



UNIVERSITY OF THE PUNJAB

Third Semester – 2019

Examination: B.S. 4 Years Program

Roll No. in Fig.

Roll No. in Words.

PAPER: Concepts of Modern Physics
Course Code: PHY-201/21330 Part-I (Compulsory)

MAX. TIME: 15 Min.
MAX. MARKS: 10

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Signature of Supdt.:

Attempt this Paper on this Question Sheet only.

Please encircle the correct option. 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. (1x10=10)

- A) The maximum kinetic energy of photo electrons depends upon
i) Intensity ii) Frequency (iii) Temperature iv) All these
- B) The spectrum of black body radiation is
i) Line Spectrum ii) Continuous spectrum iii) Band spectrum iv) Discrete
- C) If the particles listed all have the same KE, which has the longest wavelength
i) Neutron ii) Electron iii) Proton iii) Alpha particle
- D) Rayleigh-Jean's law holds good for which of the following?
i) Short wavelength ii) Intermediate wavelength
iii) Both for short & long wavelength iv) Long wavelength
- E) What is the minimum possible momentum of a particle, trapped in an infinite one dimensional potential well of width L
i) 0 ii) $h^2/2L$ iii) $h^2/2L^2$ iv) $h/2L$
- F) According to Moseley' the square root of the frequencies of lines in x-ray spectra depends linearly on
i) Mass number ii) Atomic number iii) Quantum number iv) None of these
- G) The current due to motion of majority charge carrier is called
i) Diffusion current ii) Conventional current
iii) Leakage current iv) Drift Current
- H) At critical temperature, the resistivity of the superconductors fall to zero
i) Gradually ii) Exponentially iii) Suddenly iv) None of above
- D) In Beta decay, the kinetic energy spectrum of the emitted electrons is
i) Discrete ii) Continuous
iii) Band spectrum iv) line spectrum
- J) The unit of activity of a radioactive source is
i) rad ii) Curie iii) Sievert iv) Roentgen



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PAPER: Concepts of Modern Physics
Course Code: PHY-201/21330 Part – II

MAX. TIME: 2 Hrs. 45 Min.
MAX. MARKS: 50

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

- Q.2** Give the short answer of each question. (2 x 10 = 20)
- i. Explain, why an evacuated tube is used to examine photoelectric emission
 - ii. Briefly describe Einstein's Photo electric equation.
 - iii. Briefly comment on energy- time uncertainty relationship.
 - iv. Why is the Heisenberg uncertainty principle not more radially apparent in our daily observations?
 - v. Explain briefly the difference between conduction band and valance band.
 - vi. What is difference between spontaneous emission and stimulated emission?
 - vii. State Bohr's postulates of the hydrogen atom.
 - viii. Explain the difference between donor and acceptor impurities?
 - ix. What is metastable state? what roll such a state play in laser operation?
 - x. What is doping. How N type semiconductor is formed by doping.
- Q.3** Define Compton effect. In a single photon-electron collision, show that Compton shift depends on scattering angle of photon. (1, 9)
- Q.4** (a) Derive the expression for the energy of an electron, trapped inside an infinitely deep potential well of width L. (7)
- (b) When an electron is confined to an infinite deep potential well of width 100 pm, What will be the energy of its lowest allowed state? (3)
- Q.5** (a) Explain the Rutherford's gold foil experiment for discovering the atomic nucleus. (7)
- (b) Calculate the binding energy of deuteron. The needed atomic masses are $m_n = 1.008665$, $m(^1\text{H}) = 1.007825$ u, $m(^2\text{H}) = 2.014102$ u. (3)