Register No.: …… Name: ……

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

THIRD SEMESTER B.TECH DEGREE EXAMINATION (Regular), FEBRUARY 2022
ELECTRICAL AND ELECTRONICS ENGINEERING
(2020 SCHEME)

Course Code: **20EET205**

Course Name: **Analog Electronics**

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

PART A

(Answer all questions. Each question carries 3 marks)

1. Write short note on bias compensation using diode and thermistors.
2. Explain the role of emitter bypass capacitor in CE amplifier
3. Draw the drain characteristics of JFET and mark the pinch-off voltage
4. Compare FET and BJT
5. Write short note on crystal oscillators.
6. List the advantages of negative feedback
7. What are the characteristics of ideal op-amp?
8. Explain virtual short in an op-amp circuit
9. What is the effect of slew rate of op-amp on waveform generation
10. Explain the working of zero crossing detector.

PART B

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

MODULE I

11. a) Derive the equation for input impedance, voltage gain and current gain for a BJT using approximate h-parameter model for Common Emitter configuration. (8)
    b) A CE amplifier has the h-parameters given by h_{ie} = 1000Ω, h_{re} = 2 x 10^{-4}, h_{fe}=50, h_{oe} = 25 μυ. If both the load and source resistances are 1kΩ, determine the (a)Input impedance, (b) current gain and (c) voltage gain (6)

OR

12. a) Draw a voltage divider bias circuit and derive the equations of voltage and current at input and output terminals (8)
    b) Illustrate with neat circuit diagram how the change in base emitter voltage is compensated in transistor amplifiers (6)

MODULE II

13. a) Draw the frequency response characteristics of RC coupled amplifier and explain why gain falls at very high frequencies & very low frequencies (7)
    b) Draw the Hybrid-π model of BJT and explain significance of each parameters. (7)

OR

14. a) Explain construction and operation of enhancement type metal oxide semiconductor FET with neat diagram (8)
    b) Draw and explain the working of JFET common drain amplifier (6)

MODULE III

15. a) Show that the maximum conversion efficiency of class A power amplifier can be increased using transformer coupling. (10)
    b) Design a RC phase shift oscillator having an oscillating frequency of 200Hz. (4)

OR

16. a) What is the role of coupling elements in multistage amplifiers? Compare different types of couplings used in multistage amplifier (6)
    b) An amplifier having an input resistance 4kΩ has a voltage gain of 200. If a series negative feedback with β=0.01 is introduced, determine the value of input resistance of the feedback amplifier. If the amplifier in its open loop configuration had cut off frequencies f_1= 2kHz and f_2= 500kHz before the feedback path was added, what is the new bandwidth and gain of the circuit? (8)

MODULE IV

17. a) Explain the concepts of virtual shorting op-amp. (6)
    b) Design an adder circuit using op-amp to get the output voltage as Vo = - [$3V_1$+$5V_2$+$10V_3$], where V_1, V_2 and V_3 are inputs. Given R_f = 10 kΩ (8)

OR

18. a) With neat circuit diagram, explain the operation of an Instrumentation amplifier and derive an expression for its voltage gain. What are its advantages? (9)
    b) Draw non-inverting amplifier circuits of an OP-AMP in closed loop configuration. Obtain the expressions for gain in the circuits. (5)

MODULE V

19. a) With the help of internal functional diagram, explain the working of astable multivibrator using 555 timer. (10)
    b) Design a Schmitt trigger circuit with LTP= -5V and UTP= +5V. (4)

OR

20. a) Explain the operation of Op-Amp integrator and differentiator circuits. (8)
    b) Explain the working of a square wave generator circuit using op-amp with necessary diagrams and waveforms. (6)

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