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

   μp = mobility of holes

   μn = 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.

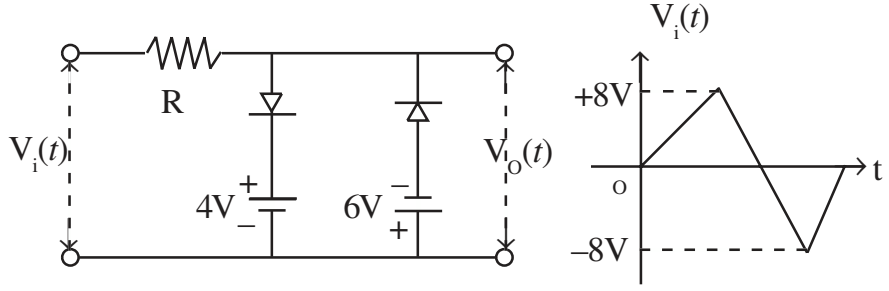

Fig. 1

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.

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