Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name : Elements of Experimental Physics

Subject Code : 5SC04EEP1 Branch: M.Sc. (Physics)

Semester : 4 Date : 24/04/2018 Time : 10:30 To 01:30 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.

SECTION – I

Q-1 Attempt the Following questions [07]

a. Define Vacuum. (01)
b. What is mean free path? (01)
c. On which principle does the McLeod gauge work? (01)
d. Why higher atomic number materials are used as the cathode source for X-ray production? (01)
e. How do filters (in terms of spectra) work? (01)
f. Define quantum efficiency in case of fluorescence and phosphorescence. (01)
g. Give the full form of XRF. (01)

Q-2 Attempt all questions [14]

A. Explain with a proper diagram the working of any one Roughing Pump. (05)
B. Define the terms : (02)
(i) Conductance.
(ii) Pumping speed involved in vacuum pumps.
C. Explain the principle, construction and working of a diffusion pump. Mention the disadvantages of this pump. (07)

OR

Q-2 Attempt all questions [14]

A. Explain the principle, construction and working of a McLeod gauge with a suitable diagram. (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 production of X-rays. Also briefly describe characteristic and (08)

Bremsstrahlung radiations.

B. Explain the process of scattering of X-rays by electrons. (06)

OR

Q-3 **Attempt all questions** **[14]**

A. Explain the process of electron diffraction, how is it useful in analyzing if the sample is crystalline, polycrystalline or amorphous? (07)

B. Explain the process of scattering of X-Rays by an atom and a unit cell. (07)

SECTION – II

Q-4 **Attempt the Following questions** **[07]**

a. Why are Ge(Li) detectors maintained at liquid nitrogen temperature? (01)

b. State the principle on which gas filled detectors work. (01)

c. Why is Thallium doped in Sodium Iodide to use as a scintillation material? (01)

d. Why is it necessary to maintain low pressure for the proper functioning of a diffusion pump? (01)

e. Give the full form of D.T.A. (01)

f. What are gauges? (01)

g. Name any one characterization technique used to detect even trace elements in a sample. (01)

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 **Attempt all questions** **[14]**

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. Define quenching, dead time and recovery time. (10)

B. Write a detailed note on Cerenkov counters. (04)

OR

Q-6 **Attempt all Questions** **[14]**

A. Explain the principle, construction and working of Scintillation detectors with the help of a schematic diagram. (09)

B. Explain briefly cloud chambers. How are they different from other detectors? (05)