

Reg. No. :

2	1	1	7	2	4	0	0	4	0	0	6	9
---	---	---	---	---	---	---	---	---	---	---	---	---

Question Paper Code :427231

B.E./B.Tech. DEGREE EXAMINATIONS April/May 2025

Second Semester

Electronics and Communication Engineering

EC23231 — ELECTRONIC DEVICES AND CIRCUITS

(Common to Electronics Engineering (VLSI Design and Technology))

(Regulations 2023)

Time : Three Hours

Maximum : 100 Marks

Answer ALL Questions

PART A — (10x2=20 Marks)

1. Define the depletion region of a PN junction diode.
2. Give the significance of the Zener breakdown in voltage regulation.
3. Design BJT fixed bias circuit with $V_{cc} = 12V$, $R_B = 240 K\Omega$, $R_C = 2.2 K\Omega$ and $\beta = 75$. Determine the values of operating point.
4. Mention the importance of biasing in transistor amplifiers.
5. Explain the advantages of a cascode amplifier.
6. Define Common-Mode Rejection Ratio (CMRR) in differential amplifiers.
7. State Barkhausen's criterion for oscillation.
8. Write the function of negative feedback in amplifiers.
9. Differentiate Class A and Class B power amplifiers.
10. Give the applications of using DC-DC converters in electronic circuits.

PART B — (5x13= 65 Marks)

11. (a) Explain the V-I characteristics and operation of a PN junction diode. Derive the diode current equation.

Or

- (b) Discuss the working of a half-wave rectifier. Derive expressions for ripple factor and efficiency.

12. (a) Analyze the small signal model of a common-emitter amplifier and derive expressions for voltage gain, input resistance, and output resistance.

Or

- (b) Explain MOSFET biasing techniques and derive the expressions for drain current and transconductance.

13. (a) Discuss the common mode and differential mode operation of a differential amplifier and derive the expression for differential mode gain.

Or

- (b) With a neat circuit diagram, explain the working of a cascode amplifier and analyze its voltage gain.

14. (a) Derive the expression for gain in a current series feedback amplifier. Discuss its advantages and disadvantages.

Or

- (b) Explain the working of a Wein bridge oscillator and derive the frequency of oscillation.

15. (a) Compare Class A, Class B, and Class AB power amplifiers. Derive the efficiency of a Class A, Class B amplifier and Class AB amplifier.

Or

- (b) Explain the working of a buck-boost converter. Derive its output voltage equation.

PART C — (1x15=15 Marks)

16. (a) Design a regulated power supply using a Zener diode. Explain its working and derive the necessary expressions.

Or

- (b) Discuss the working operation and characteristics of UJT with neat diagram.
-