

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Third Semester

Electrical and Electronics Engineering
20EEPC301 - ANALOG ELECTRONICS

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

- | | Marks | K-
Level | CO |
|--|-------|-------------|-----|
| 1. Which FET amplifier configuration has a voltage gain greater than 1, a 180° phase shift, and high input impedance?
(a) Common Gate (CG) (b) Common Drain (CD)
(c) Common Source (CS) (d) Differential Amplifier | 1 | K2 | CO1 |
| 2. In a differential amplifier, a high Common Mode Rejection Ratio (CMRR) is desirable because it indicates:
(a) High gain for the common-mode signals.
(b) The ability to reject noise that is common to both inputs.
(c) A very low difference-mode gain.
(d) The amplifier is operating in class A. | 1 | K2 | CO1 |
| 3. Which class of power amplifier has the highest theoretical efficiency but suffers from severe distortion?
(a) Class A (b) Class B (c) Class AB (d) Class C | 1 | K1 | CO2 |
| 4. The Barkhausen criterion for sustained oscillations requires:
(a) $ A\beta = 1$ and $\angle A\beta = 180^\circ$ (b) $ A\beta > 1$ and $\angle A\beta = 0^\circ$
(c) $ A\beta = 1$ and $\angle A\beta = 0^\circ$ (d) $ A\beta < 1$ and $\angle A\beta = 90^\circ$ | 1 | K1 | CO2 |
| 5. Which of the following is a DC characteristic of an operational amplifier?
(a) Slew Rate (b) Input Offset Voltage
(c) Gain Bandwidth Product (d) frequency response. | 1 | K1 | CO3 |
| 6. An ideal op-amp used in an inverting amplifier configuration has:
(a) Infinite input impedance and zero output impedance.
(b) Zero input impedance and infinite output impedance.
(c) Infinite input impedance and infinite output impedance.
(d) Zero input impedance and zero output impedance. | 1 | K2 | CO3 |
| 7. Which type of A/D converter is known for its highest conversion speed?
(a) Successive Approximation Type (b) Dual Slope Integrator Type
(c) Flash Type (d) Sigma-Delta Type | 1 | K1 | CO4 |
| 8. An Instrumentation Amplifier is primarily used for:
(a) Generating high-frequency oscillations.
(b) Amplifying signals in the output stage of a power amplifier.
(c) Amplifying small differential signals in the presence of a large common-mode noise.
(d) Converting digital signals to analog. | 1 | K1 | CO4 |
| 9. The ICL8038 is a popular IC used as a:
(a) Voltage Regulator (b) Waveform Generator
(c) Power Amplifier (d) Digital to Analog Converter | 1 | K1 | CO5 |
| 10. In a three-terminal fixed voltage regulator IC LM7805, the "05" signifies:
(a) A 5V input voltage (b) A 5V output voltage
(c) A 5mA output current (d) A 5W power rating | 1 | K2 | CO5 |

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

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|--|---|----|-----|
| 11. List the three basic FET amplifier configurations and state one key characteristic of each. | 2 | K1 | CO1 |
| 12. Differentiate between common mode and difference mode signals in a differential amplifier. | 2 | K2 | CO1 |
| 13. What is IGBT and draw the symbol of IGBT? | 2 | K1 | CO1 |
| 14. Why is a crystal oscillator more stable than an RC phase shift oscillator? | 2 | K2 | CO2 |
| 15. What is cross-over distortion in a Class B amplifier and how is it minimized? | 2 | K2 | CO2 |
| 16. State two advantages of using negative feedback in amplifiers. | 2 | K1 | CO2 |
| 17. Define Slew Rate and list its unit of measurement. | 2 | K1 | CO3 |
| 18. Draw the circuit of a practical op-amp integrator. | 2 | K1 | CO3 |
| 19. State the application of a Sample and Hold (S/H) circuit. | 2 | K1 | CO4 |
| 20. What is the main advantage of an R-2R ladder DAC over a weighted resistor DAC? | 2 | K1 | CO4 |
| 21. List the three main operating modes of the 555 Timer IC. | 2 | K1 | CO5 |
| 22. What is the primary difference between a linear voltage regulator and a switching regulator? | 2 | K1 | CO5 |

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

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|--|----|----|-----|
| 23. a) Explain the construction and working principle of IGBT. List the advantages and disadvantages of IGBT. | 11 | K2 | CO1 |
| OR | | | |
| b) Describe the operation of a BJT differential amplifier and discuss its different configurations to derive for the CMRR. | 11 | K2 | CO1 |
| 24. a) Compare Class A, Class B and Class AB power amplifiers based on their biasing, efficiency, and output waveform. | 11 | K2 | CO2 |
| OR | | | |
| b) With a circuit diagram, explain the working of a Wien Bridge oscillator. Derive the condition for its frequency of oscillation. | 11 | K2 | CO2 |
| 25. a) Discuss the AC characteristics of an operational amplifier. | 11 | K2 | CO3 |
| OR | | | |
| b) Describe the operation of summing amplifier in inverting and non inverting mode using OPAMP and derive the output voltage. | 11 | K2 | CO3 |
| 26. a) With a block diagram, explain the working of an Instrumentation Amplifier. Derive the expression for its output voltage and state its advantages. | 11 | K2 | CO4 |
| OR | | | |
| b) Explain the operation of a Successive Approximation type Analog to Digital Converter (ADC) with a neat block diagram. | 11 | K2 | CO4 |
| 27. a) Describe its operation as an astable multivibrator, deriving the expressions for the frequency of oscillation. | 11 | K2 | CO5 |
| OR | | | |
| b) Compare fixed and variable voltage regulators. Describe how an LM78XX series IC is used to build a basic linear power supply. | 11 | K2 | CO5 |
| 28. a) Discuss in detail the principle operation of RC phase shift oscillator and derive the expression for frequency of oscillation. | 11 | K2 | CO2 |
| OR | | | |
| b) Outline the basic concepts and its operation of IC 723 regulator. | 11 | K2 | CO2 |