

2024

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) Differentiate between conductor, insulator and semiconductor with examples. 6
b) What is diode? Draw the symbol of diode. Explain the working principle of diode in forward biased condition. 2+1+7=10
c) Explain the V-I characteristics of a diode. 4
2. a) Explain the working principle of half wave rectifier. Also draw the waveforms. 8
b) Derive the expression for the average value of current and average voltage across load for half wave rectifier. 10
c) Fill in the blanks: 2
(i) A full wave rectifier is _____ efficient than a half wave rectifier.
(ii) A zener diode is used as a _____.
ESTD. : 2006
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3. a) What is transistor? Explain the working principle of npn transistor. 2+8=10
b) Name different transistor configuration. 3
c) Design a fixed biased circuit using a silicon transistor having β value of 100. V_{cc} is 10 V and dc bias conditions are to be $V_{CE}=5V$ and $I_c=5\text{ mA}$. 4
d) Write true or false in the following statement: 3
i) In a transistor base is very thin.
ii) In a pnp transistor current carriers are free electrons.
iii) The function of transistor is to do rectification.

4. a) Explain the operation of n-channel JFET. 10
- b) With a neat diagram explain Enhancement type MOSFET. 6
- c) Write true or false in the following statement: 4
- (i) MOSFET is a voltage controlled device.
- (ii) MOSFET is a unipolar two terminal device.
- (iii) The arrow on the symbol of MOSFET indicates the direction of electrons.
- (iv) For p channel FET the direction of current flow is source to drain.
5. a) What is power amplifier? Explain A, B and C power amplifier. 7
- b) Show that maximum collector efficiency of a class A transformer coupled power amplifier is 50%. 7
- c) Explain push pull amplifier. 6
6. a) Draw and explain the block diagram of a voltage regulator. 8
- b) Explain the block diagram of basic three terminal IC regulator. 8
- c) Define Line regulation and Ripple rejection. 4
7. Write short notes on (any four): 5X4=20
- i) Zener Breakdown
- ii) Full Wave Rectifier
- iii) Field Effect Transistor.
- iv) Harmonic Distortion
- v) Power amplifier
- vi) Collector to base bias using transistor
