

Name of the Student: _____

Question No. 1. Encircle the correct option.**(20)**

- i. The process of ejection of electrons from a metallic surface by absorption of photons is called
 - a. Pair production
 - b. Compton effect
 - c. Photoelectric effect
 - d. Fourth power law
- ii. The minimum of amount of energy required to create an electron - positron pair is equal to
 - a. m_0c^2
 - b. m_0c
 - c. $2m_0c^2$
 - d. $2 m_0c$
- iii. Pair production is possible with
 - a. X-ray photon
 - b. Photon of visible light
 - c. γ -ray photon
 - d. infrared light
- iv. Electron microscope makes practical use of the
 - a. particle nature of electrons
 - b. wave nature of electron
 - c. Dual nature of electron
 - d. electromagnetic nature
- v. In order to perform the experiment, Davisson and Germer applied the accelerating voltage
 - a. 120 V
 - b. 110 V
 - c. 90 V
 - d. 54 V
- vi. If an object is moving with speed of light, its apparent length in the direction of motion becomes
 - a. Zero
 - b. Small
 - c. greater
 - d. Infinite
- vii. The amount of energy required to eject an electron from metal surface is called
 - a. Threshold frequency
 - b. Work function
 - c. Pair Annihilation
 - d. photoelectric effect
- viii. Photocells can be used in
 - a. security system
 - b. counting system
 - c. automatic doors
 - d. all of these
- ix. Positron is an antiparticle of
 - a. Neutron
 - b. Proton
 - c. Electron
 - d. Photon
- x. The factor h/m_0c has dimension of
 - a. Frequency
 - b. Length
 - c. Time
 - d. mass
- xi. In photoelectric effect, threshold frequency depends upon
 - a. intensity of light
 - b. nature of material
 - c. mass of material
 - d. none of these
- x. Pair production can not take place
 - a. with x-rays
 - b. with infrared light
 - c. in vacuum
 - d. all of these
- xiii. The idea of matter waves was given by
 - a. Plank
 - b. Huygens
 - c. Einstein
 - d. De-Broglie
- xiv. The glancing angle for diffracted beam of electrons from nickel crystal is
 - a. 65°
 - b. 66°
 - c. 67°
 - d. 75°
- xv. The position and momentum of a particle cannot both be measured simultaneously with perfect accuracy. This principle was given by
 - a. De-Broglie
 - b. Heisenberg
 - c. Plank
 - d. Compton
- xvi. No. of emitted photoelectrons are directly proportional to
 - a. frequency of light
 - b. intensity of light
 - c. wavelength of light
 - d. all of these
- xvii. If Compton scattering angle is zero degree, then Compton shift
 - a. is equal to Compton wavelength
 - b. three times of Compton wavelength
 - c. half of Compton wavelength
 - d. is zero
- xviii. If absolute temperature of black body doubled then the energy emitted from it becomes
 - a. double
 - b. four time
 - c. eight time
 - d. sixteen times
- xix. The work function of a metal is 6.63×10^{-30} J, its threshold frequency is
 - a. 10^2 Hz
 - b. 10^3 Hz
 - c. 10^4 Hz
 - d. 10^5 Hz
- xx. The value of Compton wavelength (h/m_0c) is equal to
 - a. 2.43×10^{-12} m
 - b. 2.43×10^{-13} m
 - c. 2.43×10^{-14} m
 - d. 2.43×10^{-15} m

Question No. 2 Write the short answers of any of the following questions.**2x6=12**

- i. As a solid is heated and begins to flow, why does it first appear red?
- ii. When does light behave as a wave? When does it behave as a particle?
- iii. Does the brightness of beam of light primarily depend on the frequency of photons or on the number of photons?
- iv. Is it possible to create a single electron from energy? Explain.
- v. State and prove uncertainty principle.
- vi. Does dilation means that time really passes more slowly in moving system or that it only seems to pass more slowly?
- vii. What happens to the total radiations of a body if its absolute temperature is doubled?
- viii. Which has lower energy quanta? Radio waves or x-rays.

Question No. 3

- a. State two postulates of special theory of relativity. Also discuss results of special theory of relativity. (5)
- b. What is the energy of a photon in a beam of infrared radiation of wavelength 1240 nm? (3)

OR**Question No. 4**

- a. Define and explain photoelectric effect. Also discuss its results on the basis of quantum theory. (5)
- b. What is the energy of a photon in a beam of infrared radiation of wavelength 1240 nm? (3)