FOR COLLEGE

SHIVAJI UNIVERSITY, KOLHAPUR

Practical Examination in Physics at the B. Sc. Part-II, March/April 2015

Instructions to Laboratory Supervisor

1. It is expected that all the experiments as per the slips be arranged in the Laboratory at the time of inspection on the day & date as declared.
2. The Candidates should be supplied with Mathematical tables.
3. Experts should keep a file of the actual circuit diagrams, observations and calculations recorded by them while performing experiments for determining the results. A copy of the file should be given to the examiners for reference. Constants data must be given wherever required.
4. A copy of question slips sent herewith would be used by laboratory supervisors for arranging experiments of each I,II,III,IV Section and the slips be displayed on the notice board for information of students immediately.
5. All the slips are to be completely pasted on the answer paper.

Sd/-

Prof. B. P. Relekar

Chairman

B. Sc. Part-II Physics

Practical Examination,

March/April, 2015

FOR COLLEGE

SHIVAJI UNIVERSITY, KOLHAPUR

Practical Examination in Physics at the B. Sc. Part-II, March 2015

Instructions to Candidates

1. The time of the examination is as given below. The candidates should be present 15 minutes before the scheduled time.
2. The Candidates who fail to present themselves at the time and place fixed for their examination will not be examined.
3. The Candidates will be required to produce their laboratory journals at the time of their practical examination. The journal **must be** properly certified by incharge staff members and also by head of the department and should bear the candidate's examination number at the vight hand top corner. If a candidate has lost his journal, he she must produce a certificate showing the completion of the requisite number of experiments.
4. The students will be examined in four practicals each of 3 hours duration.
5. The Candidates should note carefully the distribution of marks shown on each practical slip.
6. All observations and calculations must be written in **blue ink** only.
7. Use of logarithmic table /calculator is allowed. Candidate should bring their own sets of geometrical instruments.
8. Candidates must show at least one adjustment of each type to the examiner and get it signed.
9. The candidates should also read carefully the instructions printed on the answer-book.
10. The candidates should avolid manipulation of observations calculations/results.

Time : Morning : 11-00 a.m. to 2-00 p.m. and

Evening : 2-30 p.m. to 5-30 p.m.

Prof. B. P. Relekar
Chairman
Physics,
Practical Examination,
March/April, 2015

FOR EXAMINER

SHIVAJI UNIVERSITY, KOLHAPUR

Practical Examination in Physics at the B. Sc. Part-II, March/April 2015

(New Course)

Instructions to the Examiners

1. The Examiners must ask oral questions pertaining to the experiment only, They should try to know the understanding of the students, about the experiment.

2. As far as possible examiners should avoid giving a change of experiment, that is once allotted. They should help him in the experiment and deduct proportionate marks.

3. The mark list must be sent by registered post parcel to the following address immediately after the examination is over.

Address
B.Sc./M.Sc. Section Examination
Building No. 1
Room No. 109
Shivaji University Kolhapur
Pin-416 004

Sd/-
Prof. B. P. Relekar
Chairman
B. Sc. Part-II Physics
Practical Examination 2015

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP I**

1. Y by Searle's method.

Determine the Young's modulus(Y) of material of wire by Searle's method.

Measure the time period (T) for four differenet lengths (l) of the wire. Plot the graph of l (Y-axis) against T^2 (X-axis). By using the graph, determine Young's modulus (Y).

Formula,

$$Y = \frac{8\pi I l}{r^4 T^2} = \frac{8\pi I}{r^4} \text{ X slope}$$

Where Y = Young's modulus of material of wire

T = Period of vibration

l = length of wire

r = radius of wire

I = M. I. of rod = ... (gm. cm^2) (given)

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Correct procedure	6		
2	Observations	6		
3	Calculations, Graph,result, unit	6		
4	Oral	3		
5	Journal	16		
	a) Completion (8)			
	b) Punctuality (4)			
	c) Neatness (4)			
	Total :	37		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP I**

2. Young's Modulus (Vibration of Bar)

Keep suitable vibrating length of the bar (constant). Place a mass M at the vibrating end of the bar. Determine periodic time of vibration. Use five different masses. Plot a graph of M (Y-axis) against T^2 (X-axis) . By using the graph determine Young's Modulus Y and mass of vibrating part of the bar.

