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Course Code

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Third Semester B.E. Degree Examinations, March/April 2023
ANALOG ELECTRONICS CIRCUITS AND OP-AMPS

Duration: 3 hrs

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO: PI)</u>
<u>MODULE – 1</u>			
1.	a. Sketch the output for the parallel positive clipper.	04	(3 :1: 1.3.1)
	b. Derive an expression for I_B , I_C and V_{CE} for voltage divider circuit using exact analysis.	08	(3 :1: 1.3.1)
	c. In a voltage divider circuit of BJT $R_C = 4 \text{ K}\Omega$, $R_E = 1.5 \text{ K}\Omega$, $R_1 = 39 \text{ K}\Omega$, $R_2 = 3.9 \text{ K}\Omega$, $V_{CC} = 18\text{V}$ and $\beta = 70$. Find I_{CQ} and V_{CEQ} .	08	(3 :1: 1.3.1)
(OR)			
2.	a. Draw a double ended diode clipper which limits at two independent levels and explain its operation.	10	(3 :1: 1.3.1)
	b. Derive an expression for the stability factor $S(I_{CO})$ for a voltage Divider bias configuration.	10	(3 :1: 1.3.1)
<u>MODULE – 2</u>			
3.	a. Explain the need of cascading amplifier. Draw and explain the block diagram of three stage cascade amplifier.	4	(2 :2: 1.3.1)
	b. With basic circuit, Derive the expression for the frequency of oscillations of a Wien Bridge oscillator and Harley Oscillator.	08	(3 :2: 1.3.1)
	c. Derive expression for Z_{if} and Z_{of} for voltage series feedback amplifiers and list the advantages of negative feedback.	08	(3 :2: 1.3.1)
(OR)			
4.	a. Explain the operation of cascade connection with the help of neat diagram.	04	(2 :2: 1.3.1)
	b. A crystal has the following parameters $L = 0.3344\text{H}$, $C_M = 1 \text{ pF}$, $C = 0.065 \text{ pF}$ and $R = 5.5 \text{ K}\Omega$. Calculate the series resonant frequency, parallel resonant frequency and Q of the crystal.	06	(3 :2: 1.3.1)
	c. Show how bandwidth of an amplifier increases with negative feedback.	10	(3 :2: 1.3.1)
<u>MODULE – 3</u>			
5.	a. Prove that the maximum efficiency of series fed class A amplifier is 25%.	06	(3 :3: 1.3.1)
	b. A single transistor amplifier with transformer coupled load produces harmonics amplitudes of $B_0 = 1.5 \text{ mA}$, $B_1 = 120 \text{ mA}$, $B_2 = 10 \text{ mA}$, $B_3 = 4\text{mA}$, $B_4 = 2 \text{ mA}$, $B_5 = 1 \text{ mA}$. Determine the percentage THD and Total power.	06	(3 :3: 1.3.1)
	c. Discuss the construction, working and characteristics of an enhancement type JFET.	08	(2 :3: 1.3.1)

(OR)

6. a. Prove that the maximum efficiency of series fed class B amplifier is 78.5%. **06** (3 :3: 1.3.1)
- b. For a Class B amplifier with $V_{cc} = 25$ V driving an 8ohm load, determine input DC power, maximum AC output power and maximum efficiency. **06** (3 :3: 1.3.1)
- c. Discuss the construction, working and characteristics of an enhancement type MOSFET. **08** (2 :3: 1.3.1)

MODULE – 4

7. a. What is ZCD? Explain the design aspect of non inverting ZCD using Op-Amp. **06** (2 :4: 1.3.1)
- b. Explain R-2R ladder digital to analog converter circuit. **08** (2 :4: 1.3.1)
- c. Explain astable multivibrator using IC 555 timer. **06** (2 :4: 1.3.1)

(OR)

8. a. Draw the block diagram of op- amp and explain the ideal characteristics of op-amp. **06** (2 :4: 1.3.1)
- b. Explain monostable multivibrator realized using 555 timer. **06** (2 :4: 1.3.1)
- c. Explain working of ADC using successive Approximation method. **08** (2 :4: 1.3.1)

MODULE – 5

9. a. Explain with neat circuit diagram Triangular/ Rectangular wave generator. **10** (2 :5: 1.3.1)
- b. Explain with neat circuit diagram RC phase shift oscillator using op-amp. **10** (2 :5: 1.3.1)

(OR)

10. a. Explain the following working parameter of voltage regulator with a neat diagram **08** (2 :5: 1.3.1)
- (i) Regulator action
 - (ii) Source effect
 - (iii) Load effect
 - (iv) Ripple rejection
- b. Explain the working and design of voltage follower regulator. **06** (2 :5: 1.3.1)
- c. Explain with a neat circuit diagram Saw tooth wave oscillator. **06** (2 :5: 1.3.1)

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