Enrolment No:	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End-Sem Examination, May-June. 2021

Course: Basic Electrical and Electronics Engineering **Semester: II**
Program: B.Tech. SoE FSE, Civil, CE-RP, ADE, Mecha, Mech, APE Gas **Time 03 hrs.**
Course Code: ECEG 1004 **Max. Marks: 100**

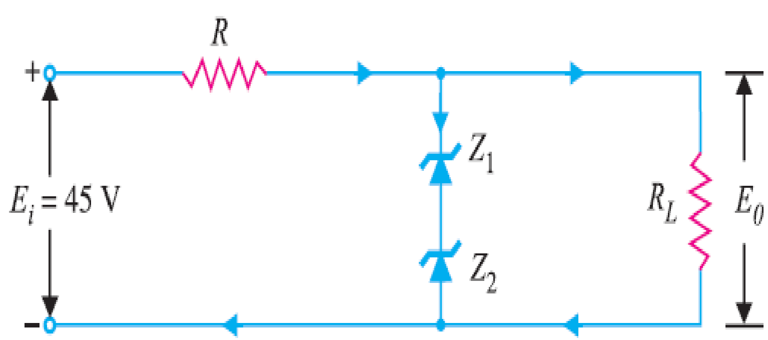
Instructions:

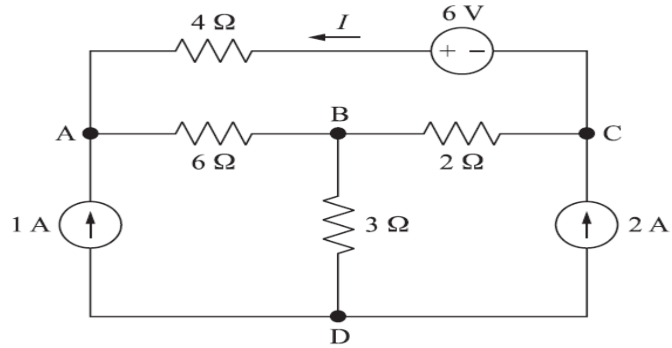
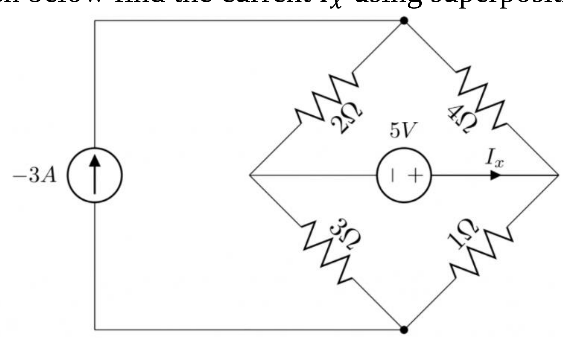
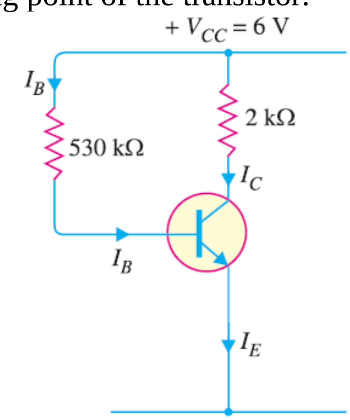
1. **Attempt Section A by typing in your answers in the relevant text box.**
2. **Attempt section B and Section C on A4 size blank sheets. Use graph paper wherever necessary.**
3. **Answer should be neat and clean. Draw a free hand sketch for circuits/tables/schematics wherever required.**

SECTION A [Type the answer] 30 Marks

S. No.		**Marks**	**CO**
Q 1	Explain the concept of charge carriers in an extrinsic semiconductor.	5	CO1
Q 2	Identify at least 2 types of diodes. Also state their applications.	5	CO1
Q 3	Which transistor biasing configuration is used for designing amplifiers? Justify your answer.	5	CO1
Q 4	Why NAND and NOR gates are generally termed as universal gates?	5	CO2
Q 5	Explain the significance of superposition theorem for circuit analysis.	5	CO2
Q 6	Explain the resonance condition in AC electrical circuits.	5	CO2

SECTION B [Scan and upload] 50 Marks

Q 7	A. For a series RL circuit draw the obtain the effective impedance and draw the phasor diagram for the same. B. A 230 V, 50 Hz sinusoidal supply is connected across a (i) resistance of 25 Ω, (ii) inductance of 0.5 H, and (iii) capacitance of 100 μH. Determine the impedance and voltage across each element.	4+6	CO3
Q 8	A. Design a complete circuit schematic for a full-wave bridge rectifier that gives a DC output of 52 V, 100 Hz for an AC input of 230 V, 50 Hz. B. For the voltage regulator shown below assume each Zener diode has a rating of 15V, 200 mA. Determine the regulated output voltage and I_L if $R_L = 10\ k\Omega$ 	6+4	CO4
Q 9	A. State and explain the Maximum Power Transfer Theorem. B. For the circuit given below determine the Thevenin equivalent across CD (Hint: by removing the 2A current source)	3+7	CO2

			
Q 10	A. Derive the EMF equation for a transformer having “two windings wound on a common core”. Also explain the significance of step-up and step-down transformers. B. A transformer has 1000 turn on its primary core. When a voltage, V of frequency 50 Hz is connected across the primary winding a maximum flux of $2 \times 10^{-3}\ Wb$ is produced in the core which links both the windings. Calculate (a) the voltage applied to the primary winding, and (b) number of turns in the secondary coil if the voltage induced in the secondary coil is 222V.	6+4	CO2
Q 11	A. For the circuit given below find the current I_x using superposition theorem.  B. For the transistor configuration shown in figure below identify the type of biasing. Determine the operating point of the transistor. 	5+5	CO2
SECTION C [Scan and upload] 20 Marks			
Q 12	A. Design a full adder circuit from combination of half adders. Also draw the truth table for the full adder to verify the circuit. B. Simplify the following Boolean function and draw the equivalent logic gate implementation for the simplified expression: $y = A.B + A.\bar{B}.C + \overline{(B + A.C)} + A.\bar{B}$ C. Perform the following number system conversion: $(1101001101)_2 = (\_\_)_8 = (\_\_)_{16}$	10 6 2+2	CO4