Formula,

$$Y = \frac{16\pi^2 l^3}{bd^3} \times \text{Slope} \quad ; \quad m = \frac{33}{140} \times \text{Intercept on Y-axis}$$

Where

l = length of the vibrating part of the bar.

M= mass attached to the bar.

T = Period of vibration

m = mass of the vibrating part of the bar.

b = breadth of the bar.

d = depth of the bar.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Correct procedure	6		
2	Observation	6		
3	Calculations, Graph,result,unit	6		
4	Oral	3		
5	Journal	16		
	a) Completion (8)			
	b) Punctuality (4)			
	c) Neatness (4)			
	Total :	37		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP I**

3. Modulus of Rigidity by (Torsional oscillations)

Determine modulus of rigidity of the material of a wire by dynamical method, using a solid cylinder/disc. Take at least five different observations by changing length of wire.Plot a graph of l (Y-axis) against T^2 (X-axis) and determine η from graph.

Formula $\gamma 2 = \frac{8\pi l\, I}{r^4\, T^2} = \frac{8\pi I}{r^4}$ X Slope

Where l = length of the wire. M = Mass of disc/solid cylinder.

I = Moment of Inertia of disc/solid cylinder. =.....gm. cm^2 (Given)

R = Radius of disc/solid cylinder

r = Radius of wire.

T = Period of Torsional oscillation.

N. B. : The micrometer & vernier readings should be shown to the Examiner.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Procedure	6		
2	Tabular form & Observations	6		
3	Graph, Calculations, result, unit	6		
4	Oral	3		
5	Journal	16		
	a) Completion (8)			
	b) Punctuality (4)			
	c) Neatness (4)			
	Total :	37		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP I**

4. Surface Tension of Mercury (Quincke's Method)

Place **a large flat drop** of mercury, on the glass surface. Find the height h of the drop and the distance h' from the upper surface to the horizontal plane of maximum area with the microscope. Determine the surface tension 'T' and the angle of contact θ using :

$$T = \frac{1}{2} g \rho h'^2 \; ; \; \text{Sin} \frac{\theta}{2} = \frac{h}{h' \sqrt{2}}$$

where ρ = density of mercury = 13.6 gm/cc

and g = acceleration due to gravity = 980 cm/sec^2

Repeat the experiment for another large flat drop.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Procedure	6		
2	Tabular form, observations, etc.	7		
3	Calculations, result and unit	5		
4	Oral	3		
5	Journal	16		
	a) Completion (8)			
	b) Punctuality (4)			
	c) Neatness (4)			
	Total :	37		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP I**

5. Surface Tension (Method of Ripples)

Use any suitable device which can produce ripples on the liguid surface and determine the surface tension of the given liquid by the method of ripples :

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

where T = Surface tension of liquid

λ = Wave length of ripple

ρ = density of liquid = ... gm./cc (Given)

n = Frequency of the fork or the vibrator

= ..... Hz (Given)

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Correct Procedure and adjustments	7		
2	Observations	6		
3	Calculations, result and unit	5		
4	Oral	3		
5	Journal a) Completion (8) b) Punctuality (4) c) Neatness (4)	16		
	Total :	37		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP I**

6. Searle's Viscometer

Keep suitable mass 'm' in the pan. Measure peroodic time T for five different heights (H) of liquid column on cylinder scale. Hence plot a graph of mT (Y-axis) against height H (along X axis). From graph determine coefficient of visscosity η of liquid and length correction.

$$\eta = \frac{gD\,(a^2 - b^2)}{8\pi^2\, a^2\, b^2\, (H+h')} \frac{mT}{} = \frac{gD\,(a^2 - b^2)}{8\pi^2\, a^2\, b^2} \text{ x Slope}$$

where H = height of the liquid column measured on the cylinder scale.

h' = length correction (intercept on- X-axis)

a = inner radius of the outer cylinder.

b = outer radius of the inner cylinder.

m = Mass in the pan plus mass of the pan.

g = acceleration due to gravity. = 980 cm/sec^2

D = diameter of the drum.

