



# UNIVERSITY OF THE PUNJAB

B.A. / B.Sc. Part – II

Annual Examination – 2019

Roll No. ....

TIME ALLOWED: 3 Hrs.

MAX. MARKS: 75

Subject: Physics-II  
PAPER: A

**Note: Attempt any FIVE questions, selecting not more than TWO questions from each section.**

## Section-I

- Q1.** (a) What is electric dipole? Derive the expression for the magnitude of electric field at any point due to dipole. (1,9)
- (b) Calculate the magnitude of electric field due to an electric dipole of dipole moment  $3.56 \times 10^{-29}$  C.m at a point 25.4 nm away along the bisector axis. (3)
- (c) When an electric dipole is placed in a non-uniform electric field. Is there a net force on dipole? Explain. (2)
- Q.2** (a) Discuss the discharging of a capacitor in RC series circuit connected with battery. Also find the expression for current during discharging of capacitor in RC series circuit. (8,2)
- (b) A capacitor C discharges through a resistor R, after how many time constant does its charge fall to one half of its initial value. (3)
- (c) What is the difference between emf and potential difference? (2)
- Q.3** (a) By applying Biot-Savart law, calculate the magnetic field at any point, due to current passing through straight wire segment of length L. (10)
- (b) A solenoid has the length 1.23 m and an inner diameter 3.55 cm. It has five layers of winding of 850 turns each and carries a current 5.57 A. What is B at its center? (3)
- (c) Discuss the similarities between Biot-Savart law and Coulomb's law. (2)
- Q.4** (a) What is electromagnetic oscillator? Derive the expression for the frequency of oscillation of a LC circuit. (1,9)
- (b) A circuit has  $L= 12$  mH,  $C= 1.6 \mu\text{F}$  and  $R=1.5$ . After what time  $t$  will amplitude of charge oscillations drop to one half of its initial value? (3)
- (c) What is difference between free, damped and forced oscillator. (2)

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## Section-II

- Q.5** (a) What is de Broglie's hypothesis, Explain in detail, how Davisson-Germer proved de Broglie's hypothesis. (2,8)
- (b) Calculate the de Broglie's wavelength of a dust particle of mass  $1.0 \times 10^{-9}$  kg moving with a speed of 2.0 cm/s. (3)
- (c) Why is the wave nature of matter not more apparent in our daily observation? (2)
- Q.6** (a) What is difference between continuous and characteristic x-ray spectrum. Show that the Bohr's theory of hydrogen atom has an excellent agreement with the Moseley plot of  $K_{\alpha}$  line of x-ray spectrum. (2,8)
- (b) Calculate the wavelength  $\lambda_{\min}$  for continuous spectrum of x rays emitted, when 35 keV electrons fall on a molybdenum target. (3)
- (c) What is metastable state? What roll such a state play in laser operation? (2)
- Q.7** (a) Explain in detail, Rutherford's gold foil experiment for discovering the atomic nucleus. (10)
- (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)
- (c) Explain the difference between elastic scattering and inelastic scattering. (2)

## Section-III

- Q.8** (a) What is doping? How p type and n type semiconductors are formed. Discuss the reverse characteristics of pn junction. (1,2,5)
- (b) Discuss the operation of bridge rectifier circuit. What are ripples, how ripples are removed. (5,2)
- Q.9** (a) How a common emitter transistor can be used as an amplifier, give answer by suitable schematic diagrams. (8)
- (b) Describe the input and output characteristics of NPN transistor in common base Configuration (7)
- Q.10** (a) What is Multivibrator? Describe the construction and working of Monostable Multivibrator. (1,9)
- (b) Define with symbols, Boolean equations and truth tables, the NAND and NOR logic Gates. Explain why NAND and NOR Gates are called Universal Gates. (4,1)