

[4]

4. Write short note on: Generation of three phase a.c. 5

Or

Draw the three phase phasor diagram? What is phase sequence? Explain positive and negative phase sequence. Differentiate between star (Y) and delta configuration in three phase system. 1+1+1+2

CO4

Ex/SC/DSE/PHY/TH/04/A2/2023

B. SC. PHYSICS (HONS.) EXAMINATION, 2023

(3rd Year, 2nd Semester)

PRINCIPLES OF INSTRUMENTATION AND MEASUREMENTS

PAPER – DSE - A2

Time : 2 hours

Full Marks : 40

(Use Separate Answer Sheet for Each Group)

Group – A

Answer **Q. No. 1** and *any two* questions from the rest.

1. Write the necessary steps required to take in the calibration process of an instrument. 5

Or

What is meant by sensitivity of an instrument? Find the voltmeter having 30 μ A full scale deflection. 3+2

CO1

2. a) Mention the advantages of multi-stage oil diffusion vacuum pump over single-stage oil diffusion vacuum pump. 2
- b) Write the conditions required to be fulfilled for efficient operation of the multi-stage oil diffusion vacuum pump. 2
- c) Write the working principle of hot cathode ionization gauge. $3\frac{1}{2}$

CO2

[Turn over

[2]

3. a) Show that in Joule-Thomson Porous-plug experiment the enthalpy is constant? 2
- b) Find the expression of inversion temperature for Van der Waals gases in Joule-Thomson Porous-plug experiment. $3\frac{1}{2}$
- c) Draw the T-S diagram for adiabatic demagnetization and explain the cooling process. 2

CO2

4. a) What are the advantages and limitations of McLeod vacuum pressure gauge? 2
- b) For a McLeod gauge, with a capillary of 1 mm diameter and effective volume of 80 cm^3 , find the reading as indicated by mercury column due to a pressure of 10 Pa. $2\frac{1}{2}$
- c) Write a short note on helium vapour pressure thermometer. 3

CO2

Group – B

Answer Q. No. 4 and *any two* questions from the rest.

1. a) What requirements should be kept in mind while constructing the moving part of the galvanometer? Name three types of supports for the moving part of the galvanometer. What is eddy current damping?

[3]

Explain one such eddy current damping device.

1+1+2

- b) Write second order differential equation that governs the galvanometer motion. Explain each terms used in the equation. Obtain the solution of the equation under critical damping condition. $1\frac{1}{2}+2$
2. a) Explain why one don't need a steady state deflection in Ballistic galvanometer? What is log decrement? What is its significance? 1+1+1
- b) Explain in details how ballistic galvanometer is used to measure magnetic field. $4\frac{1}{2}$
3. a) Explain with necessary circuit diagram how loss of charge method is used to determine unknown resistance. 2
- b) Draw Maxwell's inductance capacitance bridge and obtain the expression for self-inductance and resistance of a coil in terms of known parameters? 3
- c) Describe with necessary schematic diagram any one of the moving iron instrument to measure ac voltage or current. $2\frac{1}{2}$

CO3

[Turn over