \left(\frac{\Delta V_{Ds}}{\Delta V_{GS}} \right)_{I_D}$$

a)Scheme of Marking

Sr. No	Head of destitution of marks	Maximum Marks	Marks Obtained
1	Circuit .diagram ,proper connection	25	
2	Observation in proper tabular form, Calculation ,graph& result with unit	50	
3	Oral	15	
4	Record Book	10	
Total		100	

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3) Zener diode characteristics and shunt Regulator

Study zener diode characteristics design & build shunt regulator and study load line regulation.

a) Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Design of circuit, circuit. Diagram and proper connection	25	
2	Observation in proper tabular form, Calculation ,graph& result with unit	50	
3	Oral	15	
4	Record Book	10	
Total		100	

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4) Emitter follower (CC Amplifier)

Design of circuit build common collector amplifier (Emitter follower)to study its gain – frequency response and determine its I/P and O/p impedance.

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Design of circuit .diagram and proper connection	25	
2	Observation in proper tabular form, Calculation ,graph& result with unit	50	
3	Oral	15	
4	Record Book	10	
Total		100	

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5) Hartley oscillator

Design and build Hartley oscillator and determine its frequency of oscillation using CRO

Formula :- $f = \frac{1}{2\pi\sqrt{LC}}$ if $L = L_1 + L_2$

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Design of circuit. Diagram and proper connection	25	
2	Observation in proper tabular form, Calculation, graph& result with unit	50	
3	Oral	15	
4	Record Book	10	
Total		100	

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6) Wein – Bridge Oscillator

Design and build Wien –Bridge oscillator by using Op-Amplifier (741)for frequency 964 Hz

Formula :- $f = \frac{1}{2\pi RC} = \frac{0.159}{RC}$

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Design of circuit. Diagram and proper connection	25	
2	Observation in proper tabular form, Calculation, graph& result with unit	50	
3	Oral	15	
4	Record Book	10	
Total		100	

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07) OP-AMP as adder & Subtractor
TO Study the OP-AMP as adder & Subtractor By using IC741

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Circuit diagram and construction	25	
2	Proper observation in tabular form.	50	
3	Oral	15	
4	Record Book	10	
Total		100	

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8) Study of Thermocouple

To Study Thermocouple (Fe-Cu) and to find inversion temperature

Formula:

$$a = \frac{e_1 2 \theta_2^2 + e_2 \theta_1^2}{\theta_1^2 \theta_2 - \theta_2^2 \theta_1}$$

$$b = \frac{e_2 \theta_1 + e_2 \theta_2}{\theta_1^2 \theta_2 - \theta_2^2 \theta_1}$$

The Inversion Temperature

$$t_i = -a/b$$

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Circuit diagram and connection	15	
2	Proper tubular form & required observation & graph	50	
3	Calculation, answer	10	

4	Oral	15	
5	Record Book	10	
Total		100	

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9) Demonstration of phase Diffⁿ in case of L,R,C Circuit

To demonstrate the phase Difference in case of resistance, inductance and capacitance using a C R O

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Circuit diagram and construction	15	
2	Proper tubular form & required observation & graph	50	
3	Calculation, answer & Unit	10	
4	Oral	15	
5	Record Book	10	
Total		100	

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10) **Charge of an Electron By Millikan's oil drop Method**

Determine the charge of an electron by Millikan's oil drop method

Formula :-
$$e = \frac{9\pi d(v_1 + v_2)}{V} (\eta)^{\frac{3}{2}} \left[\frac{2v_1}{g(\rho - \sigma)} \right]^{\frac{1}{2}}$$

Where :

ρ =density of oil , σ =density of oil , η = coefficient of viscosity of air

g =Acceleration due to gravity , V = Applied voltage ,

d =distance between plates

v_1 = Terminal velocity of oil drop moving downward due to gravity

v_2 = Terminal velocity of oil drop moving up due to electric

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Settings of Millikan's apparatus for Measuring v_1 & v_2 .	25	
2	Trials Observation for measuring	50	

	v1&v2,Calculation result with unit		
3	Oral	15	
4	Record Book	10	
Total		100	

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11) Equality Delector

To study the performance of equality delector

Formula :- $Y = \bar{A}.\bar{B} + A.B$

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Circuit diagram and construction	25	
2	Proper observation and Truth Table	50	
3	Oral	15	
	Record Book	10	
Total		100	

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12) Series LCR Circuit

To plot a graph between current and frequency in a series LCR circuit to find the resonant frequency, Quality factor & bandwidth.

Formula:

$$1) f_0 = \frac{1}{2\pi\sqrt{LC}}$$
$$2) Q = \frac{2\pi f_0 L}{R}$$

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Circuit diagram and construction	15	
2	Proper tubular form & required observation & graph	50	
3	Calculation, answer	10	
4	Oral	15	
5	Record Book	10	

Total	100	
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13) Study of Transistor characteristics in CE/CB configuration by using Microsoft Excel

Create table in Excel and plot characteristics curves by using chart wizard & calculate transistor parameter when data is provided.

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Creation of table and proper feeding of data	25	
2	Calculation, graph by using Excel	50	
3	Oral	15	
4	Record Book	10	
Total		100	

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14) Study of JFET characteristics by using Microsoft Excel

Create table in Excel and plot characteristics curves by using chart wizard & calculate JFET parameter when data is provided.

Scheme of Marking

Sr. No	Head of distribution of marks	Maximum Marks	Marks Obtained
1	Creation of table and proper feeding of data	25	
2	Calculation, graph by using Excel	50	
3	Oral	15	
4	Record Book	10	
Total		100	

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