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M. Sc. EXAMINATION, 2020

(Fourth Semester)

(C Scheme) (Re-appear)

(PHYSICS)

PHY610C

Electronics Special-III (Novel and Smart Materials)

Time : 2½ *Hours*] [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Four* questions in all. All questions carry equal marks.

1. (a) Integrated circuit are preferred as compare to discrete circuit in Electronics. Justify.

(b) Prove that at equilibrium, the position of Fermi level is constant in a Semiconductor.

(c) Magnetic Bubble is a memory device. Justify.

(d) Differentiate between physical vapor deposition and chemical vapor deposition technique.

(e) What are the advantages of ferrites over other magnetic materials for various applications ?

2. (a) Derive an expression for carrier concentration in *p*-type extrinsic semiconductor and discuss the position for Fermi level in it.

(b) Explain the effect of effective mass in direct and indirect semiconductor.

3. (a) Distinguish between drift and diffusion current and obtain the equation of continuity for flow of charge carrier in semiconductor.

(b) Discussing the phenomenon of recombination in semiconductor prove that in direct recombination process the net recombination rate is proportional to the excess minority carrier concentration.

4. (a) Describe various steps involved in the fabrication of a monolithic transistor in integrated circuit.

(b) Discuss the various modes of classification of Integrated Circuit.

5. (a) Explain, how the integrated resistors are fabricated in monolithic integrated circuit.

(b) Briefly explain the factors on which the diffusion process in integrated circuit depends.

(c) Define the following :

(i) Buried Layer

(ii) Parasitic Capacitance

(iii) Sheet Resistance

(iv) Supergain Transistor

(v) Electronic Graded Silicon

6. (a) Describe in detail the classification of Ferrites on the basis of crystal structure.

(b) Discuss the ball milling method used to synthesize nanomaterials.

7. (a) Listing various methods used for synthesis of nanomaterials describe Liquid Phase-Hydrothermal method in detail.

(b) What are Nanomaterials ? Compare the top-down and down-up approach used to synthesize nanomaterials.

8. (a) Differentiate between inductive head and resistive head. Describe in detail Thin Film Magnetic head used for magnetic recording.

(b) Discuss the basic principle of magnetic recording. Also write the advantages of magnetic recording over conventional recording.

9. (a) Write notes on the following :

(i) Hard and Soft Magnet

(ii) Bonded Magnet.

(b) Explain, how particulate media is synthesized and also, how can it be used in magnetic recording.