Total number of printed pages: 2 **D/3rd Semester/DIE302**

2022

ELECTRONICS DEVICES AND CIRCUITS-I

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. a) What is p-n junction? Explain the theory of p-n junction. 2+5=7

   b) Explain the operation of forward biased diode. 7

   c) Draw and explain the V-I characteristics of a p-n junction diode. 6

2. a) What is rectifier? Draw the full wave rectifier circuit and explain its operation. 2+8=10

   b) Derive average D.C. current of full wave rectifier. 4

   c) Draw the load current and load voltage waveforms for half wave rectifier 4

   d) Draw the symbol of zener diode and p-n junction diode. 2

3. a) What are the types of BJT? Explain their construction. 2+2=4

   b) Explain the working principle of npn transistor. 8

   c) State the operating region of BJT. 3

   d) For a transistor has I_E=1 mA and I_B=10 μA. Determine α and β. 5

4. a) Draw the neat circuit configuration of CB connection. 2

   b) Explain Q-point and DC load line. 3

   c) What is transistor biasing? Name different methods of transistor biasing. 4

   d) Explain fixed biased method. 5

   e) A fixed biased circuit with silicon transistor (V_{BE}=0.7 V) has V_{CC}=15 V, V_{CE}=6V and collector current 7 mA. Find R_C, I_B, and R_B if β=100. 6

5. a) Explain the construction and operation of N channel JFET. 10

   b) Draw the following symbols 2

   (i) P channel E-MOSFET (iii) N Channel D-MOSFET

   c) Explain the operation of N-channel E-MOSFET. 8

6. a) What is power amplifier? Define Class A, Class B, and Class C power amplifier 7

   b) A sinusoidal signal V_s=2sin 350t is applied to a power amplifier. The resulting current is i_0=15sin 400t + 1.2sin 800t + 0.8sin 1250t

   Calculate (i) the total harmonic distortion and (ii) increase in power (%) 5

   b) Derive the efficiency of a Class B power amplifier. 8

7. Write short notes on (any four): 5X4=20

   i) Regulated power supply

   ii) Diode reverse breakdown

   iii) Harmonic distortion

   iv) Adjustable voltage regulator

   v) Push Pull power amplifier