

**International Islamic University Chittagong**  
**Department of Electrical and Electronic Engineering**

Final Examination Spring-2018  
 Course Code: **PHYS-1201**  
 Time: **2 hours 30 minutes**

Program: B.Sc. Engg. (EEE)  
 Course Title: **Physics-II**  
 Full Marks: **50**

**Part A**

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

- 1(a). Define current and current density. 02  
 1(b). State and explain Ohm's law and hence draw the  $I$ - $V$  curve. 04  
 1(c). Calculate the values of  $i_1$  and  $i_2$  in the circuit shown Fig. 1: 04

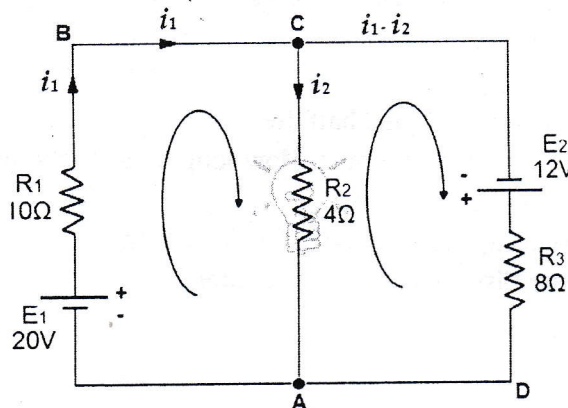


Fig. 1

- 2(a). Define electromotive force. 01  
 2(b). Derive the expressions for growth and decay of charge in an  $RC$  series circuit. 07  
 2(c). A fully charged capacitor  $C$  having charge  $Q$  is discharged through a resistor  $R$ . How much time is spent in which the capacitor discharges half of its initial charge  $Q$ ? 02
- 3(a). Define lattice, basis, unit cell, and single crystal. 02  
 3(b). What is Miller indices? Establish a relation between Miller indices and inter planar spacing. 05  
 3(c). Draw the following plane for the unit cell of a cubic crystal; 03  
 i. (011), ii. (110) and iii. (111).

**Part B**

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

- 4(a). Write down the postulates for the special theory of relativity. 02  
 4(b). Write down inverse-Lorentz transformation formulae. 02  
 4(c). At what speed should a clock be moved so that it may appear to lose 1 minute in each hour? 03

- 4(d). A rod has length 1m. When the rod is in a satellite moving with velocity  $0.8c$  relative to laboratory, what is the length of the rod as determined by an observer (a) in the satellite and (b) in the laboratory. 03
- 5(a). State postulates of Bohr's atomic model. 02
- 5(b). On the basis of Bohr's theory, deduce an expression for the energy of an electron in the  $n$ -th orbit of a hydrogen atom. 05
- 5(c). Define atomic mass unit, mass defect and binding energy. 03
- 6(a). Explain photo-electric effect and Compton effect in brief. 04
- 6(b). Calculate the longest wavelength of incident radiation which will eject an electron from a metal whose work function is  $6 \text{ eV}$ .  
The Plank's constant is  $6.624 \times 10^{-34}$  joule-second. 03
- 6(c). What is meant by wave particle duality? 02
- 6(d). Explain Zeeman effect. 01
- 7(a). What is radioactivity? Define half life. 02
- 7(b). The half-life of  $^{25}\text{Na}$  is 15 hours. How long does it take for 80 percent of a sample of this nuclide to decay? 03
- 7(c). Explain alpha decay, beta decay and gamma decay. 03
- 7(d). Explain nuclear Fission and Fusion reaction. 02

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