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**Question Paper Code : 80286**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Second Semester

Medical Electronics

PH 8253 — PHYSICS FOR ELECTRONICS ENGINEERING

(Common to Bio Medical Engineering/Computer and Communication Engineering/Electrical and Electronics Engineering/Electronics and Communication Engineering/Electronics and Instrumentation Engineering/Electronics and Telecommunication Engineering/Instrumentation and Control Engineering)

(Regulation 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by a free electron?
2. What are forbidden bands?
3. Define the term mobility of a semiconductor.
4. Mention the uses of Ohmic contact.
5. Define magnetic susceptibility and permeability.
6. The dielectric constant of a He gas at NTP is 1.0000684. Calculate the electronic polarizability of He atoms if the gas contains  $2.7 \times 10^{25}$  atoms/m<sup>3</sup> and hence evaluate the radius of the He atoms. Given  $\epsilon_0 = 8.85 \times 10^{-12}$  F/m.
7. Define carrier generation and recombination.
8. What are excitons? Give its types.
9. What is meant by tunnelling?
10. Define Coulomb blockade effect.

## PART B — (5 × 16 = 80 marks)

11. (a) Deduce mathematical expression for electrical conductivity and thermal conductivity of a conducting material and hence obtain Wiedemann-Franz law. (16)

Or

- (b) Obtain Eigen values and Eigen functions of an electron enclosed in a 3-D potential box. (16)

12. (a) Derive the intrinsic carrier concentration for intrinsic semiconductor. (16)

Or

- (b) Explain the fabrication of the power transistor with applications. (16)

13. (a) (i) Explain the different types of polarization mechanisms involved in a dielectric material. (10)

- (ii) Explain its frequency and temperature dependence. (6)

Or

- (b) What are the different types of dielectric break down in dielectric medium? Discuss in detail the various types of dielectric breakdown. (16)

14. (a) Explain the theory and working of LED. (16)

Or

- (b) Explain the construction and working of a semiconductor diode laser (laser diode) with diagram. (16)

15. (a) Discuss density of states in quantum well, quantum wire and quantum dot. (16)

Or

- (b) Describe the carbon nano tubes with their properties and applications. (16)