Note : The drum should rotate slowly and uniformly for each reading.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Correct Procedure	6		
2	Observations	6		
3	Calculations, Graph, result and unit	6		
4	Oral	3		
5	Journal	16		
	a) Completion (8)			
	b) Punctuality (4)			
	c) Neatness (4)			
	Total :	37		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP I**

7. Velocity of sound by Kundt's tube and audio oscillator

Determine the wavelength (λ_a) of sound waves in air at room temperature for different audio frequencies (n) produced by using A. F. Generator. Hence determine velocity of sound

i) at room temperature, (V_a)

ii) at zero degree celsius, (V_0)

Formulae :

$$V_a = n\lambda_a$$

$$V_a = V_0 (1 + \frac{1}{2} \propto t)$$

where $\propto = 0.00367/^0C$

t = room temperature = ... ^0C (Given)

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Correct Procedure	6		
2	Observations	6		
3	Calculations, results & unit	6		
4	Oral	3		
5	Journal	16		
	a) Completion (8)			
	b) Punctuality (4)			
	c) Neatness (4)			
	Total :	37		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP I**

8. Velocity of sound by Resonating Bottle

Measure the volume of resonating air column in the bottle for tuning forks of five different frequencies (n). Plot the graph of volume V (Y-axis) against $\frac{1}{n^2}$ (X - axis).

Hence determine velocity of sound (v) in air using formula,

$$v^2 = \frac{4\pi^2 l}{a} \times \text{slope}$$

where v = Velocity of sound in air

l = length of the neck

a = cross-section area of neck.

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Correct Procedure	6		
2	Observations	6		
3	Calculations, graph, result and unit	6		
4	Oral	3		
5	Journal	16		
	a) Completion (8)			
	b) Punctuality (4)			
	c) Neatness (4)			
	Total :	37		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP II**

1. Fresnel's Biprism

Obtain the interference fringes by using Fresnel's biprism hence determine the mean fringe width. Calculate the wavelength λ of given source of light. Apply bench error.

$$\lambda = \frac{\overline{x}d}{D}, \text{ and } d = \sqrt{d_1 d_2}$$

where $\overline{x}$ = mean fringe width.

d_1 = distance between the magnified images.

d_2 = distance between the reduced images.

bench error = ... cm. (Given)

N. B. : Show your adjustments to the examiner.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Good stationary fringes, Ray diagram	6		
2	Tabular form, observations	6		
3	Calculations, answer and unit	5		
4	Oral	4		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP I I**

2. Searle's Goniometer (Equivalent focal length)

Find the equivalent focal length 'F' of a system formed by two convex lenses for four different distances 'd' between them. Plot a graph of 1/F against d with (0, 0) as origin.

Measure the intercepts on both the axes and interpret them.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Adjustments, procedure, ray diagram	6		
2	Tabular form, observation etc.	6		
3	Graph, calculations, interpretation	6		
4	Oral	3		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP I I**

3. Searle's Goniometer (Cardinal points)

Take a suitable distance 'd' between two coaxial lenses of unequal focal length. find the equivalent focal length of the system by Searle's Goniometer and determine the positions of focal planes for the system.

Hence plot the cardinal points for the system.

Repeat the expt. for another distance 'd' between the two-coaxial lenses.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Adjustments, procedure, ray diagram	6		
2	Tabular form & observations	6		
3	Calculations, plotting of cardinal points	6		
4	Oral	3		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP II**

4. Determination of Cauchy's Constants

Adjust the spectrometer for parallel light by Schuster's method.

