KUMARAGURU
college of technology
character is life

B.E DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Third Semester

MECHATRONICS ENGINEERING

U18MCI3201**:** Electronic Devices and Circuits

COURSE OUTCOMES

CO1: Use passive elements and basic theorems to solve electric circuits.
CO2: Understand the basic principles of semiconductor devices.
CO3: Use diode to construct regulators, rectifiers, and other applications.
CO4: Analyze small signal amplifiers and oscillators constructed using transistors.
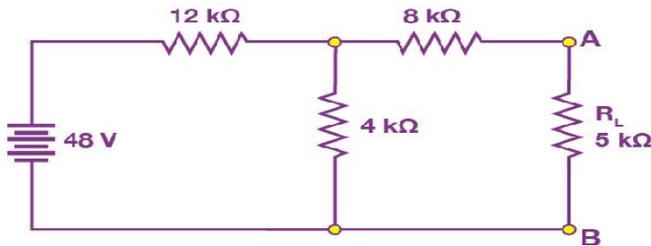**CO5:** Apply op-amp to construct various applications.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
**PART A (10 x 2 = 20 Marks)**
(Answer not more than 40 words)

1. State Maximum Power Transfer Theorem.	CO1	[K$_2$]
2. Find the Thevenin resistance of the given circuit:	CO1	[K$_3$]

3. What is DC and AC resistance of PN junction diode?	CO2	[K$_2$]
4. Draw a BJT with fixed bias for CB configuration.	CO2	[K$_2$]
5. What is the ripple factor for half wave rectifier without filter?	CO3	[K$_2$]
6. Distinguish between series and shunt voltage regulator.	CO3	[K$_2$]
7. Define small signal current gain for CE configuration. Mention the h-parameter associated with this.	CO4	[K$_2$]
8. What is Barkhausen stability criterion?	CO4	[K$_2$]
9. Give an op-amp circuit for adding two voltage sources and the output should be in phase with the input.	CO5	[K$_2$]
10. What is hysteresis?	CO5	[K$_2$]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11. a) Using superposition theorem, find the current through the resistor R_2:   8   CO1   [K₃]
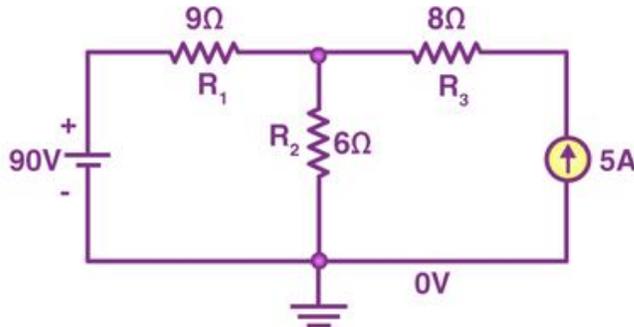
    b) Find the voltages V_a, V_b, V_c in the below circuit using nodal analysis: 8   CO1   [K₃]
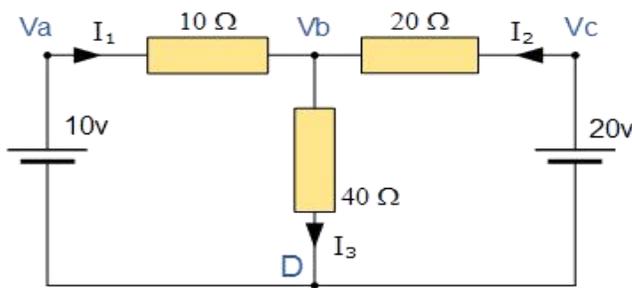
12. a) Explain how zener diode functions as voltage regulator using the V-I   8   CO2   [K₂]
characteristics.

    b) Compare JFET and MOSFET.   8   CO2   [K₃]

13. a) Explain the working of a bridge rectifier with capacitor filter with necessary   8   CO3   [K₂]
diagrams.

    b) Design a two-level shunt diode clipper to pass the signal between the levels +2V   8   CO3   [K₃]
and -2V with an input sinusoidal signal of 6Vpp. Explain the working.

14. a) Obtain the h-parameter model for the small signal CE amplifier and derive the   8   CO4   [K₃]
voltage gain.

    b) Explain the working of Hartley oscillator and give the expression for frequency   8   CO4   [K₂]
of oscillation.

15.	a)	Design an inverting amplifier with a gain of 10 using op-amp.	8	CO5	[K$_3$]
	b)	Explain the working of an RC Phase Shift Oscillator with appropriate diagrams.	8	CO5	[K$_2$]
16.	a)	Compare CB, CE, CC configurations of BJT.	8	CO2	[K$_3$]
	b)	Explain the working of a differential amplifier using BJT.	8	CO3	[K$_2$]

****