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

PAPER ID : 1116 **Roll No.** ☐☐☐☐☐☐☐☐☐☐

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 mA and α = 0.98. Determine the value of β and I_E.

(g) In JFET I_{DSS} = 8 mA, V_P = –4 V biased at V_{GS} = –1.8 V. Determine the value g_m.

(h) Draw the Capacitance verse Voltage transfer characteristic for the Varactor Diode.

(i) An OP amp has a slew rate of 15 V/μS. What is the power bandwidth for a peak output voltage of 10 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 :
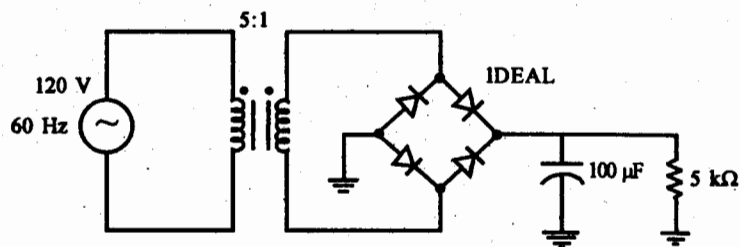

Figure 1

(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 Ω. Determine the output voltage :
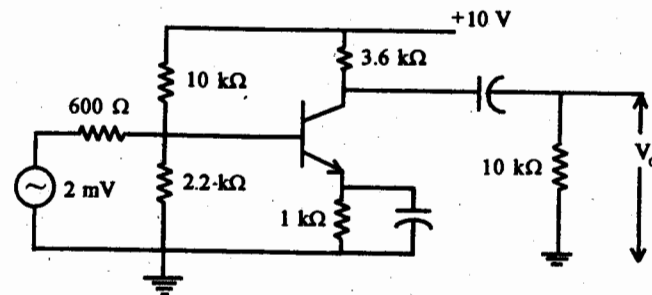

Figure 2

(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 β_{dc} = 300. Calculate
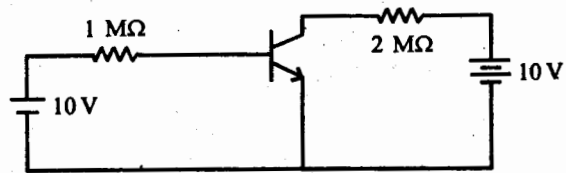
I_B, I_C, V_{CE} and P_D.

Figure 3

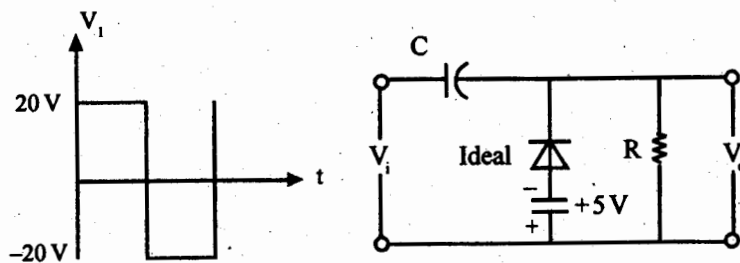(b) Sketch V_o of the following network as shown in Figure 4 :

Figure 4

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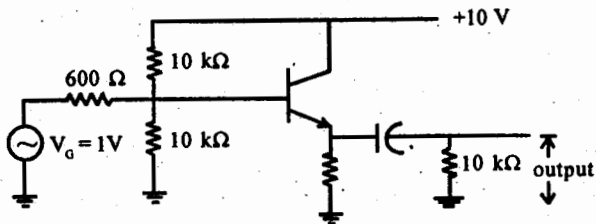

Figure 5

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 :
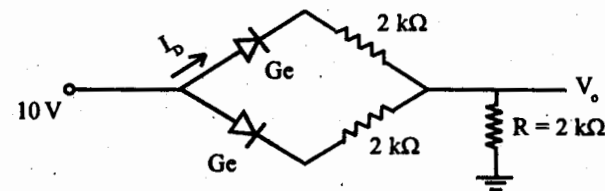

Figure 6

(b) The Depletion Mode MOSFET as shown in Figure 7 $V_{GS(off)} = -2$ V, $I_{DSS} = 4$ mA and $g_{mo} = 200$ μS. Determine the circuits output Voltage :
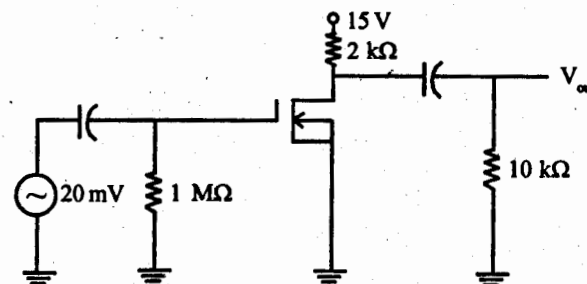

Figure 7

(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 kΩ, R_s = .5 kΩ, R_G = 1 MΩ, r_d = 5 kΩ, ε_m = .5 mho, V_{DD} = 20 V. Calculate A_v, R_D and R_i as shown in figure 8 :
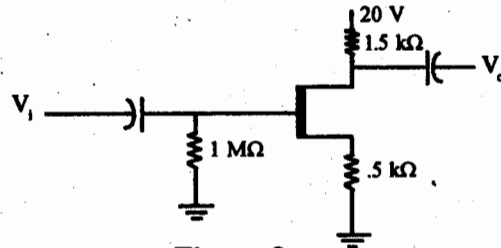

Figure 8

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.

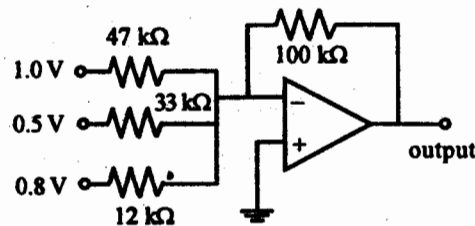(b) Determine the output voltage for the given Figure 9 :

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.