Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UPES

End Semester Examination, December 2023

Course: Basic Electrical and Electronics Engineering **Semester: I**

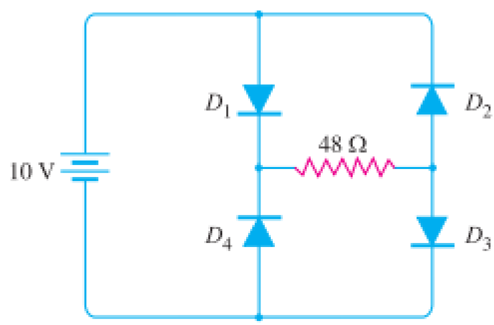
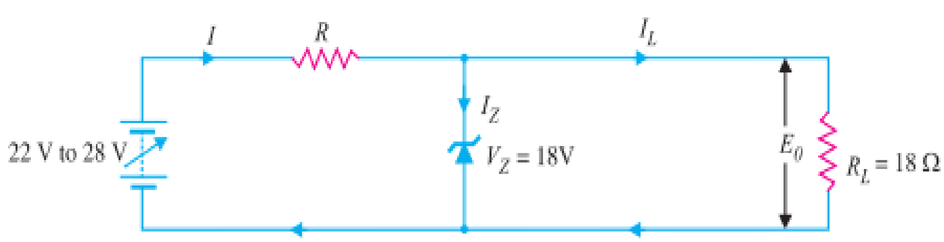
Program: B. Tech-APE, ECE, CHEM, ELE **Time : 03 hrs.**

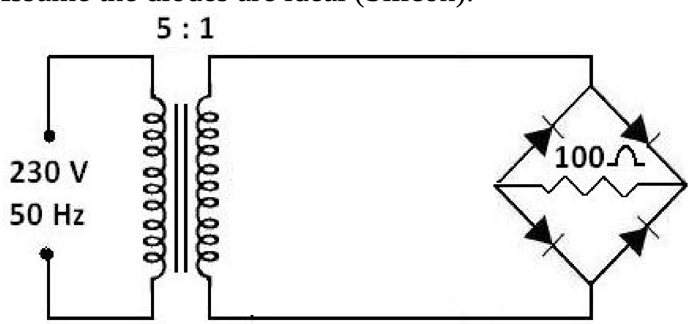
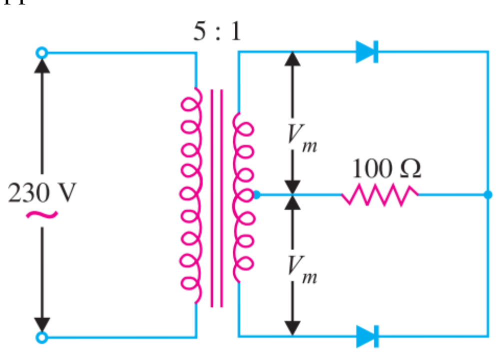
Course Code: ECEG-1004 **Max. Marks: 100**

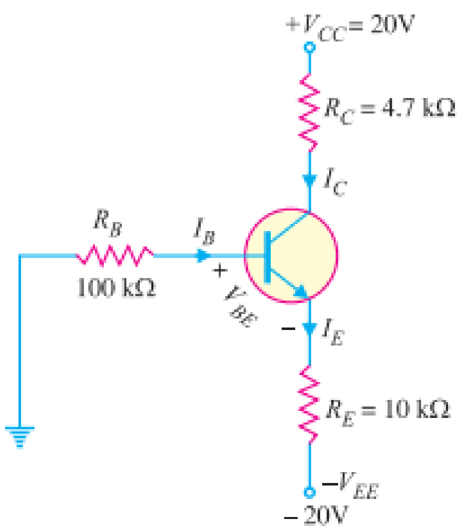
Instructions: Attempt all the questions. Draw a free hand sketch for circuits/tables/schematics wherever required.

SECTION A

(5Qx4M=20Marks)

S. No.		**Marks**	**CO**
Q 1	Compare the conductors, semiconductors and insulators based on their energy band diagram.	**4**	**CO1**
Q 2	Calculate the current through 48-ohm resistor in the given circuit. Assume diodes are silicon and each diode have the forward resistance of 1 ohm.  	**4**	**CO1**
Q 3	The zener diode shown in figure has Vz = 18 V. The voltage across the load stays at 18 V as long as Iz is maintained between 200 mA and 2A. Find the value of series resistance R so that E_0 remains 18 V while input voltage Ei is free to vary between 22 V to 28V.  	**4**	**CO2**
Q 4	Derive the relation between β (base current amplification factor) and α (current amplification factor).	**4**	**CO3**

Q 5	Convert: i. $(4253)_{10} = (?)_{16}$ ii. $(C1)_{16}= (?)_8$ iii. $(532.2)_8= (?)_{10}$ iv. $(10101011)_2=(?)_{16}$	**4**	**CO3**
SECTION B **(4Qx10M= 40 Marks)**			
Q 6	A full bridge rectifier circuit is shown below, which has the load resistance and transformer turn ratio. The primary of each is connected to 230 V, 50 Hz supply. (i) Find the dc voltage. (ii) Find the RMS voltage. (iii) Efficiency (iv) PIV for each case for the same dc output. (v) Draw the output waveform of the rectifier with proper voltage and time sale levels. Assume the diodes are ideal (Silicon).  OR A centre-tap rectifier circuit is shown in the figure have 100-ohm load resistance and turns ratio as 5:1. The supply voltage is connected to 230V, 50Hz. **Find:** (a) Average current (b) RMS current (c) output voltage (c) Efficiency (d) Peak inverse voltage (e) ripple factor. 	**10**	**CO2**

Q 7	Design a full adder circuit by considering two inputs and a carry and also generate the truth table.	**10**	**CO3**
Q 8	a) Derive the expression for resonance in a parallel circuit. Consider a circuit in which a combination of Resistor- inductor is in parallel with Capacitor. b) A capacitor having a capacitance of 10 microfarad is connected in series with a non- inductive resistance of 120 ohm across a 100 V, 50 Hz supply. Calculate (i) current (ii) phase difference between the current and the supply voltage (iii) Power.	**10**	**CO3**
Q 9	An emitter bias circuit is shown below having β=85 and V_{BE}=0.7. Find: i. Emitter current (I_E). ii. Collector current (I_C) iii. Collector Voltage (V_C) iv. Collector-Emitter Voltage (V_{CE}) 	**10**	**CO2**
	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	a) Derive EMF equation of transformer and also draw the phasor diagram of No-load Transformer. b) The no load current of a transformer is 5 A at 0.25 pf, when supplied at 235V, 50 Hz. The number of turns on the primary winding is 200. Calculate: i.) The maximum value of flux in the core. ii.) The core loss. iii.) The magnetizing component. **OR** a) A 200 kVA, 6600/400 V, 50 Hz single phase transformer has 80 turns on the secondary. Calculate (i) the approximate values of the primary and secondary current (ii) The maximum value of flux in the core.	**20**	**CO4**

	b) A 4-pole generator has a lap-wound armature with 50 slots with 16 conductors per slot. The useful flux per pole is 30mWb. Determine the speed at which the machine must be driven to generate an e.m.f. of 240V.		
Q 11	a) A 6 pole, lap wound shunt motor has 500 conductors in the armature. The resistance of the armature path and resistance of the shunt field are 0.05 ohm and 25-ohm resp. Find the speed of the motor when it takes 120 A from a d.c. main of 100 V supply having flux per pole=20mWb. b) Draw and explain the characteristics of DC Motor.	**20**	**CO4**