Measure the angles of minimum deviation (δm) for different colours in the spectrum of the mercury source produced by prism.

Determine the refractive index (μ) for different colours

Formula

$$\mu = \frac{\text{Sin}\left(\frac{\theta + \delta m}{2}\right)}{\text{Sin}\frac{\theta}{2}}$$

Where θ = Angle of prism = 60 degrees

λ = Wavelength of the colour.

Plot a graph of μ (Y-axis) against $\frac{1}{\lambda^2}$ (X-axis) & hence determine the Cauchy's Constants A & B.

Cauchy's Formula, $\mu = A + \frac{B}{\lambda^2}$

	Colour	Wavelength		Colour	Wavelength
1.	Red	..... Å	4.	Blue	..... Å
2.	Yellow	..... Å	5.	Violet	..... Å
3.	Green	..... Å			

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Adjustments, procedure, ray diagram	6		
2	Tabular form & observations	6		
3	Calculations, result	6		
4	Oral	3		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP I I**

5. Resolving Power of a Plane Diffraction Grating

Set up the spectrometer for parallel light and mount the grating on the prism table normal to the incident light.

Using mercury yellow doublet, determine the angles of diffraction (θ) for the first order only.

Place an auxiliary slit in front of telescope and adjust its width till the doublet in the first order is just resolved. If 'a' be the slit width then find $\frac{\lambda}{d\lambda}$ for the given pair of lines using the formula,

$$\text{R. P.} = \frac{n\,a}{e\cos\theta}\ , \text{Also verify R. P.} = \left(\frac{\lambda}{d\lambda}\right) \text{for } n = 1$$

Given $\lambda_1 = 5791$ A. U. ; $\lambda_2 = 5769$ A. U. for mercury yellow doublet,

Grating element (e) $= 1.693 \times 10^{-4}$ cm

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Adjustments, procedure, ray diagram	8		
2	Tabular form & observations	5		
3	Calculations, result	5		
4	Oral	3		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP II**

6. Resolving Power of a prism

Set the spectrometer in the minimum deviation position for the mercury yellow doublet [λ_1 = 5791 A$^{\circ}$ λ_2 = 5769 A$^{\circ}$] and determine δm. Put an auxiliary slit in-front of the telescope and adjust its width till the doublet is just resolved. If 'a' is this slit width. find R.P. of prism using the formula:

$$\text{R.P.} = \frac{\lambda}{d\lambda} = \frac{4\ \text{BaSin}\left(\frac{\theta}{2}\right)}{\lambda^3 \cos\left(\frac{\theta+\delta_m}{2}\right)}$$

(Given) :- i) Cauchy's constant B $= 9.1 \times 10^{-11}$

ii) Angle of prism $\theta = 60$ degrees

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained	Remarks if any
1	Correct procedure a) optical leveling. (3) b) Schuster's method (4)	7		
2	Observations a) Min. deviation position for yellow (3) b) Correct width of auxilliary slit to resolve yellow doublet (3)	6		
3	Calculations , results	5		
4	Oral	3		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP II**

7. Polarimeter

Using the given polarimeter take observation for distilled water.

Prepare a sugar solution of suitable concentration by dissolving appropriate amount of sugar in distilled water. Measure the angle of rotation of the plane of polarisation for this solution.

Repeat the experiment for four different concentrations.

Plot a graph of angle of rotation θ (Y-axis) versus concentration of sugar solution m (X-axis). Hence determine the specific rotation($\propto$), using the formula

$$\propto = \frac{10\,\theta}{mL} = \frac{10}{L} \text{ (slope)}$$

where θ = angle of rotation, m = concentration in gm/cc and L = length of the polarimeter tube in cm.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Adjustments, procedure, ray diagram	8		
2	Tabular form & observations	5		
3	Graph, Calculations, results	5		
4	Oral	3		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP I I**

8. Double Refracting Prism

You are provided with a double refracting prism (with its optic axis ..... to its edge).

