

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

**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**FOURTH SEMESTER B.TECH DEGREE EXAMINATION (S), AUGUST 2023****ELECTRONICS AND COMMUNICATION ENGINEERING****(2020 SCHEME)****Course Code: 20ECT202****Course Name: Analog Circuits****Max. Marks: 100****Duration: 3 Hours****PART A*****(Answer all questions. Each question carries 3 marks)***

1. With the help of neat circuit diagram and waveforms, differentiate between High pass and Low pass RC filter.
2. Explain the working of a two level clipping circuit with the help of circuit diagram and waveforms.
3. Give the circuit diagram of an RC coupled CE amplifier and label the components.
4. Explain Miller Effect. Give its applications.
5. Three Stages of RC coupled BJT amplifiers are cascaded. Mid-band gain of the individual stages is 80. Lower and upper cut-off frequencies are 100 Hz and 300 MHz respectively for the individual stages. Find the resultant gain and cut-off frequencies of the cascaded amplifier.
6. Give the Circuit diagram of a Cascode amplifier and comment on its advantages over other configurations.
7. What are feedback amplifiers? Explain the concept of positive feedback.
8. State Barkhausen Criteria. Explain how it is achieved in Wien Bridge oscillators.
9. Explain about various distortions that could be present in power amplifiers.
10. List out and explain the classification of Power amplifiers.

**PART B*****(Answer one full question from each module, each question carries 14marks)*****MODULE I**

11. a) Design a clamping circuit to clamp a  $20V_{pp}$  sin wave so that its positive peak is clamped at +2V. Assume ideal diode. Draw and explain the output waveform. (6)
- b) With the help of neat circuit diagrams, explain the working of RC integrating and differentiating circuits. Show how the (8)

input and output voltages are related in each circuit with the help of equations.

**OR**

12. a) Explain the concept of operating point with the help of DC load line. Why voltage divider biasing is considered superior to other biasing circuits? (6)
- b) Draw the circuit of a collector to base bias transistor amplifier having the values  $\beta=80$ ,  $R_B=100K\Omega$  and  $R_C=10K\Omega$  and  $V_{CC}=15V$  and determine the following. i)  $I_C$  ii)  $V_{CE}$ . (8)

**MODULE II**

13. a) Explain the frequency response curve of RC coupled amplifier. Explain the reason behind the gain fall-off at low and high frequencies? (6)
- b) Explain high frequency analysis of BJT CE amplifier. (8)

**OR**

14. With the help of neat diagram, explain the hybrid-pi model of BJT. Explain the importance of each component shown in the model. Also give the equations for gain and impedances at low and mid frequencies. (14)

**MODULE III**

15. a) What are multi stage amplifiers? Give the expression for total gain of multistage amplifiers. List out the properties that the coupling element must possess. (5)
- b) Draw the circuit diagram of RC coupled and Transformer coupled multistage amplifiers. Compare their advantages and disadvantages. (9)

**OR**

16. a) With the help of small signal equivalent circuit, give the analysis of MOSFET CS amplifier. Derive the equations for gain and various impedances. (6)
- b) Compare the working of MOSFET CS circuits with Current source and Diode connected loads with diagram. (8)

**MODULE IV**

17. a) With the help of necessary equations, explain the effect of negative feedback on gain and frequency response of amplifiers. (6)
- b) List out the basic feedback topologies with its block diagram. Compare the features of each topology. (8)

**OR**

18. a) Explain the working principle of Hartley oscillator with the help of a neat diagram. Give the equation for its frequency of oscillation. (8)
- b) Draw the circuits of crystal oscillator as series and parallel circuits. Give the advantages of crystal oscillator over other types of oscillators. (6)

**MODULE V**

19. a) With necessary mathematical derivation, prove that the efficiency of Class A power amplifier is lesser than that of Class B amplifier. (8)
- b) What is meant by fold back protection? Explain how it is attained in series voltage regulator circuit. (6)

**OR**

20. a) With the help of neat diagram and waveforms, explain the working of a Class-B Push-Pull amplifier. (6)
- b) Give the circuit diagram of series voltage regulator with short-circuit protection. Explain how short-circuit protection is achieved. (8)

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