

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S3 (S,FE) (FT/WP) (S1 PT) Examination May 2025 (2019 Scheme)

Course Code: EET205**Course Name: ANALOG ELECTRONICS**

Max. Marks: 100

Duration: 3 Hours

PART A*Answer all questions. Each question carries 3 marks*

Marks

- | | | |
|----|---|-----|
| 1 | List down the factors affecting the stability of operating point of a transistor. | (3) |
| 2 | Describe the role of emitter resistance in bias stabilisation. | (3) |
| 3 | Illustrate how the different internal capacitances of BJT are incorporated in its high frequency hybrid pi model. | (3) |
| 4 | Define transconductance of JFET and derive its mathematical expression. | (3) |
| 5 | State and explain Barkhausen criterion for feedback oscillators. | (3) |
| 6 | Explain the terms (i) conversion efficiency and (ii) Harmonic distortion with respect to power amplifiers. | (3) |
| 7 | Draw the basic block diagram of a general opamp and briefly explain the function of each block. | (3) |
| 8 | Realise a difference amplifier/ subtractor circuit using opamp and deduce the expression for output voltage. | (3) |
| 9 | Give the detailed pin description of comparator IC LM311 and mention its salient features. | (3) |
| 10 | Explain the effect of slew rate on waveform generation. | (3) |

PART B*Answer any one full question from each module. Each question carries 14 marks***Module 1**

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|-------|--|-----|
| 11(a) | Derive an expression for stability factor for voltage divider bias of a BJT | (7) |
| 11(b) | Calculate (i) input impedance Z_{in} and (ii) voltage gain A_v of the CE BJT amplifier shown in Figure (1). Given the h parameters of the transistor :
$h_{ie} = 1500\Omega$, $h_{re} = 4 \times 10^{-4}$, $h_{fe} = 100$, $h_{oe} = 4 \times 10^{-4} S$. | (7) |

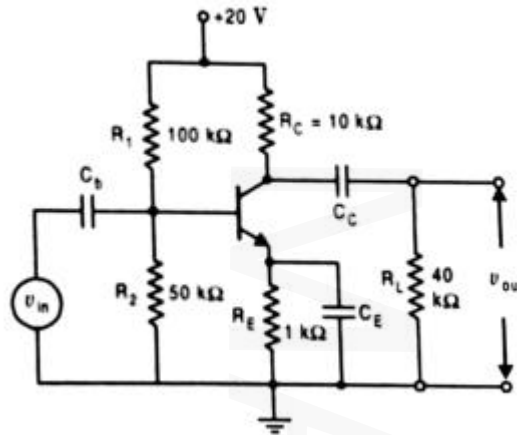


Figure (1)

- 12(a) Briefly explain Bias compensation using (i) diode and (ii) thermistors (7)
- 12(b) Derive the expressions for current gain, voltage gain, input impedance and output impedance in terms of h- parameters of BJT (7)

Module 2

- 13(a) Explain the working of ENMOSFET with the help of its characteristic curves. (7)
- 13(b) Analyse the low frequency response of CE amplifier . (7)
- 14(a) Sketch the frequency response of CE amplifier and explain why gain falls at very high frequencies & very low frequencies. (7)
- 14(b) For the circuit shown in Figure (2), FET has $I_{DSS} = 4 \text{ mA}$ and $V_p = -4\text{V}$. Calculate I_D , V_{GS} and V_{DS} . (7)

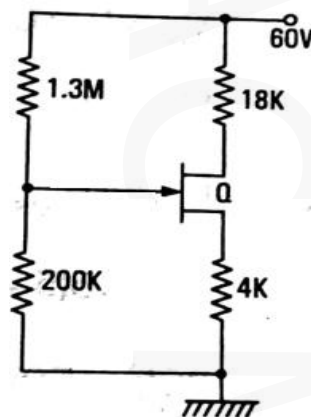


Figure (2)

Module 3

- 15(a) Explain the working of two-stage transformer coupled amplifier with circuit diagram. (7)

- 15(b) Draw the circuit diagram of Colpitt's Oscillator and explain its principle of operation. (7)
- 16(a) Compare the merits and demerits of different types of inter stage coupling in amplifiers (7)
- 16(b) Describe class A operation of power amplifiers and derive the expression for conversion efficiency of transformer coupled class A power amplifier. (7)

Module 4

- 17(a) Explain the different modes of operation of a fundamental differential amplifier. (7)
- 17(b) Define (i) CMRR and (ii) Slew rate. (7)
Give the typical values of above parameters for 741 IC
- 18(a) Mention the salient features of an instrumentation amplifier. Derive the expression for its output voltage. (7)
- 18(b) Find the output voltage of the following op-amp circuit shown in Figure (3) (7)

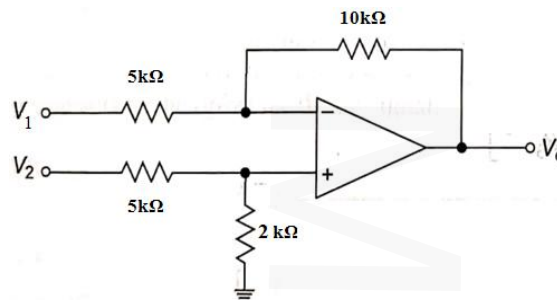


Figure (3)

Module 5

- 19(a) Explain the operation of op-amp integrator circuit. What practical modifications are to be incorporated into the basic integrator and why? (7)
- 19(b) Describe the operation of Schmitt trigger circuit. (7)
- 20 With the help of internal circuit diagram of IC555 explain the operation of astable multivibrator. Derive the expression for frequency of oscillation. (14)
