



B.E DEGREE EXAMINATIONS: DEC 2022

(Regulation 2018)

Third Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U18ECI3202: Electron Devices and circuits

COURSE OUTCOMES

- CO1:** Analyze the characteristics of semiconductor devices.
CO2: Design and analyze amplifier circuits
CO3: Explore and verify the frequency response characteristics of amplifier
CO4: Apply and verify the concepts of Power amplifiers and tuned amplifiers
CO5: Apply the concepts of devices to design DC power supplies

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1.

List I	List II
A Both EB and CB Junction in a transistor, if forward biased	i Zener breakdown region
B. Sudden rise in current and voltage is maintained constant.	ii. Space charge region
C. Decrease in current as the voltage is increased in esaki diode	iii. Saturation region
D. Accumulation of immobile ions in a PN diode	iv. Negative resistance region

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	ii	i
c)	ii	iv	iii	i
d)	iii	i	iv	ii

CO1 [K₂]

2. Junction field effect transistor is at advantage compared to BJT due to

CO1 [K₂]

- 1 High input impedance
2. More noisy
3. JFET is unipolar

4. Larger in size

- a) 1,2
- b) 2,3
- c) 1,3
- d) 1,4

3. If a sinusoidal voltage is applied to the base of a biased NPN transistor and the resulting sinusoidal collector voltage is clipped near zero volts, the transistor is ----- CO2 [K₂]

- a) Being driven into saturation
- b) Answers a) & c)
- c) Operating linearly
- d) Being driven into cutoff

4. In a common source amplifier, the output voltage is----- CO2 [K₂]

- a) 180° degrees out of phase with the input
- b) In phase with the input
- c) Taken at the drain
- d) Answers a) & c)

5. Assertion (A): In frequency response of an amplifier, the gain remains constant between critical frequencies. CO3 [K₂]

Reason (R): Each RC circuit causes the gain to drop at a rate of 20dB /decade

- a) Both A and R are Individually true and R is the correct explanation of A
- b) Both A and R are Individually true but R is not the correct explanation of A
- c) A is true but R is false
- d) A is false but R is true

6. The capacitance present in the feedback path of transistor amplifier is millerised and is greatly magnified when looking from the input as given by----- CO3 [K₂]

- a) $C_M = C(A_v + 1)$
- b) $C_M = C(A_v - 1)$
- c) $C_M = C(1/A_v)$
- d) $C_M = C(1/A_v - 1)$

7. Which type of power amplifier is biased for operation at less than 180° of the cycle? CO4 [K₂]

- a) Class A
- b) Class b
- c) Class C
- d) Class D

8. The maximum theoretical efficiency of Class A transformer coupled amplifier is----- CO4 [K₂]

- a) 25 %
- b) 50%
- c) 75%
- d) 90%

9. The ripple factor of full wave rectifier is----- CO5 [K₂]

- a) 1.21
- b) 0.812
- c) 1..1
- d) 0.483

10. Pick the basic components in series type linear regulator in a sequence for its operation CO5 [K₂]

- 1. Reference voltage

2. Sampled voltage
3. Error detector
4. Control element
5. Unregulated input voltage

- | | |
|--------------|--------------|
| a) 5-2-1-3-4 | b) 5-1-2-3-4 |
| c) 5-2-1-4-3 | d) 4-2-1-3-5 |

**Answer any TEN Questions:-
PART B (10 x 4 = 40 Marks)
(Answer not more than 80 words)**

- | | | |
|---|-----|-------------------|
| 11. Demonstrate how the transition region width across a PN junction vary with the applied bias voltage? | CO1 | [K ₂] |
| 12. Distinguish between Zener Breakdown and Avalanche Breakdown. | CO1 | [K ₂] |
| 13. Discuss the operation of emitter coupled differential amplifier. | CO2 | [K ₂] |
| 14. Enumerate self-bias arrangement of JFET. | CO2 | [K ₃] |
| 15. Give the equation for overall lower and upper cutoff frequency of multistage amplifier | CO3 | [K ₂] |
| 16. Draw the hybrid π equivalent circuit of BJT and write its significance. | CO3 | [K ₂] |
| 17. What is cross over distortion and how is it eliminated? | CO4 | [K ₂] |
| 18. Determine the conversion efficiency of Class A series fed power amplifier and comment on it. | CO4 | [K ₂] |
| 19. Compare series and shunt voltage regulators. | CO5 | [K ₂] |
| 20. Sketch the block diagram of switched mode power supply and outline its significance. | CO5 | [K ₂] |
| 21. Sketch the shape of drain characteristics of JFET for $V_{GS}=0V$ with the indication of operating region clearly | CO1 | [K ₂] |
| 22. Define holding current, switching current in SCR and draw the two-transistor equivalent circuit of SCR | CO1 | [K ₂] |

**Answer any FIVE Questions:-
PART C (5 x 10 = 50 Marks)
(Answer not more than 250 words)**

- | | | | |
|--|----|-----|-------------------|
| 23. a) Sketch the tunnel diode characteristics and discuss its significance | 4 | CO1 | [K ₂] |
| b) Interpret the output characteristics of a CE Transistor configuration | 6 | CO1 | [K ₂] |
| 24. Analyze CE amplifier using hybrid model and derive the current gain, input impedance, voltage gain and output admittance of CE transistor amplifier using hybrid model | 10 | CO2 | [K ₃] |

25. a) Explain the circuit of Common source JFET amplifier with neat diagram. 3 CO3 [K₂]
b) Discuss the low frequency response of an amplifier and derive its cut off frequency. 7 CO3 [K₃]
26. Explain the working principle of Class B push pull power amplifier and derive the conversion efficiency of class B power amplifier. 10 CO4 [K₂]
27. Explain the working of Bridge rectifier. Give the expressions for RMS current, PIV, ripple factor and efficiency. 10 CO5 [K₂]
28. Elaborate the construction and explain the operation of depletion mode MOSFET. Also draw the characteristics. 10 CO1 [K₂]
