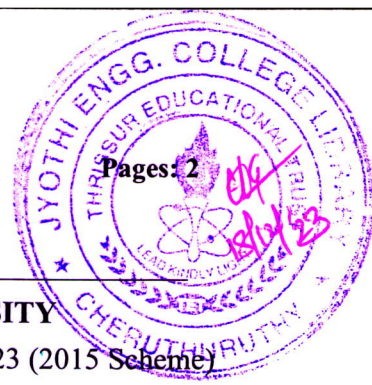Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S3 (S, FE) / S1 (PT) (S, FE) Examination December 2023 (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 clamper circuit to clamp a $10V_{pp}$ sine wave so that its positive peak is clamped at +3V. Assume diode drop is 0.7V. Draw and explain the output waveform and transfer characteristics. (5)

2. Explain the construction and working of n-channel JFET. (5)

3. What are the four topologies of a feedback amplifier? Identify input signal, output signal, feedback signal and transfer gains of each topology. (5)

4. Design a RC phase shift oscillator using transistor for generating a 2 kHz sinusoidal signal. (5)

5. Explain the working of a Half Wave Precision Rectifier specifying the role of op-amp. (5)

6. Derive the expression for voltage gain for an inverting amplifier. (5)

7. Draw the circuit diagram of a triangular wave generator. Sketch the waveforms and explain the circuit operation. (5)

8. Explain the working of a Wein bridge oscillator using op-amp. (5)

PART B
Answer any two full questions, each carries 10 marks.

9. a) Design a collector to base bias circuit to have an operating point of $V_{CE}=6V$ and $I_C=5mA$. The supply voltage is 15V and transistor h_{FE} is 125 (5)

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

10. a) Draw the hybrid equivalent model of common emitter amplifier and derive the expression for current gain and voltage gain. (5)

    b) Draw the small signal equivalent diagram of Common Drain FET amplifier and derive the expression for output impedance and voltage gain. (5)

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

    b) Explain the working of FET as a switch and voltage-controlled resistor.   (5)

PART C

Answer any two full questions, each carries10 marks.

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

    b) Derive the expression for frequency of a Wein Bridge Oscillator using transistor.   (5)

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

    b) With a neat diagram explain the working of a fundamental differential amplifier.   (5)

14 a) Draw the circuit diagram of a transformer coupled amplifier and explain its   (5)
        working.

    b) With a neat diagram explain the working of a Hartley oscillator.   (5)

PART D

Answer any two full questions, each carries 10 marks.

15 a) Draw the circuit diagram of an op-amp inverting Schmitt Trigger circuit. Sketch   (5)
        typical input output waveform and explain circuit operation. Write equation for the
        upper and lower triggering point.

    b) Design a square wave generator using 555 timer to produce an output signal of   (5)
        2kHz frequency having 25% duty cycle.

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

    b) With neat circuit diagram explain the working of RC phase shift oscillator using   (5)
        op-amp. Mention its disadvantages.

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

    b) With a neat diagram explain the working of an instrumentation amplifier. Mention   (5)
        its application.

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