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Roll No

EC - 304

B.E. III Semester Examination, December 2014

Electronics devices

Time: Three Hours

Maximum Marks: 70

- *Note:* i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.
 - ii) All parts of each questions are to be attempted at one place.
 - iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.
 - iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

- 1. a) What is meant by intrinsic semiconductor?
 - b) State and explain Mass-Action Law.
 - c) What do you mean by diffusion capacitance of a forward biased diode?
 - d) Draw and the V-I characteristics of a P-N junction diode.

OR

Prove that the conductivity of a semiconductor is given by

$$\sigma = q (p_{\mu p} + n_{\mu n})$$

where

 σ = conductivity

q = charge of electron or hole in columb

p = no. of holes per unit volume

n = No. of free electrons per unit volume

 $\mu p = mobility of holes$

 μ n = mobility of electrons

Unit - II

- 2. a) What is a rectifier? What are different types of rectifiers?
 - b) What is a clamper? Explain with the help of diagrams.
 - c) Sketch V_o for the clipping network as shown in fig 1 for the input shown. Assume the diodes are ideal.

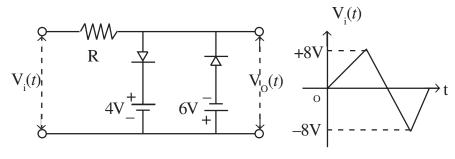


Fig. 1

d) Derive expressions for rectification efficiency, ripple factor, transformer utilization factor, form factor and peak factor for an half-wave rectifier for resistive load.

OR

Calculate the value of capacitance to use in a capacitor filter connected to a full-wave rectifier operating at a standard aircraft power frequency of 400 Hz, if the ripple factor is 10% for a load of 500 Ω .

Unit - III

- 3. a) What is avalanche breakdown?
 - b) What is the principle behind varactor diode?
 - c) What is tunnelling?
 - d) What is Schottky diode? Explain how the construction of a schottky diode favours its use in the high frequency region.

OR

What is a PIN diode? What are its advantages over PN diode? What are the applications of PIN diodes?

Unit - IV

- 4. a) Explain the early effect and its consequences.
 - b) What is a BJT? What are its different configurations?
 - c) Draw the static input and output characteristics of BJT. Also name the regions of operation of transistor.
 - d) Draw the Ebers-Moll model for a NPN transistor and give the equations for emitter current and collector current.

OR

Explain the terms in reference to UJT.

- i) Intrinsic stand off ratio
- ii) Peak point voltage
- iii) Valley point voltage

Unit - V

- 5. a) Define the terms trans conductance and drain resistance.
 - b) What is a MOSFET? How many types of MOSFETs are there?
 - c) Compare JFET with BJT.
 - d) Draw the two biasing circuits for an enhancement type MOSFET.

OR

Explain how an FET is used as voltage variable resistor.
