Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree (S,FE) Examination December 2022 (2015 scheme)

Course Code: EE203

Course Name: ANALOG ELECTRONICS CIRCUITS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1 Design a clipper circuit to clip a $20V_{pp}$ sine wave so that its positive half is clipped at +5.7V and negative half is clipped at -4.7V. Assume diode drop is 0.7V. Draw and explain the output waveform and transfer characteristics. (5)

2 Explain the drain and transfer characteristics of n-channel JFET. (5)

3 Explain positive and negative feedback. Explain why negative feedback is used in amplifiers? (5)

4 State Barkhausen criterion and explain generation of sustained oscillation in sinusoidal oscillators. (5)

5 Draw the circuit of zero crossing detector and explain why hysteresis to be introduced in the circuit. (5)

6 Derive the expression for voltage gain for a non-inverting amplifier. (5)

7 Explain the working of a crystal oscillator using an op-amp. Mention any two limitations of crystal oscillator. (5)

8 Explain the working of a square wave generator using op-amp. (5)

PART B

Answer any two full questions, each carries10 marks.

9 a) Design a voltage divider biasing circuit for an NPN transistor operating in common emitter configuration to have $V_{CE} = V_E = 4$ V, $I_C = 4$mA and $V_{CC} = 12$V. Assume transistor h_{FE} as 100 and V_{BE} =0.7V. (5)

b) Explain the operation of n-channel enhancement type MOSFET, and explain its drain and transfer characteristics. (5)

10 a) A common emitter amplifier has the following h-parameters given by $h_{ie} = 1500\Omega$, $h_{re} = 1.5 \times 10^{-4}$, $h_{fe} = 100$, $h_{oe} = 50\ \mu\mho$. If both the load and source resistances are 1.5 kΩ, determine the current gain and voltage gain. (5)

b) Explain the high frequency hybrid pi model of a common emitter configuration transistor. (5)

11 a) Explain the bias compensation method using diode. (5)

b) Derive the expression for output impedance and voltage gain for a common source FET amplifier. (5)

PART C

Answer any two full questions, each carries 10 marks.

12 a) Explain the working of Class B Power amplifier and derive its maximum power conversion efficiency. (5)

b) Derive the expression for frequency of a RC phase shift oscillator using transistor. (5)

13 a) What is cross over distortion in power amplifier and how this is eliminated. (5)

b) Define Slew rate and CMRR of an Op-amp and its typical values for IC 741. (5)

14 a) List out the different types of coupling in multistage amplifier and explain their frequency response characteristics. (5)

b) With a neat diagram explain the working of a Colpitt's oscillator. (5)

PART D

Answer any two full questions, each carries 10 marks.

15 a) Design a Schmitt Trigger whose output has an LTP of -3V and UTP of +3V and explain its working. (5)

b) Design an astable multivibrator using 555 IC to produce an output signal of 1 kHz frequency having 50% duty cycle. (5)

16 a) Explain the working of integrator circuit using op-amp. (5)

b) Design a RC Phase shift Oscillator using op-amp to produce an output signal of 2kHz. (5)

17 a) Explain the working of a mono stable multivibrator using 555 IC with its internal diagram. (5)

b) With a neat diagram explain the working of a half wave precision rectifier. (5)

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