

C.U.SHAH UNIVERSITY

Summer Examination-2019

Subject Name : Elements of Experimental Physics

Subject Code : 5SC04EEP1

Branch: M.Sc. (Physics)

Semester : 4

Date : 15/04/2019

Time : 02:30 To 05:30

Marks : 70

Instructions:

- (1) Use of Programmable calculator and any other electronic instrument is prohibited.
 - (2) Instructions written on main answer book are strictly to be obeyed.
 - (3) Draw neat diagrams and figures (if necessary) at right places.
 - (4) Assume suitable data if needed.
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SECTION – I

Q-1 Attempt the Following questions (07)

- a. Define Pumping Speed.
- b. Why inert gases are difficult to be removed using sorption pump?
- c. On which principle does the McLeod gauge work?
- d. State the principle on which ionization gauge works.
- e. How do filters (or absorbers) work?
- f. Looking at the electron diffractograms, which property of the sample can be identified immediately?
- g. Which property of tungsten makes it a good candidate for X-Ray source?

Q-2 Attempt all questions (14)

- a. Explain with a proper diagram the working of a Rotary pump. (05)
- b. Define the terms i) Vacuum and ii) Mean free path. (02)
- c. Explain the construction and working of a McLeod gauge with a suitable diagram. (07)

OR

Q-2 Attempt all questions (07)

- a. Explain the principle, construction and working of a diffusion pump. Mention the disadvantages of this pump. (07)
- b. Explain the principle, construction and working of any one thermal conductivity gauges. (07)

Q-3 Attempt all questions (14)

- a. Explain in detail the principle, construction and working of a Coolidge tube used to produce X-Rays; also mention the two types of radiations emitted in the (09)



process.

- b. Write a short note on electron diffraction and its importance. (05)

OR

Q-3 Attempt all questions

- a. Explain the process of scattering of X-Rays by an electron, atom and a unit cell. (10)
b. Based on their principles, define the terms sorption, gettering and sputtering. (04)

SECTION – II

Q-4 Attempt the Following questions (07)

- a. Name any one characterization technique used to detect even trace elements in a sample.
b. Why is it necessary to maintain the sample at liquid nitrogen temperature if specifically phosphorescence is to be studied?
c. What is the main difference between DTA and DSC?
d. Why is Thallium doped in Sodium Iodide to use as a scintillation material?
e. State the principle on which gas filled detectors work.
f. Why are Ge(Li) detectors maintained at liquid nitrogen temperature?
g. How can one identify the type of ionizing radiation by looking at the path it follows in a cloud chamber?

Q-5 Attempt all questions (14)

- a. Explain the thermo gravimetric analysis technique used for the characterization of samples. (07)
b. Explain briefly power compensated and heat flux DSC. (07)

OR

- Q-5 a. Write a note on X-ray Photoelectron Spectroscopy (XPS). (08)
b. Explain the process of Phosphorescence. (06)

Q-6 Attempt all questions (14)

- a. Explain the principle, construction and working of Geiger-Muller counters. (09)
Define quenching, dead time and recovery time.
b. Explain briefly cloud chambers. How are they different from other detectors? (05)

OR

Q-6 Attempt all Questions (09)

- a. Explain the principle, construction and working of Scintillation detectors with the help of a schematic diagram. (09)
b. Write a short note on Spark Chambers. (05)

