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SEAT No. _____

[No. of printed pages: 02]

[58]

SARDAR PATEL UNIVERSITY
M.Sc. Physics IInd Semester Examination
Tuesday, Date: 30/10/2018, Time: 10:00 a.m. to 01:00 p.m.
Subject: PHYSICS, Subject Code: PS02EPHY21
Title: Elements of Experimental Physics

Instruction:

Figures to the right indicate marks.

Total Marks: 70

Q.1 Write answer of all questions by showing your choice against the question number. [8]

- (i) In the rotary pump, the top seal between rotor and stator must have a clearance of _____ microns.
 (a) 0.2-0.3 (b) 2-3 (c) 20-30 (d) 200 -300
- (ii) _____ pump is used to create vacuum in the range 10^{-4} to 10^{-14} torr.
 (a) rotary (b) diffusion (c) molecular drag (d) sputter ion
- (iii) X-rays consist of :
 (a) negatively charged particles (b) electromagnetic radiation
 (c) positively charged particles (d) a stream of neutrons
- (iv) X-rays are produced when an element of high atomic weight is bombarded by high energy _____.
 (a) protons (b) photons (c) neutrons (d) electrons
- (v) Which factor is independent of the size and shape of the unit cell?
 (a) structure (b) absorption (c) gas multiplication (d) none of these
- (vii) In a GM counter, the slope of the plateau is greater than _____ per 100 volts will not give the satisfactory results.
 (a) 4% (b) 6 % (c) 8 % (d) 10%
- (viii) The time during which the amplitude of the pulse is increasing is known as the _____ time of the counter.
 (a) dead (b) resolving (c) recovery (d) relaxation

Q.2 Attempt any Seven of the followings: [14]

- (i) Explain constant volume method for the measurement of pumping speed.
- (ii) Draw the schematic diagram of rotary pump and write its principle.
- (iii) State and explain Bragg's law for X-ray diffraction.
- (iv) Distinguish between continuous X-rays and characteristics X-rays.

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1

[Continue on Page No.: 02]

(v) Differentiate between thermogravimetric analysis and differential thermal analysis.

(vi) Write applications of UV-Visible spectroscopy.

(vii) Describe the method to prepare liquid scintillator.

(viii) Explain the working of ionization chamber.

(ix) What do you understand by photographic emulsion.

Q.3(a) What is sputtering? Describe the construction and working of the sputter ion pump using necessary diagram. [6]

Q.3(b) Using schematic diagram of magnetron gauge and describe its principle, construction and working in detail. [6]

OR

Q.3(b) With the help of suitable diagram describe Bayard-Alpert gauge used for the measurement of lower pressure. Also mention disadvantages of this gauge. [6]

Q.4(a) Explain the term: X-ray filters and X-ray absorbers in detail. [6]

Q.4(b) Draw diagram of transmission electron microscope and describe its construction and working in detail. [6]

OR

Q.4(b) What is neutron scattering? Discuss in detail slow neutron scattering in solid. [6]

Q.5(a) Describe differential scanning calorimetry in detail. [6]

Q.5(b) How X-rays are produced? Using necessary diagram discuss in detail X-ray photoelectron spectroscopy. [6]

OR

Q.5(b) Write a short note on atomic absorption spectroscopy. [6]

Q.6(a) Describe detailed procedure for pure germanium and lithium doped germanium is used as a detector. [6]

Q.6(b) Draw the schematic diagram of the scintillation spectrometer and explain its construction and working in detail. [6]

OR

Q.6(b) Discuss in detail diode detector and the diffused junction detector. [6]

