Register No.: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

THIRD SEMESTER B.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022
ROBOTICS AND AUTOMATION
(2020 SCHEME)

Course Code: **20RBT203**

Course Name: **Electronic Devices and Circuits**

Max. Marks: **100** **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. With neat circuit diagram, explain the working of a two-level clipper.
2. Explain the h-parameter model of a BJT in CE configuration.
3. Differentiate between a BJT and FET.
4. Why FET is called a voltage-controlled device?
5. Explain the concept of negative feedback in amplifiers. List out the advantages of negative feedback in amplifiers.
6. What is Barkhausen's criterion?
7. Compare various properties of an ideal and practical Op-Amp.
8. Define the term CMRR. State its importance.
9. Explain the working of zero crossing detector using Op-Amp with the help of neat diagrams.
10. With neat illustration explain the working of an integrator using Op-Amp.

PART B

(Answer one full question from each module, each question carries 14marks)

MODULE I

11. a) Derive the equation for voltage gain, input impedance, current gain and output admittance for a BJT using h-parameter model for Common Emitter configuration. (8)

    b) Design a clamping circuit to clamp a 20Vpp sine wave, so that its positive peak is clamped at +2V. Assume that the diode is ideal. (6)

OR

12. a) Explain the working of a voltage divider biasing circuit. Why is it considered better than other biasing circuits? (6)

b) Draw the circuit of a collector to base biasing circuit having the values β=80, R_B=100kΩ and R_C=10kΩ and V_{CC}=15V and determine the following. i) I_C ii) V_{CE}. (8)

MODULE II

13. a) Draw the circuit diagram of a RC coupled amplifier. Explain the frequency response curve of RC coupled amplifier. Why does the gain fall off at low and high frequencies? (8)

b) State and Prove Millers' theorem. (6)

OR

14. a) With the help of necessary illustrations, explain the construction and working of an N-Channel JFET. (10)

b) Draw the equivalent circuit of a Common Source JFET amplifier and derive the expressions for (i) input impedance (ii) Output impedance. (4)

MODULE III

15. a) Show that negative feedback improves gain stability. (4)

b) Draw the circuit diagram of RC coupled and Transformer coupled multistage amplifiers. Compare their advantages and disadvantages. (10)

OR

16. a) Prove that the efficiency of Class A power amplifier is lower than that of Class B power amplifier. (10)

b) List out and explain the various feedback topologies with necessary illustration. (4)

MODULE IV

17. a) Draw the circuit diagram of Colpitt's Oscillator and explain its working. (6)

b) Derive the expression for frequency of oscillation of a Wien bridge oscillator using BJT. (8)

OR

18. a) Design a circuit to obtain the output Vo=-[V_1+2V_2+5V_3], where V_1, V_2 and V_3 are inputs to Op-Amp. Assume R_f = 50 KΩ (6)

b) Design an inverting and a non-inverting amplifier with gains -100 and 101 respectively. Draw circuit diagrams for each and explain their working. (8)

MODULE V

19. a) With neat illustration explain the working of an instrumentation amplifier and derive its expression for gain. (10)

b) Explain the effect of slew rate on wave form generation with the help of an illustration. (4)

OR

20. a) With the help of internal functional diagram, explain the working of an astable multivibrator using 555 timer. (10)

b) With a neat block diagram explain the working of IC 565. (4)

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