I D NO.

PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 40 % Max Marks: 80 Max Time: 02 hrs. 08 May Tuesday 2018

ENDTERM FINAL EXAMINATION MAY 2018

Even Semester 2017-18 Course: **PHY 101 Engineering Physics** II Sem. Physics cycle

---

Instructions:

(i) *Read the question properly and answer accordingly.*
(ii) *Question paper consists of 3 parts.*
(iii) Scientific and Non-programmable calculators are permitted
(iv) $h = 6.625 \times 10^{-34}$ Js, $m_e = 9.1 \times 10^{-31}$ kg , $e = 1.602 \times 10^{-19}$ C

Part A

(5 Q x 4 M = 20 Marks)

1. Define p-type and n-type semiconductors
2. Define ionic and orientation polarization
3. Define phase and group velocity
4. Mention any two important features of quantum free electron theory of metals
5. Define mean free path and Fermi energy

Part B

(3 Q x 10 M = 30 Marks)

6. Derive relation between phase and group velocity. Calculate the minimum energy an electron can possess in an infinitely deep potential well of width 5 nm.
7. Define electronic polarizability. The polarizability of Ne gas is 0.35×10^{-40} Fm^2. If the gas contains 2.7×10^{25} atoms/m^3 at 0^{0C} and 1 atmospheric pressure, calculate its relative dielectric constant
8. Explain with a neat sketch the construction working and V-I characteristics of solar cell.

Part C

(2Q x 15 M = 30 Marks)

9. Derive the time-independent (1-D) Schrodinger wave equation.

10. (i) Deduce Clausius- Mossotti equation from local field expression for a dielectric having contribution due to electrical polarizability alone. (12M)

    (ii) The mean free collision time of copper at 300K is equal to 2×10^{-14} s. Determine its electrical conductivity. Given that free electron density, $n = 8.5\times10^{28}$ m^{-3}. (3M)

ID NO:	

PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 20% Max Marks: 40 Max Time: 1 hr. 28 March Wednesday 2018

TEST – 2 **SET B**

Even Semester 2017-18 Course: **PHY 101 Engineering Physics** II Sem Physics. cycle

---

Instruction:

(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted

---

Part A

(3 Q x 4 M= 12 Marks)

1. Define total internal reflection with suitable diagrams.
2. Define superconductivity and Meissner effect.
3. Define the following terms

   I. Magnetic field strength **II.** Magnetic dipole moment

Part B

(2 Q x 6 M= 12 Marks)

4. The numerical aperture of a fiber is 0.25 and relative refractive index is 0.02. Determine the refractive indices of the core and cladding of a fiber.
5. A magnetic field of 1800 A/m produces a magnetic flux of 3 X 10^{-5} Wb in an iron bar cross-sectional area 0.2 cm^2. Calculate permeability.

Part C

(1 Q x 16 M= 16 Marks)

6. I. Define relative refractive index. Write a short note on point to point communication system with neat diagram. (10 M)

II. Show that superconducting material is diamagnetic in nature and obtain $\chi = -1$. (6 M)

ID NO:	

PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 20 % Max Marks: 40 Max Time: 1 hr. 20 Feb Tuesday 2018

TEST – 1

Even Semester 2017-18 Course: **PHY 101 Engineering Physics** II Sem Physics cycle

---

Instruction:

(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted
(iv) Given:

$h = 6.625 \times 10^{-34} Js,\ k_B = 1.38 \times 10^{-23}\ J/K \quad and\ c = 3 \times 10^{8}\ m/s.$

Part A

(4 Q x 3 M = 12 Marks)

1. Name the requisites of laser system?
2. What are the fundamental mode of vibration in CO_2 molecule
3. Write any three applications of Holography.
4. Define induced absorption with diagram.

Part B

(2 Q x 6 M = 12 Marks)

5. Find the wavelength at which the rates of spontaneous and stimulated emission become equal at a temperature of 55.38×10^3 K.
6. A medium in thermal equilibrium at temperature 300K has two energy levels with a wavelength separation of 1μm. Find the ratio of population densities of the upper and lower levels.

Part C

(1Q x 16 M = 16 Marks)

7. Define population inversion. For atomic transitions, derive the expression for Einstein's relations and hence deduce the expression for the ratio of stimulated emission rate to the spontaneous emission rate.