Total No. of printed pages = 5

19/3rd Sem/DIE302

2021

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 Diode? Explain how depletion region is formed in open circuited p-n junction. 6

   (b) Explain the behavior of p-n junction under forward biasing. 7

   (c) Plot the volt-ampere curve for a p-n diode and explain the nature of this curve. 6

   (d) The depletion region in an unbiased P-N junction contains _____. (Fill in the blank) 1

[Turn over

2. (a) Draw the symbol of a normal diode and a zener diode. 2

(b) What do you mean by reverse breakdown of a diode ? Explain how reverse breakdown occurs in a diode. 2+6=8

(c) Draw the circuit diagram of half-wave rectifier and explain the operation. 7

(d) State the advantages of half-wave rectifier. 3

3. (a) Draw the full-wave rectifier circuit and explain its operation. 8

(b) Derive expressions of average value of D.C. current and average D.C. load voltage of a full-wave rectifier. 7

(c) A full-wave rectifier supplies a load of 1 KΩ. The A.C. voltage applied to the diodes is 220-0-220 volt rms. If diode resistance is neglected, calculate average D.C. voltage, average D.C. current, DC power output and RMS current. 5

4. (a) What is transistor ? What are the types of BJT ? State the two junctions in the transistor. 1+2+2=5

(b) Explain the working principles of NPN transistor. 7

(c) State the operating region of BJT. 3

(d) A transistor has I_B=100μA and I_C=2mA. Find 5

(i) β of the transistor,

(ii) α of the transistor,

(iii) Emitter current,

(iv) If I_B changes by +25 μA and I_C changes by +0.6mA find the new value of β.5

5. (a) What is FET ? Explain with neat sketch construction of n-channel and p-channel JFET. 1+6=7

(b) Explain the working of n-channel JFET. 8

(c) Explain the construction of E-MOSFET. 5

6. (a) Classify power amplifier based on mode of operation. 6

(b) Give the differences between voltage amplifier and power amplifier. 4

(c) Describe a transistor class A power amplifier with output transformer as load. 5

(d) A class A power amplifier uses a transformer as a coupling device. The transformer has a turn ratio of 10 and the secondary load 10Ω. Zero signal current is 100mA. When signal is present at the base, the output voltage swings between 24V and 4V while the collector current swings between 0.9A and 0.5A. Determine : 5

(i) collector impedance

(ii) signal power output

(iii) D.C power input and

(iv) overall efficiency.

7. Write short notes on the following any *four* : 5×4=20

(a) Clipping Circuits

(b) Rectifier

(c) Transistor CE configuration

(d) MOSFET

(e) Push-Pull power amplifier.

(f) Power supply (Block diagram).