Determine the angles of minimum deviation both for ordinary and extraordinary rays taking only yellow and blue lines in the spectrum using mercury source. Use a Nicol prism or a polaroid to identify ordinary and extra-ordinary rays and calculate 'μ' for both the rays. Hence determine whether the material of prism is positive or negative.

Angle of the prism = A = 60 degree

Formula : $\mu = \dfrac{\text{Sin}\left(\dfrac{A + \delta m}{2}\right)}{\text{Sin}\,(A/2)}$

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Adjustments, procedure, ray diagram	6		
2	Tabular form & observations, etc.	6		
3	Calculations, results	5		
4	Oral	4		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP III**

1. Transistor Series Voltage Regulator

With a given rectifier, prepare a regulated power supply, by using transistor. Vary output currents by changing load resistance. Hence measure output voltages for different output currents. Plot graph of output voltage against output current. From graph determine percentage load regulation. for R_L=..... Ω

$$\% \text{ load regulation} = \frac{V_o - V_L}{V_L} \times 100$$

where, V_o = open circuit voltage

V_L = Output voltage corrresponding to rated (designed) Load Current

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Circuit Diagram	4		
2	Connections	3		
3	Observations	6		
4	Graph,Calculations and results	5		
5	Oral	3		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP III**

2. Colpitt's Oscillator

(using transistor)

Draw the neat circuit diagram of Colpitt's Oscillator.

Assemble the circuit and measure the frequency of oscillator on C. R. O. Verify your result by using

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

$$\text{Where } C = \frac{C_1 . C_2}{C_1 + C_2}$$

given $C_1 = C_2 =$.....F

$L =$.....H.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Circuit Diagram	6		
2	Connections	6		
3	Observations and result	6		
4	Oral	3		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP III**

3. Phase Shift Oscillator

Draw the neat circuit diagram of phase shift Oscillator.
Assemble the circuit and measure the frequency of oscillator on C. R. O.

Verify your result by using the formula $f = \frac{1}{2 \pi RC \sqrt{6}}$

Given : R=..... Ω & C =.....F
Scheme of Marking : Given :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Circuit Diagram	6		
2	Connections	6		
3	Observations and result	6		
4	Oral	3		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP III**

4. Logic Gates
(using 74 series)

Draw the necessary diagrams & verify the truth tables of NAND, NOR, Ex-OR, Ex-NOR gates

Note : Pin connections of given IC'S are provided.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Diagrams	4		
2	Connections	7		
3	Observations : Verification of truth table	6		
4	Oral	4		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP III**

5. de Morgan's Theorem
(using 74 series)

Draw the necessary diagrams and Verify de Moragan's theprems using 74 series.

Note : Pin Connections of given ICs are provided

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Diagrams	4		
2	Connections	7		
3	Observations : Verification of truth table	6		
4	Oral	4		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP III**

6. Cathode Ray Oscilloscope

i) Determine A. C. OR D. C. sensitivities of Y plate of given C. R. O.

ii) Connect the frequency generator to the Y input of C. R. O. Hence determine the frequency of the A. C. voltage. Repeat the experiment for another unknown frequency.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Circuit diagrams	6		
2	Connections	5		
3	Observations	5		
4	Result with unit	2		
5	Oral	3		
	Total :	21		

Signature of the examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B.Sc. Part-II Practical Examination March / April 2015

Physics

GROUP –III

7. Characteristics of FET

Seat No.

Plot the output characteristics of FET (----------) for three different V_{GS}- voltages.

Determine the drain resistance (r_{ds}), transconductance (g_m) and amplification factor (μ).

i) $r_{ds} = (V_{DS}/ID)V_{GS}$ ii) $g_m = (I_D/V_{DS})I_D$ iii) $\mu = r_{ds} \times g_m$

N.B.

i) Get your circuit diagram checked by examiner.

ii) Get your connections checked before passing the current.

