310707

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B. Tech. III Sem. (Main) Exam., Dec. - 2019

Common for ECE/EIC

3EC4-07 Electronic Devices

Time: 3 Hours **Maximum Marks: 160**

Instructions to Candidates:

Part – A: *Short answer questions (up to 25 words) 10 × 3 marks = 30 marks. All ten questions are compulsory.*

Part – B: *Analytical/Problem Solving questions 5 × 10 marks = 50 marks. Candidates have to answer five questions out of seven.*

Part – C: *Descriptive/Analytical/Problem Solving questions 4 × 20 marks = 80 marks. Candidates have to answer four questions out of five.*

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART - A

Q.1 Why is a semiconductor an insulator at ordinary temperature? [3]

Q.2 Why is silicon preferred to germanium in the manufacture of semiconductor devices? [3]

Q.3 Describe the electron distribution in a silicon atom. [3]

Q.4 Why the doping materials are called impurities? [3]

Q 5 Briefly define the Ebers – Moll Model of Bipolar Junction Transistor [BJT]. [3]

Q 6 Write down various applications of Photodiode. [3]

Q 7 Define the leakage current for reverse V/I characteristic of P–N Junction. [3]

Q 8 Write down the Poisson and continuity equation for P–N junction characteristics. [3]

Q 9 Write any three advantages of Ion implantation process of ICs fabrication. [3]

Q 10 Briefly define the Etching process of ICs fabrication. [3]

PART – B

Q 1 Give the mechanism of hole current flow in a semiconductor. And, what do you understand by intrinsic and extrinsic semiconductors. [10]

Q 2 Explain the E-k diagrams of semiconductors. [10]

Q 3 Describe the basic fundamental construction features and working principle of Light Emitting Diode (LED). Also, write down various applications of LED. [10]

Q 4 Write short – note on –

(a) Zener diode and [5]

(b) Schottky diode [5]

Q 5 Give the detailed explanation of following ICs fabrication process –

(a) Oxidation [3]

(b) Diffusion [3]

(c) Photolithography [4]

Q 6 Explain the generation and recombination process of carriers in semiconductors. [10]

Q 7 Describe the small signal switching models of P–N Junction. Also, define the Avalanche breakdown phenomenon in P–N Junction. [10]

PART – C

Q.1 What do you understand by a semi-conductor? Discuss some important properties of semi – conductors, which are the most commonly used semiconductors and why? Also, give the energy band description of semiconductors. [20]

Q.2 Write the detailed explanation of diffusion current, drift current, mobility and resistivity as carrier transport in semiconductors. [20]

Q.3 Describe the various biasing and their characteristics of P–N Junction. [20]

Q.4 Describe the constructional features and I–V characteristics of MOSFET. [20]

Q.5 Give the detailed description of constructional features and C–V characteristics of MOS capacitor. [20]
