Name: Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, Dec 2022

Course: Basic Electrical and Electronics Engineering   Semester: I
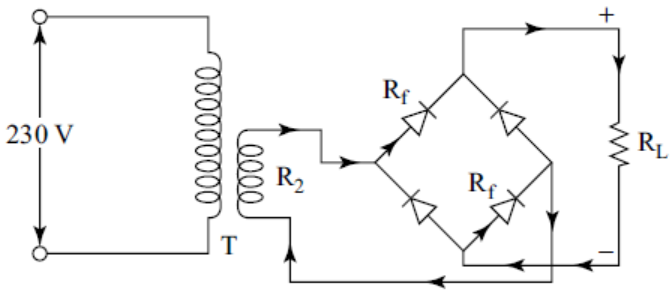Program: B. Tech- All SoE branches   Time   : 03 hrs.
Course Code: ECEG-1004   Max. Marks: 100

Instructions: Attempt all the sections.

SECTION A
(5Qx4M=20Marks)

S. No.	Attempt all the questions.	Marks	CO
Q 1	Differentiate the intrinsic and extrinsic semiconductor. Why extrinsic semiconductor is required in electronics applications.	4	CO1
Q2	Analyze the operation of center-tape rectifier operation with neat sketch diagram. Also show the limitations.	4	CO1
Q3	What is significance of the Thevenin's theorem and how it is different from Kirchhoff's law?	4	CO2

Q4	Convert the following:
	  (a) $(100101011)_2 = ($? $)_{16}$
	  (b) $(305.B2)_{16} = ($? $)_8$
	  (c) $(1110101)_{Gray\ code} = ($? $)_{Binary\ code} = ($? $)_{10}$
		4	CO3

Q5	Explain the principle of electromechanical energy conversion. Give appropriate examples of machines that transfer electrical energy to mechanical energy and vice versa.	4	CO4

SECTION B
(4Qx10M= 40 Marks)

| Q 6 | In a bridge full wave rectifier circuit shown in Figure (1), assume Load resistance R_L= 500 Ω, uses a transformer turn ratio= 10:1, forward resistance (R_f) of each diode is 2Ω.

Figure- 1
Determine: | 10 | CO1 |

	(i) Maximum current (I_m) **(ii)** Average current or DC current **(iii)** RMS current or AC current **(iv)** Output DC voltage **(v)** AC and DC power		
Q7	Determine the current through resistance R= 4 ohm in Figure (2) using current divider rule without using the Thevenin's theorem. R_1 $20\,\Omega$ R_3 $12\,\Omega$ R_5 $2\,\Omega$ $100V = E$ R_2 $5\,\Omega$ R_4 $16\,\Omega$ $R = 4\Omega$ Fig. (2)	10	CO2
Q8	What are the universal logic Gates. Design NOT, AND and OR Logic Gates using NAND Universal Logic Gate	10	CO3

Q9	**Attempt both the parts**
	  (a) In a DC power supply unit, which type of transformer form step-up and step down transformer is used and why? Draw the sketch diagram of step-up and step down transformer based on the turn's ratio.
	
	  (b) A 100 KVA, 6000/400V, 50 Hz single phase transformer has 100 turns in the the secondary. Find
	  (i) Number of turns in the primary coil
	  (ii) Maximum flux in the core
		5+5	CO4

SECTION-C **(2Qx20M=40 Marks)**			
Q 10	**Attempt both the parts:** (a) Minimize the function using K- map: $F(A, B, C)= \sum m(1,3,5,6,7)$ (b) Design a full adder circuit from combination of half adders. Also draw the truth table for the full adder to verify the circuit.	10+10	CO3
Q11	**Attempt both the parts:** (a) Design and analyze the operation of DC machine with neat sketch diagram. (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 elements.	10+10	CO4

OR

Attempt both the parts:

(a) Define the principle of operation of a DC generator. Analyze the role of the necessary components used in DC machine.

(b) An 8-pole generator has 40 slots; each slot has 10 armature conductors and has a useful flux per pole of 0.050 Wb.
Determine:
   (i)   The EMF generated if it is LAP connected and runs at 1000 rpm?
   (ii)   What will be the speed at which it is to driven to produce the same above calculated EMF if it is connected with WAVE wound?