Department of Electrical and Electronic Engineering

Final Examination Autumn 2018

Course Code: PHY-1201

Course Title: Physics II

Time: 2 hours 30 minutes

Full Marks: 50

Part A

[Answer any ***two*** questions from the followings; figures in the right margin indicate full marks.]

1(a). State and explain Kirchhoff's law. 3

1(b). What is alternating current? Show that the current, I though a circuit can be expressed as $I = I_0 \sin\omega t$. 5

1(c). A metal rod of length 20.3cm has resistance 85μΩ. If the diameter of the rod is 0.5 cm, calculate the resistivity of the metal. 2

2(a). What do you mean by packing fraction? 2

2(b). Prove that the packing fraction of an fcc structure is 0.72 5

2(c). Draw the following planes (101), (200), (010). 3

3(a). Write down the name of basic unit cells by mentioning their unit cell specifications. 2

3(b). A circuit is made up of a source of constant *emf*, an Ohmic resistance, a capacitor and a key in series. Assuming the capacitor is uncharged before closing the key, investigate theoretically how its charge varies with time after closing the key. 5

3(c). A capacitor is fully charged by a *dc* source through a resistor of resistance 2MΩ. If it takes 0.5 seconds for the charge to reach 75% of its final value, what is the capacitance of the capacitor? 3

Part B

[Answer any ***three*** questions from the followings; figures in the right margin indicate full marks.]

4(a). State the postulates of special theory of relativity. 2

4(b). What is meant by length contraction? Show that the length of a stationary object with respect to an observer in motion is shorter than the length measured by the observer at rest. 5

4(c). What is the length of a meter stick moving parallel to its length when its mass is 1.5 times of its rest mass? 3

5(a). State the postulates Bohr's atom model. What are the limitations of Bohr's model? 3

5(b). Find an expression for the radius of orbit according to Bohr atomic model. 5

5(c). The wavelength of second line of the Balmer series in the hydrogen spectrum is 4861 angstrom. Calculate the wavelength of the first line. 2

6(a).	Define nuclear fission and fusion with example.	2
6(b).	Deduce the expression, $N = N_0e^{-\lambda t}$, where the symbols have their usual meaning.	4
6(c).	What is half-life? A certain radioactive substance has a decay constant of 1.44×10^{-3} per hour. In ...t time will 75% of the initial ...mber of atoms disintegrate?	4
7(a).	What is X-ray? Write down the properties and applications of X-ray.	4
7(b).	Explain photoelectric effect.	3
7(c).	The half life of Cs is 30 years. A sample of Cs has an activity of 5.8×10^5 Bq. After how long time will the activity fall to 1.6×10^4 Bq.	3