UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Fourth Semester – 2019

Paper: Physics-IV (Concepts of Modern Physics)
Course Code: PHY-213 / PHY-22307 Part – I (Compulsory) Time: 15 Min. Marks: 10

Roll No. in Fig. .....
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Signature of Supdt.:

ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.
Division of marks is given in front of each question.
This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the right answer cutting and overwriting is not allowed. (10x1=10)

1. When a photo-emissive surface is exposed to light of some suitable fre quency:
   (a) Protons are emitted
   (b) Photons are emitted
   (c) Photoelectrons are emitted
   (d) Photograph can be taken

2. Quasi-free electrons means:
   (a) Loosely bound electron
   (b) Tightly bound electron
   (c) Any of these
   (d) Completely free electron

3. Compton shift refers to:
   (a) Proton
   (b) Meson
   (c) Positron
   (d) Photon

4. The part/s of a photocell is/are:
   (a) Thin anode rod
   (b) Evacuated glass tube
   (c) Evacuated glass tube and Cathode of an appropriate metal surface
   (d) Cathode of an appropriate metal surface

P.T.O.

5. Time:

   (a) is relative
   (b) is an absolute quantity
   (c) Depends upon motion of frame of reference
   (d) All above

6. The special theory of relativity is based on:

   (a) Two postulates
   (b) Four postulates
   (c) Three postulates
   (d) One postulate

7. Photoelectrons are emitted when visible light falls on:

   (a) Potassium
   (b) Sodium and Potassium
   (c) Cesium coated oxidized silver
   (d) Sodium

8. There is no way to detect:

   (a) Absolute uniform motion
   (b) State of rest
   (c) State of motion
   (d) Accelerated motion

9. The concept of direction is purely:

   (a) Absolute
   (b) Relative to stars always
   (c) Relative
   (d) Relative to the sun always

10. All motions are:

    (a) Absolute
    (b) Relative to the instrument
    (c) Relative to a person and Relative to the instrument
    (d) Relative to a person

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B.S. 4 Years Program / Fourth Semester – 2019

Roll No. .....

Paper: Physics-IV (Concepts of Modern Physics)
Course Code: PHY-213 / PHY-22307 Part – II

Time: 2 Hrs. 45 Min. Marks: 50

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q.2. Give short answers to the following. (4x5=20)

1. What is blackbody radiation? Write down Rayleigh's law and Planck's law for energy density and explain the differnce between them. What is ultraviolet catastrphe?

2. The kinetic energies of photoelectrons range from zero to $4.0 \times 10^{-19} J$ when light of wavelength $3000\mathring{A}$ falls on a surface. What is the stopping potential for this light?

3. Determine the maximum scattering angle in a Compton experiment for which the scattered photon can produce a positron-electron pair.

4. Calculate the kinetic energy of a neutron whose de Broglie wavelength is $0.7\mathring{A}$.

Q.3. Give long answers to the following. (3x10=30)

1. (a) Find the energies of two photons that are produced when annihilation occurs between an electron and positron that are initially at rest.
   (b) Dtermine a photon's threshold energy for pair production.

(5+5)

2. Discuss in detail the stability of nuclei.

(10)

3. State and explain de Broglie hypothesis. State properties of matter waves.

(10)