



B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Third Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U18EEI3203: Analog Electronics and Linear Integrated Circuits

COURSE OUTCOMES

- CO1:** Understand the characteristics and applications of various semiconductor devices.
- CO2:** Gain knowledge about small signal analysis of BJT and FET amplifiers.
- CO3:** Analyze large signal amplifier and oscillator circuits.
- CO4:** Design and analyze the linear applications of Op-amp and Familiarize with the concept of IC based voltage regulator and signal conversion circuits.
- CO5:** Apply the knowledge of semiconductor devices to design analog circuits for various applications using simulation software tools and hardware.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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|---|-----|------|
| 1. Draw the PN junction diode VI characteristics | CO1 | [K1] |
| 2. Draw the Circuit symbol of Enhancement Type p-channel and n-channel MOSFET. | CO1 | [K1] |
| 3. The transistor has $I_E = 10 \text{ mA}$ and $\alpha = 0.98$. Find the value of base and collector currents. | CO2 | [K2] |
| 4. what is meant by Pinch-off voltage? | CO2 | [K2] |
| 5. Negative feedback is preferred to other methods in modifying Amplifier characteristics. Why? | CO3 | [K2] |
| 6. What is the expression for frequency of oscillation in Weinbridge oscillator? | CO3 | [K2] |
| 7. Draw the voltage follower circuit using OP-AMP. | CO4 | [K3] |
| 8. What is the maximum frequency for a sine wave output voltage of 10 V peak with Op-amp whose slew rate is $1 \text{ V}/\mu\text{s}$? | CO4 | [K3] |
| 9. Define sink current and source current. | CO5 | [K3] |
| 10. Draw the pin diagram of IC 723 regulator. | CO5 | [K3] |

Answer any FIVE Questions: -

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

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|--|---|-----|------|
| 11. a) Illustrate the construction, operation, and characteristics of PN junction diode. | 8 | CO1 | [K1] |
|--|---|-----|------|

	b)	Design an Enhancement MOSFET for any switching application, with its necessary characteristics curve.	8	CO1	[K1]
12.	a)	Explain the selection of Q point for a transistor bias circuit and discuss the limitations on the output voltage swing.	8	COL	[K2]
	b)	Design a RC coupled amplifier and mention its applications.	8	COL	[K2]
13.	a)	Draw the block diagram of voltage series, voltage shunt, current series, current shunt feedback amplifier topologies and compare them based on gain, input & output resistance. Give one example for each.	8	COL	[K2]
	b)	With a neat diagram explain about RC phase shift oscillator using BJT and derive the expression for frequency of oscillation and condition of oscillation.	8	COL	[K2]
14.	a)	Describe the characteristics of an ideal op-amp in detail.	8	COL	[K3]
	b)	Construct an op-amp based instrumentation amplifier for industrial applications.	8	COL	[K3]
15.	a)	Design a monostable multivibrator with pulse duration of 1ms using 555 timer IC.	8	COL	[K3]
	b)	Design an adjustable voltage regulator (5V to 15V) with a short circuit current of limit 50mA using 723 regulator.	8	COL	[K3]
16.		How will you design an inverting amplifier circuit for a gain of 10. Also include necessary compensation circuitry for minimizing, input bias current, offset current and offset voltage.	16	COL	[K3]
