

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1116

Roll No.

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**B.Tech.**

(SEM. I) ODD SEMESTER THEORY

EXAMINATION 2013-14

**ELECTRONICS ENGINEERING**

Time : 3 Hours

Total Marks : 100

Note :- All Sections are compulsory.

**SECTION-A**

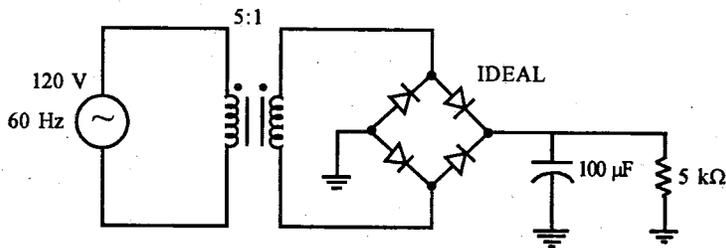
1. All parts are compulsory. Write short answers by giving proper reasons : (2×10=20)
- (a) Define the terms conductivity, intrinsic concentration and energy gap of a semiconductor material.
  - (b) A silicon diode has a saturation current of 5 nA at 25°C. What is the saturation current at 100°C ?
  - (c) Draw the circuit diagram of peak to peak detector using diode.
  - (d) Enlist the difference between JFET and BJT.
  - (e) A Zener diode regulator circuit has an input voltage that may vary from 22 V to 30 V if the regulated output voltage is 12 V and the load resistance varies from 140 Ω to 10 kΩ. Determine the maximum allowable series resistance.

- (f) The BJT circuit has  $I_C = 10 \text{ mA}$  and  $\alpha = 0.98$ . Determine the value of  $\beta$  and  $I_E$ .
- (g) In JFET  $I_{DSS} = 8 \text{ mA}$ ,  $V_P = -4 \text{ V}$  biased at  $V_{GS} = -1.8 \text{ V}$ . Determine the value  $g_m$ .
- (h) Draw the Capacitance versus Voltage transfer characteristic for the Varactor Diode.
- (i) An OP amp has a slew rate of  $15 \text{ V}/\mu\text{S}$ . What is the power bandwidth for a peak output voltage of  $10 \text{ V}$ ?
- (j) Write the advantages of Negative Feedback in Amplifiers.

### SECTION-B

2. Attempt any **three** parts of the following : **(10×3=30)**

- (a) Determine the DC load voltage and ripple voltage for the circuit as shown in Figure 1 :



**Figure 1**

- (b) With the help of block diagram describe the working of a CRO and explain the application and measurement of phase and frequency using CRO.

- (c) In transistor amplifier circuit as shown in Figure 2, the ac generator has an internal resistance of  $600\ \Omega$ . Determine the output voltage :

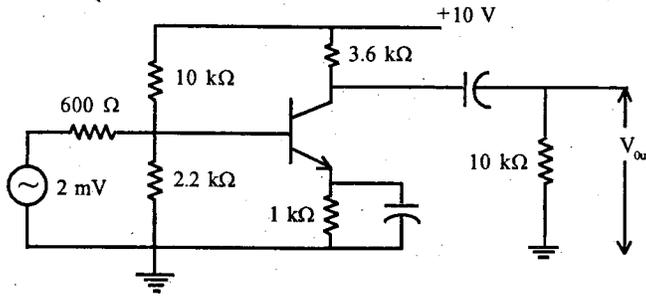


Figure 2

- (d) Draw the structure of a JFET and explain its principle of operation with neat diagrams alongwith its V-I characteristics. Define pinch-off voltage and mark it on the characteristic.
- (e) Draw the basic structure of a CE BJT and explain its principle of operation with neat diagrams alongwith its input output characteristics.

### SECTION-C

**Note :-** This Section consists of five theory questions. Each question is of 10 marks. (10×5=50)

3. Attempt any two parts of the following : (5×2=10)

- (a) The transistor as shown in Figure 3 has  $\beta_{dc} = 300$ . Calculate

$I_B$ ,  $I_C$ ,  $V_{CE}$  and  $P_D$ .

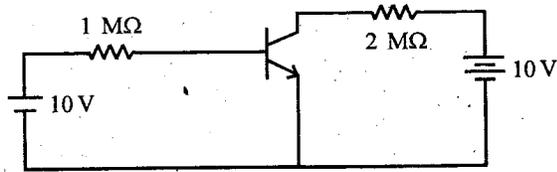


Figure 3

(b) Sketch  $V_o$  of the following network as shown in Figure 4 :