Scheme of Marking:

Sr. No.	Heads of distribution of marks	Marks Allotted	Marks obtained	Remarks if any
1.	Circuit Diagram	4		
2.	Circuit Connections	3		
3.	Observations	4		
4.	Calculation (2),Graph (3) & Results(2)	7		
5.	Oral	3		
	Total:	21		

Signature of examiner.

SHIVAJI UNIVERSITY, KOLHAPUR

B.Sc. Part-II Practical Examination March / April 2015

Physics

GROUP –III

8. FET as VVR

Seat No.

Draw the circuit diagram and assemble the circuit of FET as voltage variable resistance. Measure the Drain current (I_D) with change in V_{DS} for different values of V_{GS} and plot the output characteristics. Also calculate drain resistance (R_{DS}) for different values of V_{GS} plot the graph of R_{DS} against V_{GS} and comment on the nature of the graph.

$$R_{DS} = V_{DS} / I_D$$

i) Get your circuit diagram checked by examiner.

ii) Get your connections checked before passing the current.

Scheme of Marking:

Sr. No.	Heads of distribution of marks	Marks Allotted	Marks obtained	Remarks if any
1.	Circuit Diagram	4		
2.	Circuit Connections	3		
3.	Observations	3		
4.	Calculation (2),Graph (4)and Comments (2)	8		
5.	Oral	3		
	Total:	21		

Signature of examiner,

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B. Sc. Part-II : Practical Examination, March/April 2015

Physics (New Course)

Candidates Seat No. **GROUP IV**

1. Constants of a Ballistic Galvonometer

Determine the following constants of a ballistic galvonometer.

1) Figure of Merit (K) $= \frac{E}{(P+Q)\,.\,(R+G)} \,.\, \frac{P}{\theta} \,.\, \frac{D}{100} \times 10^{6}$

2) Current Sensitivity $(S_i) = \frac{1}{K}$

3) Voltage Sensitivity $(S_v)\ \frac{1}{KG}$

where symbols have their usual meaning

[Given : Resistance of B. (G) = - - - - - ohms]

Plot the graph of P (y-axis) against θ (x-axis). Use slope to calculate K.

N. B. : 1. Get your diagram checked

2. Get your connections checked before passing the current.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Circuit Diagram	3		
2	Connections	3		
3	Observations	6		
4	Calculation Graph and results	6		
5	Oral	3		
	Total :	21		

Signature of the examiner.

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Physics (New Course)

Candidates Seat No. **GROUP IV**

2. Comparison of Capacities (De-Sauty's Method)

Determine the ratios of the capacities, $C_A : C_B$ and $C_A : C_C$ of the condensers A, B and C.

C_A = ...μF , Find C_B and C_C.

N. B. : 1. Draw the circuit diagram and get it checked.

2. Get your connections checked before connecting the source of e.m.f.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Circuit diagram and connections	5		
2	Procedure	5		
3	Tabular form, observation	4		
4	Graph, calculations and results	4		
5	Oral	3		
	Total :	21		

Signature of the examiner.

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Physics (New Course)

Candidates Seat No. **GROUP IV**

3. Mutual Inductance

Determine the mutual inductance for air core/iron core transfomer using a ballistic galvanometer.

Plot a graph of r (y-axis) against Φ, (x-axis) and measure the slope of the graph.

Use the formula $M = \frac{T}{2\pi}$ X slope X $\theta_1 . \left(\frac{\theta_1}{\theta_3}\right)^{1/4}$

where T = Periodic time of B. G.

r = Small resistance across which the galvanometer and secondary coil are connected;

Φ = Steady deflection;

θ_1 = Initial throw ; θ_3 = next throw on the same side as θ_1.

