## Unit - IV

4. a) Write down the operation of n-p-n transistor with schematic diagram.

   b) Define $\alpha$ and $\beta$ of BJT.

   c) Explain the early effect in BJT with the aid of necessary plots.

   d) Derive the expression for $I_E$ and $I_C$ for BJT using Eber - Moll model with proper necessary diagram

   OR

   Draw the basic structure, circuit symbol and equivalent circuit of UJT. Also explain the working of it.

## Unit - V

5. a) Explain the working of a JFET and give its characteristic curves.

   b) Define the pinch - off voltage $V_p$.

   c) Discuss the working of depletion type MOSFET.

   d) Draw the circuit of (i) CS amplifier (ii) Source follower using FET at low frequencies. Derive the expressions for the voltage gain at low frequencies in each case.

   OR

   In the fig.3 $V_{gs} = -1$ V. Calculate $V_G$, $V_S$, $I_D$ and $V_D$ if $I_{DSS} = 10$ mA , $V_{GS\ OFF} = -4$ V.
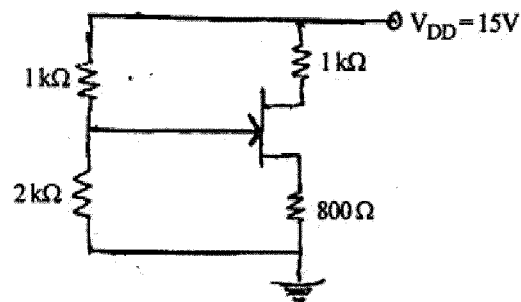


Fig. 3

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# EC - 304

## B.E. III Semester

Examination, June 2015

## 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 question 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 do you mean by drift current and diffusion current in a semiconductor?

   b) With reference to semiconductor diode. Explain the following terms in brief.

   i) Depletion Layer

   ii) Knee Voltage.

   c) Draw and explain the volt - ampere (V-I) characteristic of a PN junction diode.

d) Consider a circuit consisting of a diode D, a resistance R and a signal source $V_i$ in series, define:
   i) Static characteristic
   ii) Dynamic characteristic
   iii) Transfer characteristic
   iv) What is the correlation between (ii) and (iii)?

OR

The hall - coefficient of a specimen of doped silicon is found to be $3.66 \times 10^{-4}$ m³C; the resistivity of the specimen is $8.93 \times 10^{-3}$ Ω–m. Find the mobility and density of charge carriers assuming single carriers conduction.

## Unit - II

2. a) Discuss piecewise linear volt - ampere diode characteristics with its significance.

   b) Explain the load line concept.

   c) Differentiate between clippers and clampers.

   d) A triangular voltage waveform shown in fig.1 (a) is applied to the biased clipper circuit of fig 1(b). Explain the working of the clipping circuit and draw the output voltage waveform.
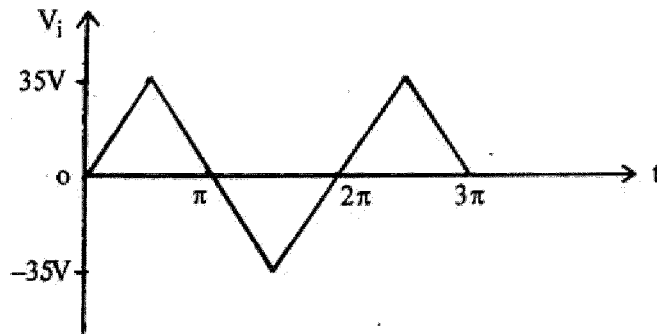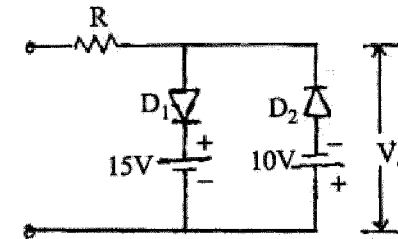


Fig 1(a) Input waveform

Fig. 1 (b) Biased clipper circuit

OR

Define a rectifier with types and explain the functions of rectifiers. Draw the circuit and explain the types of rectifiers. Also, calculate PIV (Peak Inverse Voltage) for the same.

## Unit - III

3. a) Define Zener Breakdown.

   b) What is a Varactor diode? Explain.

   c) Explain the basic structure and working of Light Emitting Diode (LED).

   d) Explain tunnel diode with reference to:
   i) V-I characteristics.   ii) Tunneling theory
   iii) Advantages           iv) Disadvantages
   v) Applications

OR

For the circuit shown in fig.2, calculate:
i) Output voltage
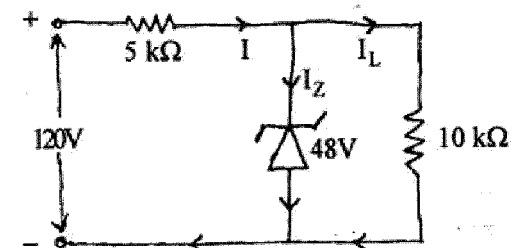ii) Voltage drop across series resistance
iii) Current through Zener Diode



Fig. 2