Total number of printed pages: 2

D/3rd Semester/DIE302

2023

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. 7

   b) Explain the behaviour of p-n junction under reverse biasing. 7

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

2. a) Draw the circuit diagram of full wave rectifier and explain the operation. 7

   b) Derive the following: 5+3=8

   (i) Average DC current of full wave rectifier.

   (ii) Average DC load voltage.

   c) In full wave rectifier primary of transformer is connected to AC mains. The secondary voltage is 12-0-12 V. Calculate output voltage, PIV, ripple frequency and load current if R_L=2 kΩ . 5

3. a) Explain the following: 5+5=10

   (i) Biased positive series clipper

   (ii) Positive parallel clipper

   b) What are the types of BJT? State two junctions in the transistor. 4

   c) Explain the working principles of NPN transistor. 6

[Turn Over]

4. a) Show that $\beta=\alpha/(1-\alpha)$. 5

b) Draw the load line on the output characteristics of a common emitter amplifier. What is the significance? Show how the transistor acts as an amplifier? 2+2+6=10

c) What do you understand by transistor biasing? Name different methods used for transistor biasing. 2+3=5

5. a) Explain the working of n-channel JFET. 10

b) Explain with a neat sketch construction of n-channel MOSFET in enhancement mode. 5

c) Explain the operation of depletion type MOSFET. 5

6. a) Explain the following: 2x4=8

(i) Class A amplifier (ii) Class B amplifier (iii) Class C amplifier (iv) Voltage amplifier.

b) Show that maximum collector efficiency of class A transformer coupled power amplifier is 50%. 6

c) For a power amplifier working in class-A operation, the zero signal collector current is 80 mA. If D.C. supply voltage is 10 V. Determine (a) maximum A.C. power output (b) power rating of transistor (c) maximum collector efficiency. 4

d) Fill in the blanks: 2

(i) Push-Pull amplifier requires_____ transistors.

(ii) Overall efficiency of class B power amplifier is _____.

7. (a) Explain the block diagram of basic three terminal IC regulator. 6

(b) Show that output voltage of an adjustable voltage regulator is $V_0=1.25[1+R_2/R_1]$. 8

(c) Write a short note on Push-Pull amplifier. 6

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