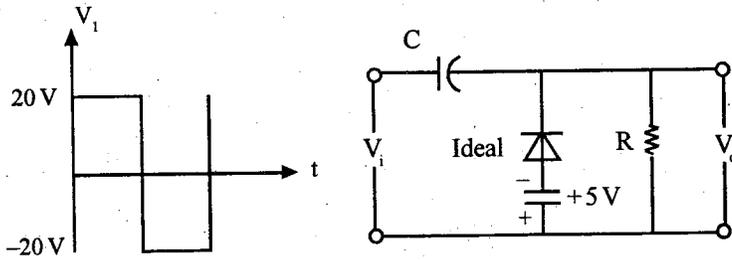


Figure 4

(c) A common collector amplifier has a potential divider bias using  $V_{CC} = 10\text{ V}$ ,  $R_E = 4.3\text{ k}\Omega$ ,  $R_1 = 10\text{ k}\Omega$ ,  $R_2 = 10\text{ k}\Omega$ , as shown in Figure 5. Determine the voltage Gain :

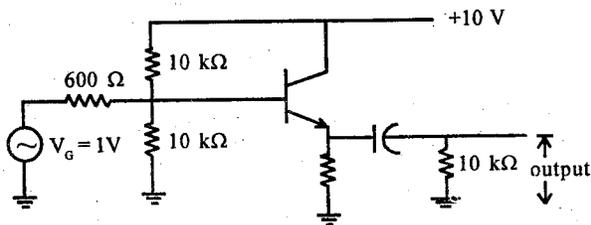
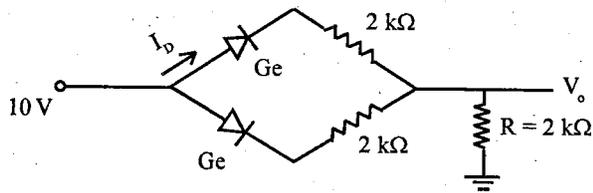


Figure 5

4. Attempt any **two** parts of the following : **(5×2=10)**

(a) Determine  $V_o$  and  $I_D$  for the given circuit as shown in Figure 6.

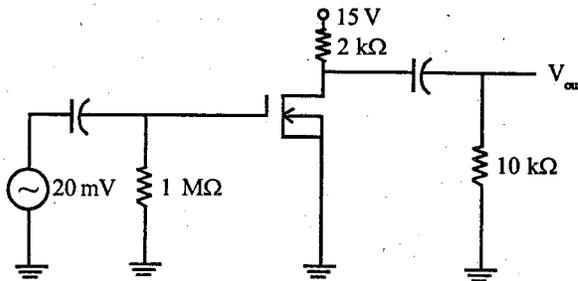
Diodes are ideal :



**Figure 6**

(b) The Depletion Mode MOSFET as shown in Figure 7

$V_{GS(off)} = -2\text{ V}$ ,  $I_{DSS} = 4\text{ mA}$  and  $g_{mo} = 200\ \mu\text{S}$ . Determine the circuit's output Voltage :



**Figure 7**

(c) Distinguish between enhancement type and depletion type MOSFETs. Draw the cross-section of N-channel enhancement MOSFET. Explain and draw the transfer characteristics.

5. Attempt any two parts of the following : (5×2=10)

- (a) Explain the Full Wave Voltage Doublers circuit using diode.
- (b) Write a short note on Optoelectronic Device.
- (c) A common source JFET amplifier with Un-bypassed  $R_s$  has the following circuit parameters  $R_D = 15 \text{ k}\Omega$ ,  $R_s = .5 \text{ k}\Omega$ ,  $R_G = 1 \text{ M}\Omega$ ,  $r_d = 5 \text{ k}\Omega$ ,  $\epsilon_m = 5 \text{ mho}$ ,  $V_{DD} = 20 \text{ V}$ . Calculate  $A_v$ ,  $R_D$  and  $R_i$  as shown in figure 8 :

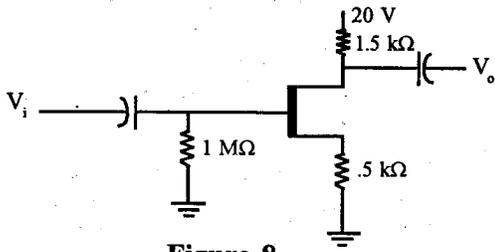


Figure 8

6. Attempt any two parts of the following : (5×2=10)

- (a) Explain the ideal characteristic of Op-amp. Draw an integrator circuit using op-amp.
- (b) Determine the output voltage for the given Figure 9 :

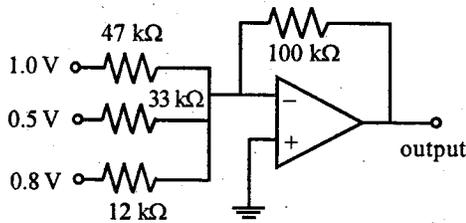


Figure 9

- (c) Write a short note on Comparator Circuit using op-amp.

7. Attempt any **two** parts of the following : (5×2=10)

- (a) Using a suitable diagram explain the basic principle of a Multimeter and enlist the applications of multimeter.
- (b) Using a suitable Block diagram explain the working of Function generator.
- (c) Explain the Basic principle of Digital Voltmeter.