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SEAT No. _____

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SARDAR PATEL UNIVERSITY
M.Sc. Physics IInd Semester Examination(CBCS)
Wednesday, Date: 20/03/2019, Time: 02:00 p.m. to 05:00 p.m.
Subject: PHYSICS, Subject Code:PS02CPHY02(OLD)
Title: Elements of Experimental Physics

Instructions:

- (a) Figures to the right indicate marks.
(b) Answer of all the questions (including MCQs) should be written in the provided answer book only.

Total Marks: 70

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

- (1) Pumped gas is directly exhausted from chamber to atmosphere, is the principle of _____ pump
(a) Sputter ion (b) getter ion (c) diffusion (d) rotary
- (2) In a thermocouple gauge, thermocouple is made of _____ wire.
(a) Aluminium – platinum (b) Silver – platinum
(b) nickel – nichrome (d) chromel- alumel
- (3) Which method is used to study the crystal structure?
(a) X-rays diffraction (b) X-rays refractions
(c) Compton scattering (d) none of these
- (4) In X-ray tube, _____ filter is used in conjunction with Cu target metals.
(a) V (b) Ni (c) Zr (d) Fe
- (5) Which among the following class of compound shows intense fluorescence?
(a) Compounds having aromatic functional group
(b) Compounds having aliphatic carbonyl structures
(c) Compounds having alicyclic carbonyl structures
(d) Compounds having conjugated double bond
- (6) The main advantage of fluorescence over UV-Vis spectroscopy is _____.
(a) Its sensitivity (b) Its compatibility with separation techniques
(c) Its compatibility with most analyses (d) None of the above
- (7) If absolute frequency is 16 and the total frequency is 200, then relative frequency will be _____.
(a) 0.08 (b) 12.5 (c) 3200 (d) 216
- (8) Time during which the amplitude of the pulse is increasing is called:
(a) Resolving time (b) recovery time (c) relaxation time (d) dead time

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

- (1) Draw the schematic diagram of roots pump and write its principle and pressure range of operation.
- (2) What is sputtering? Mention advantages of sputter ion pump.
- (3) What is short-wave length limit (λ_{SWL}) & white radiation?
- (4) Explain Moseley's law.
- (5) What is difference between coherent and incoherent scattering?
- (6) Explain fundamental principle of X-ray fluorescence technique.

(P.T.O.)

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- (7) When and where light guide is used in scintillation spectrometer.
- (8) What is histogram? Mention the requirements of histogram.
- (9) Draw and explain plateau characteristic of G. M. counter in brief.
- Q.3(a) With the help of suitable diagram, explain the principle and working of bridge network used in Pirani gauge. [6]
- Q.3(b) Distinguish between hot and cold cathode ionization gauge. Describe the construction and working of hot cathode ionization gauge in detail. [6]
- OR
- Q.3(b) Sketch the diagram of the diffusion pump and explain in detail working of this pump. [6]
- Q.4(a) Explain Thomson's equation of X-ray scattering by an electron. Differentiate between X-ray and electron diffractions? [6]
- Q.4(b) Define: Absorption edge & X-ray filter. Derive the equation for mass absorption coefficient. [6]
- OR
- Q.4(b) What is neutron scattering? Explain slow neutron scattering in solid materials. [6]
- Q.5(a) Draw the schematic diagram of thermo gravimetric technique (TGA) and explain its working and applications. [6]
- Q.5(b) Discuss in detail the basic principle of X-ray photo electron spectroscopy (XPS) with diagram. Also mention its applications. [6]
- OR
- Q.5(b) Describe in detail differential thermal analysis and differential scanning calorimetry. [6]
- Q.6(a) Explain the following in brief: (a) cloud chamber, (b) bubble chamber and (c) spark chamber. [6]
- Q.6(b) Differentiate between organic and inorganic scintillator. Using suitable diagram explain working of NaI(Tl) used as a scintillator in detail. [6]
- OR
- Q.6(b) (i) Prove that arithmetic mean is the best estimated true value of the data. [6]
 (ii) Describe the properties of the Gaussian distribution.

