

THE BHAWANIPUR EDUCATION SOCIETY COLLEGE

BSc. Part II (General) Online Practical Examination 2021

PHYSICS General

Paper: 2A

F.M=50

Time:3 Hrs

Answer script submission link:

<https://forms.gle/WNHQtq9N4uDo7egH7>

N.B. i) Students should use millimeter graph paper wherever necessary..

ii) They are advised to use dark pencils.

iii) Students must mention their C.U. roll number and registration number within the grided zone of graph paper without affecting data points.

iv) Avoid fractional scaling in the graph.

Answer any one question . All questions carry equal marks.

1.a)Write down the theory and working formula of the experiment ‘Determination of the coefficient of the thermal expansion of a metallic rod using an optical lever’.

7+8=15

b) From the given data calculate the coefficient of linear expansion of an iron rod.

Write following data in Tabular form.

length of the rod =102cm Arm of optical lever=4.3cm

Distance between mirror and scale=107cm

Temperature before steam passed=32.5 degree centigrade

Steady temperature after steam passed=99.5degree centigrade

Linear displacement of image of scale=3.7cm

10+5=15

c) Why is it called an optical lever?

5

d) Will the coefficient of linear expansion change with the variation of arm length and distance between mirror and scale?

5

e) Why are two thermometers required? 5

f) What is the expression for the magnification in case of an optical lever? 5

2. a) Clearly mentioning the terms and circuit elements, write down the theory and draw the related circuit diagram for determination of average resistance per unit length of a metre bridge wire by Carey-Foster's method and hence determine an unknown resistance using that circuit. (10+4)

b) Determine resistance per unit length of the bridge wire and the value of an unknown resistance from the given data sheet. **Calculations must be shown in tabular form.**

i) Data for measurement of resistance per unit length

$$R_1 = R_2 = 1 \text{ ohm.} \quad (\text{Terms have usual meaning})$$

| No. of obs. | Resistances in Ω applied in | | Null points in cm with | |
|---------------|------------------------------------|-------------------|------------------------|-----------------|
| | Extreme left gap | Extreme right gap | Direct current | Reverse current |
| 1. (a) (b) | 2.1 | 0.0 | 4 | 4.2 |
| | 0.0 | 2.1 | 96 | 96.2 |
| 2. (a) (b) | 2.0 | 0.0 | 7.2 | 7.4 |
| | 0.0 | 2.0 | 93.5 | 93.1 |
| 3. (a) (b) | 1.8 | 0.0 | 9.1 | 9.3 |
| | 0 | 1.8 | 91.3 | 91.1 |

ii) Data for measurement of unknown resistance R:

$$R_1 = R_2 = 1 \text{ ohm}$$

| No. of obs. | Resistances in Ω applied in | | Null points in cm with | |
|---------------|------------------------------------|-------------------|------------------------|-----------------|
| | Extreme left gap | Extreme right gap | Direct current | Reverse current |
| 1. (a) (b) | 4.8 | R | 60.2 | 60.8 |
| | R | 4.8 | 42.1 | 42.3 |
| 2. (a) (b) | 4.9 | R | 58.5 | 58.3 |
| | R | 4.9 | 44.3 | 44.1 |
| 3. (a) (b) | 5.1 | R | 53.8 | 53.6 |
| | R | 5.1 | 49.2 | 49.4 |

(18+18)

3. a) Draw the circuit diagrams for drawing the IV characteristics of a resistor and a PN junction diode.
- b) Draw the nature of IV characteristics of a resistor and a PN junction diode so that they would intersect.
- c) What is the nature of variation of resistance for metal and semiconductor with respect to temperature. Explain your answer.
- d) Why the IV characteristics for a resistor is linear whereas it is non linear for pn junction diodes?
- e) What is the cut in voltage for the 1N4007 pn junction diode?

$$(7+7)+(5+6)+(5+10)+7+3=50$$