SARDAR PATEL UNIVERSITY
M.Sc. Physics IInd Semester Examination
Thursday, Date: 25/10/2018, Time: 10:00 a.m. to 01:00 p.m.
Subject: PHYSICS, Subject Code:PS02CPHY02
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   **[8]**
         number.
         (i)   Vacuum measured in SI unit as _____.
                (a) Newton/m^2 (b) m^2/Newton (c) Newton^2/m^2 (d) m^2/Newton^2

         (ii) Operating range of Pirani gauge is : _____ torr.
                (a) 1-10^{-4} (b) 10^{-5}-10^{-7} (c) 10^{-8}-10^{-11} (d) 10^{-12}-10^{-14}

         (iii) The X-rays photons are _____.
                (a) heavier than mass of ultra-violet ray photons
                (b) lighter than mass of ultra-violet ray photons
                (c) of equal mass of ultra-violet ray photons
                (d) none of the above

         (iv) In Bragg's law, $n\lambda=2d\sin\theta$, where 'd' is the distance between two ___ .
                (a)lattice points (b)anti-parallel planes (c) parallel planes (d)unit cells

         (v) _____ is used in fluorescent screen for detection of X-rays.
                (a) ZnS   (b) ZnSSe   (c) ZnSe   (d) ZnO

         (vi) Current is proportional to the change in weight of the sample in_____.
                (a) differential thermal analysis   (b) differential scanning calorimetry
                (c) thermo gravimetric analysis   (d) all of the above

         (vii) If absolute frequency is 6 Hz and the total frequency is 200 Hz, then
                relative frequency is _____ Hz.
                (a) 33.33   (b) – 33.33   (c) -0.03   (d) 0.03

         (viii) The coupling between scintillator and P.M.Tube is done through:
                (a) light guide   (b) ionization chamber
                (c) proportional counter   (d) G.M.Counter

Q.2   Attempt any Seven of the followings: **[14]**
         (i) Mention the advantages and disadvantages of mercury over oil used in
             diffusion pump.
         (ii) Describe the square scale method used to measure the lower pressure
             using McLeod gauge.
         (iii) Explain in brief production of X-rays.

(iv) Discuss the X-ray absorber in brief.

(v) What do you understand by differential thermal analysis?

(vi) Explain thermogravimetric analysis in brief.

(vii) Differentiate between high purity germanium detector and lithium doped germanium detector.

(viii) Explain Wilson cloud chamber used for the detection of particles.

(ix) Describe the procedure to prepare liquid scintillator.

Q.3(a) What is vacuum? How vacuum pumps are classified? Write basic principle of operation of each class. [6]

Q.3(b) With help of schematic diagram of thermocouple gauge, explain its principle, construction and working in detail. [6]

OR

Q.3(b) Describe in detail molecular drag pump using necessary diagram. Also mention its advantages. [6]

Q.4(a) Explain continuous and characteristic of X-rays in detail. [6]

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

OR

Q.4(b) What is scattering? Describe elastic scattering and coherent scattering. [6]

Q.5(a) Draw the schematic diagram of instrument used for measurements of phosphorescence spectroscopy and write its principle, construction and working in detail. [6]

Q.5(b) Write a short note on X-ray photo-electron spectroscopy. [6]

OR

Q.5(b) Define photoluminescence and discuss how the intensity of photoluminescence depends on the concentration. [6]

Q.6(a) Write a short note on G.M.Counter. [6]

Q.6(b) What is scintillator? Explain working of NaI (Tl) scintillator using necessary diagram in detail. [6]

OR

Q.6(b) Prove that the arithmetic mean is the best estimated true value of the data. Mention the properties of the Gaussian distribution. [6]

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