Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III(OLD) • EXAMINATION – WINTER 2016

Subject Code:131101 **Date:06/01/2017**

Subject Name:Basic Electronics

Time:10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Define **07**

(i) Potential energy
(ii) Electron volt
(iii) *hole* in semiconductor
(iv) Space charge region
(v) Diffusion capacitance of diode
(vi) Photovoltaic Effect
(vii) The Continuity Equation

(b) Draw and explain volt-ampere characteristic of an avalanche diode. What is meant by *cut in* voltage and reverse saturation current? what is effect of temperature on these two parameters? **07**

Q.2 **(a)** (i) Draw the steady state output voltage waveform with respect to input voltage $V_i = 5 \sin \omega t$ for Figure 1(a) and Figure 1(b) **07**

(ii) Compare half wave, center tapped and bridge rectifier

(b) What is comparator circuit? How does such a circuit differ from a clipping circuit? **07**

OR

(b) Define current gain α and β for transistor. Derive relationship between α and β. **07**

Q.3 **(a)** (i) Compare CB, CE and CC configuration in transistor. **07**
(ii) Explain Early effect and Reach through condition related to transistor.

(b) Give the complete analysis of a transistor amplifier circuit using *h* parameters. Find current gain and voltage gain in terms of *h* parameters. **07**

OR

Q.3 **(a)** Discuss various biasing methods of FET. **07**

(b) (i) Explain : Phototransistor **07**
(ii) Explain : Alloy type transistor construction

Q.4 **(a)** Explain bias compensation circuits for transistor in detail **07**

(b) Explain the basic structure of *n* channel field effect transistor. Explain its operation. **07**

OR

Q.4 **(a)** What is thermal run away in transistor? Define thermal resistance. What should operating point consideration to minimize self heating in transistor? **07**

(b) Explain structure, the drain characteristic and the transfer curve of *p* channel enhancement type MOSFET. Define threshold voltage. **07**

Q.5 **(a)** Explain why even harmonics are not present in a push pull amplifier. give additional advantages of this circuit over that of a single transistor amplifier. **07**

(b) Determine the quiescent current and collector to emitter voltage for a silicon transistor with β=50 in the self bias method (Figure 2), the circuit component values are **07**

V_{cc}= 20 V
R_c= 2 KΩ (Collector Resistor)
R_1= 100 KΩ
R_2= 5 KΩ
R_e= 0.1KΩ (Emitter Resistor)

OR

Q.5 **(a)** What is cross over distortion in class B push pull amplifier. How this problem can overcome , discuss with suitable circuit diagram. **07**

(b) For source self bias circuit shown in Figure 3, utilized an *n* channel FET for which V_p= -2 V and I_{DSS}=1.65 mA. It is desire to bias the circuit at I_D=0.8 mA using V_{DD}=24 V. Find V_{GS}, g_m and R_s **07**

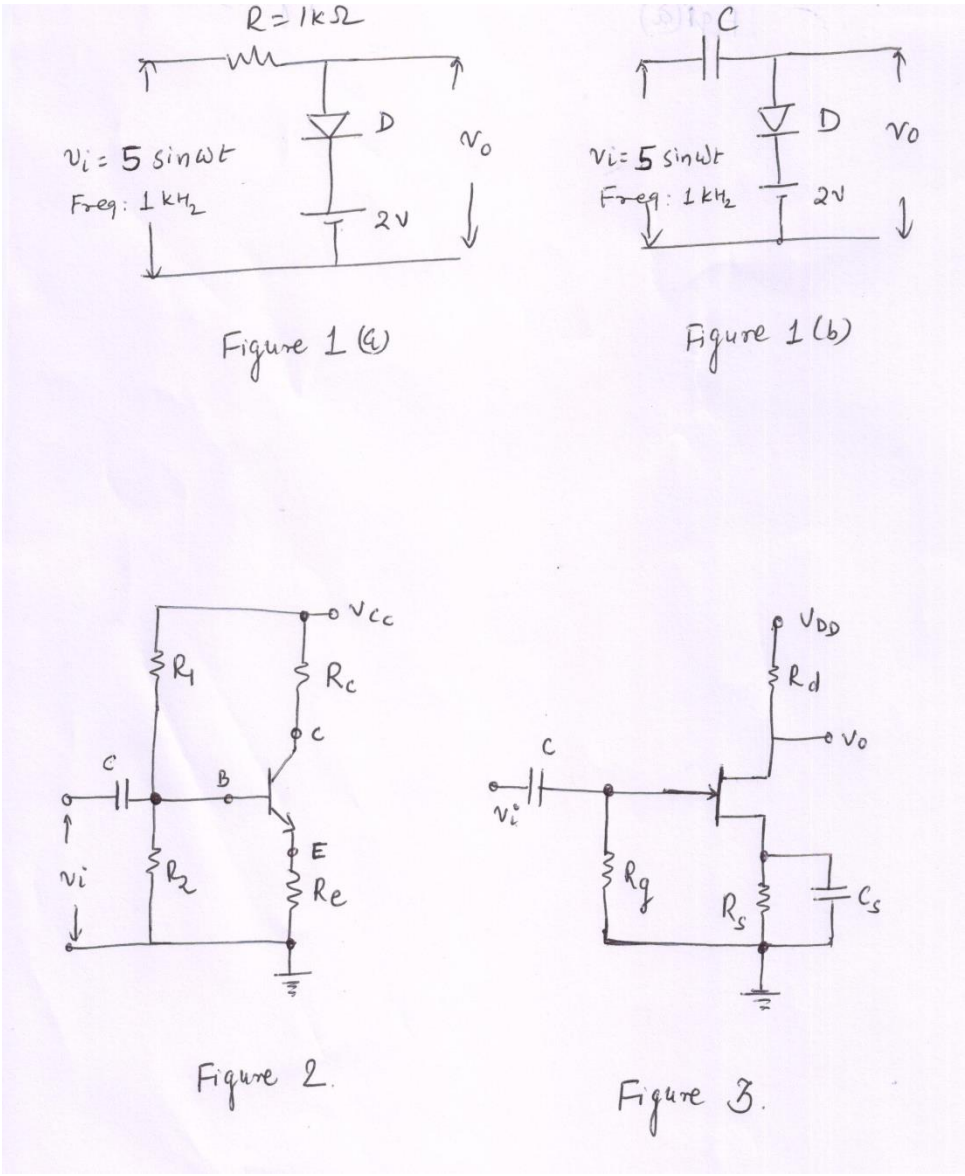

Figure 1 (a)

Figure 1 (b)

Figure 2.

Figure 3.

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