Reg. No. : | | | | | | | | | | | | |

stion Paper Code : 90500

: EXAMINATIONS, NOVEMBER/DECEMBER 2019

Second Semester

Medical Electronics

PH 8253 – PHYSICS FOR ELECTRONICS ENGINEERING

(Common to Biomedical 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)

(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. State Widemann-Franz law. Give the value of Lorentz number and state whether it holds good for all metals at all temperatures.
2. Explain the concept of hole and give its advantages.
3. Draw a neat sketch to represent the variation of Fermi level with temperature for various concentrations in P-type semi-conductor.
4. Mention any two differences between Zener and avalance breakdown.
5. Define magnetic susceptibility and permeability.
6. What is meant by high-k-dielectrics ? Give examples.
7. Why group III and group V elements alone should be chosen for manufacturing LED's ?
8. What do you understand by quantum confined Stark effect ?
9. What will happen to the band gap when the volume is reduced from that of a solid to a nanomaterial ?
10. What is meant by coherent transport and conductance fluctuations ?

PART – B (5×16=80 Marks)

11. a) i) Write Fermi distribution function. Explain how Fermi function varies with temperature. (14)

ii) Evaluate the Fermi function for an energy kT above the Fermi energy. (2)

(OR)

b) i) Obtain the Eigenvalues and Eigenfunctions of an electron enclosed in a three dimensional potential box. (12)

ii) What is meant by degenerate and non-degenerate states ? (4)

12. a) Derive an expression for density of electrons in the conduction band and density of holes in the valence band of an intrinsic semi-conductor. (16)

(OR)

b) With a neat sketch, describe the principle, working and applications of

i) Tunnel diode.

ii) Schottky diode. (8+8)

13. a) Explain ferromagnetic domain theory. Briefly explain different types of energy involved in domain growth. (16)

(OR)

b) i) What is meant by dielectric breakdown and dielectric strength ? (4)

ii) Discuss in detail the various dielectric breakdown mechanisms and mention the remedies to avoid breakdown in dielectric material. (12)

14. a) i) Describe the principle, construction and working of a photo diode. (12)

ii) Give the advantages, disadvantages and application of photo diode. (4)

(OR)

b) i) Describe the principle, construction and working of a GaAlAs diode Laser. (14)

ii) Calculate the wavelength of emission from GaAs semiconductor laser whose band gap energy is 1.44eV (Plank's Constant is 6.625×10^{-34} Js and velocity of light is 3×10^{8} m/sec.) (2)

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

(OR)

b) Write a short note on :

i) GMR

ii) Spin Valve. (8+8)