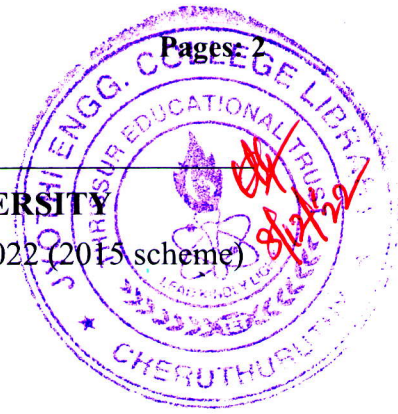


Reg No.: _____

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 carries 10 marks.*

- 9 a) Design a voltage divider biasing circuit for an NPN transistor operating in common emitter configuration to have $V_{CE} = V_E = 4V$, $I_C = 4mA$ and $V_{CC} = 12V$. 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 $h_{ie} = 1500\Omega$, $h_{re} = 1.5 \times 10^{-4}$, $h_{fe} = 100$, $h_{oe} = 50 \mu\Omega$. If both the load and source resistances are $1.5 k\Omega$, 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)
