

THE BHAWANIPUR EDUCATION SOCIETY COLLEGE

BSc. Semester III (General) Online Practical Examination 2021

PHYSICS GENERAL

Paper: PHS-G-CC-3-3-P

<https://forms.gle/PWxFC8KeoXi1yhaj7>

Full marks 30

Time 2 Hours

Answer any one of the following questions

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.

1. (a) Draw the circuit diagram and write down theory to verify Stefan's law. (5+5)

(b) Draw the calibration curve of the filament from the data given below. (8)

Temperature T (in K)	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800
R_t/R_d	0.42	0.70	1.00	1.31	1.63	1.97	2.33	2.69	3.05	3.47	3.89	4.31	4.75

Use the calibration curve to generate filament temperature of the bulb for different current as obtained in (c) and Draw $\log P$ vs. $\log T$ graph.

R_d of the filament = 7.4Ω

(8)

(c) I/V data for the glowing bulb is given below.

Current I (in mA)	110	150	180	200	240	250	280
P.D.(V) in Volt	0.79	1.50	1.97	2.48	3.45	3.79	4.50

(d) Hence estimate Stefan's constant from the graph. (4)

2. (a) Write down the theory to estimate Thermal Conductivity of a bad conductor by Lee's method clearly explaining all the terms. (10)

(b) The steady state temperatures of the two thermometers used in this experiment are found to be 100 °C and 77 °C.

i) Draw the cooling curve using the data given below and ii) estimate the rate of cooling of the lower disc used in this experiment at steady state condition.

Time- temperature record of the lower disc during its cooling is given below.

Temperature of lower disc (in °C)	90	88.5	87.4	86	85	83.6	82	81	80	79	78.6	77.4	76
Time (in sec)	0	30	60	90	120	150	180	210	240	270	300	330	360

Temperature of lower disc (in °C)	75	74	73	72	71	70	69	68	67	66	65	64.6	63.6
Time (in sec)	390	420	450	480	510	540	570	600	630	660	690	720	750

Temperature of lower disc (in °C)	63	62	60.4
Time (in sec)	780	810	840

(10+5)

(c) Can you measure the thermal conductivity of a good conductor by this method? Explain. (5)

3. 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'. 5+5=10

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

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

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? 3

e) Why are two thermometers required? 2