

**I B.TECH II SEMESTER REGULAR EXAMINATIONS, SEPTEMBER - 2021**  
**BASIC ELECTRONIC DEVICES AND CIRCUITS**  
**(ELECTRICAL AND ELECTRONICS ENGINEERING)**

Time : 3 Hours

Max. Marks : 70

Note : Answer ONE question from each unit (5 ×14 = 70 Marks)

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UNIT-I

1. a) Explain the following with respect to a Diode [7M]  
(i) Static resistance  
(ii) Dynamic resistance  
(iii) Reverse resistance
- b) A Si diode has a saturation current  $I_0 = 10\text{nA}$  at  $T = 300^\circ\text{K}$ . [7M]  
(i) Find the forward current  $I_D$  if the forward drop  $V_D$  is 0.5V.  
(ii) This diode is rated for a maximum current of 5A. What is its junction temperature at rated current if the forward drop is 0.7V.

(OR)

2. a) Draw the energy band diagram of a PN Junction and explain the working of a diode. [7M]
- b) Explain the terms avalanche breakdown and 'Zener breakdown'. What do you mean by Zener voltage and Zener current? How does Zener diode regulate the DC voltage? [7M]

UNIT-II

3. a) Draw and explain operation of bridge rectifier. Why a bridge rectifier is preferred over a center-tap rectifier? [7M]
- b) A HWR circuit has filter capacitor of  $1200\mu\text{F}$  and is connected to a load of  $400\Omega$ . The rectifier is connected to a 50Hz,  $120\text{V}_{\text{rms}}$  Source. It takes 2mSec for the capacitor to recharge during each cycle. Calculate the minimum value of the repetitive surge current for which the diode should be rated. [7M]

(OR)

4. a) Show that the maximum rectification efficiency of HWR is 40.6% and that of FWR is 81.2%. [7M]
- b) What are the important characteristics of a rectifier circuit? Explain them briefly. [7M]

UNIT-III

5. a) What are the differences between Bipolar Junction transistor and Field effect Transistor? [7M]
- b) Define  $\alpha_{\text{dc}}$  and  $\beta_{\text{dc}}$  of a transistor, for a transistor the base current in  $100\mu\text{A}$  and collector current in  $2.9\mu\text{A}$ . Find  $\alpha_{\text{dc}}$  and  $\beta_{\text{dc}}$ . [7M]

(OR)

6. a) Draw the circuit and explain the drain and gate characteristics of a JFET in Common Source configuration. [7M]

- b) Describe a set up to obtain the output characteristics of a transistor in CE configuration. Indicate the various regions of operation on the output characteristics. [7M]

## UNIT-IV

7. a) Draw a circuit employing sensistor compensation and explain its working. [7M]  
b) Draw the small signal hybrid model of CE amplifier and derive the expressions for its  $A_i$ ,  $A_v$ ,  $R_i$  and  $R_o$ . [7M]

(OR)

8. a) Explain thermal instability. What are the factors affecting the stability factor. [7M]  
b) A transistor used in CB circuit has the following set of h parameters, [7M]  
 $h_{ib} = 20\Omega$ ,  $h_{fb} = 0.98$ ,  $h_{rb} = 3 \times 10^{-4}$ ,  $h_{ob} = 0.5 \times 10^{-6}$ . Find the values of  $R_i$ ,  $R_o$ ,  $A_i$  and  $A_v$  if  $R_S = 600\Omega$  and  $R_L = 1.5K\Omega$ .

## UNIT-V

9. a) Give the block diagram of a general negative feedback amplifier. Obtain the expression for closed loop gain for a negative feedback amplifier. [7M]  
b) Find the input output resistance of voltage series feedback amplifier. [7M]

(OR)

10. a) Give the two Barkhausen conditions required in order for sinusoidal oscillations to be sustained. [7M]  
b) Calculate the frequency of oscillation of a Hartley oscillator having [7M]  
 $L_1 = 0.5mH$  and  $L_2 = 1mH$  and  $C = 0.2\mu F$ , neglect mutual inductances.

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