N. B. : 1. Draw the circuit diagram and get it checked.

2. Get your connections checked before connecting the source of e.m.f.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Circuit diagram and connections	4		
2	Procedure	5		
3	Tabular form, observation	4		
4	Graph, calculations and result	5		
5	Oral	3		
	Total :	21		

Signature of the examiner.

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Physics (New Course)

Candidates Seat No. **GROUP IV**

4. Carey Foster's Bridge

Determine the resistance per unit length of the given bridge wire.

Replace the resistance box in one of the gaps of the Carey Foster's key by an unknown low resistance (X) and hence determine its value. Similarly determine the value of another low resistance (Y)

N. B. : 1. Draw the circuit diagram and get it checked.

2. Get your connections checked before passing the Current.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Circuit diagram and Connections	5		
2	Procedure	5		
3	Tabular form, observations	4		
4	Calculations and results	4		
5	Oral	3		
	Total :	21		

Signature of the examiner.

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5. Calibration of Bridge wire by Griffith's method

Calibrate the given bridge wire by Griffith's method. Cover the entire length of the wire in succession by taking a segment (about 7 cm.) of wire. Plot the calibration curve and interprete the curve.

N. B. : 1. Draw the circuit diagram and get it checked.

2. Get your connections checked before passing the Current.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Circuit diagram and Connections	6		
2	Procedure	5		
3	Tabular form, with observations	4		
4	Graph and interpretation	3		
5	Oral	3		
	Total :	21		

Signature of the examiner.

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Candidates Seat No. **GROUP IV**

6. Wien's Bridge

Determine the frequency of the given oscillator (Source) by Wien's bridge method using resonance condition.

$$\frac{Z_1}{Z_2} = \frac{R_3}{R_4}$$

Where, Z_1 = impedance of branch C_1 & R_1 in parallel.

Z_2 = impedance of branch C_2 & R_2 in series

Keep $R_4 = 2\ R_3$; $C_1 = C_2 = C =$..... (given)

Select $R_1 = R_2 = R$ for minimum sound / null point.

Formula :

$$f = \frac{1}{2\pi RC}$$

Repeat the experiment for three different frequencies.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Circuit diagram	4		
2	Connections	4		
3	Observations	6		
4	Calculations with result	4		
5	Oral	3		
	Total :	21		

Signature of the examiner.

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Physics (New Course)

Candidates Seat No. **GROUP IV**

7. Measurement of High Resistance

Measure the given high resistance by the method of nearly equal deflections.

$$X = \frac{d_2}{d_1}\left\{\frac{R\,(S + G)}{S} + G\right\} - G$$

where X = Unknown high Resistance

G = Resistance of ballistic galvanometer = ... ohms (Given)

d_1 = Deflection when X is included in the circuit

d_2 = Deflection when combination of R and S is included in the circuit.

Take at least 3 different sets of R and S resistances for unknown high resistance.

Repeat the experiment for another unknown high resistance.

N. B. : 1. Draw the circuit diagram and get it checked.

2. Get your connections checked before connecting the source of e.m.f.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Circuit diagram and connections	4		
2	Procedure	6		
3	Tabular form and observations	4		
4	Calculations with results	4		
5	Oral	3		
	Total :	21		

Signature of the examiner.

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Physics (New Course)

Candidates Seat No. **GROUP IV**

8. LCR Series Resonance

Plot a resonance curve for a series resonant circuit for two different values of R.Calculate Q and band width in each case. Comment on the results obtained. Verify the resonant frequency using the formula.

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

where L = ...Henry (Given)

C = ... Farad. (Given)

Band width $= f_2 - f_1$

Quality facter $Q = \frac{F_r}{f_2 - f_1}$

N. B. :- Do not pass the current before getting the connections checked.

Scheme of Marking :

Sr. No.	Different heads for distribution of marks	Allotted Marks	Marks obtained by Candidate	Remarks if any
1	Circuit diagram	4		
2	Connections	4		
3	Observations	5		
4	Graph, Calculations and results	5		
5	Oral	3		
	Total :	21		

Signature of the examiner.