UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
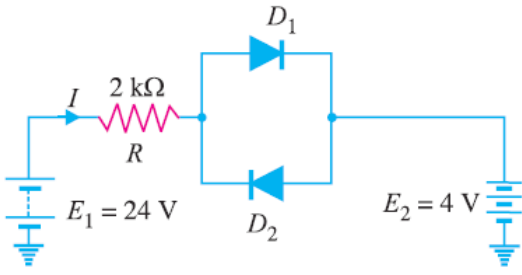### End Semester Examination, May 2022

Course: Basic Electrical and Electronics Engineering **Semester: II**
Program: B. Tech. (ADE, AM & NT, APE(Gas),CE, Civil, FSE,ME, Mechatronics) Time: 03 hrs.
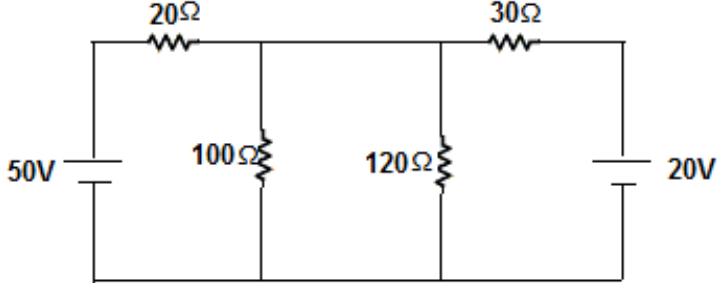**Course Code: ECEG 1004** **Max. Marks: 100**

Instructions:

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Determine the current I in the circuit shown in Fig. Assume the diodes to be of silicon and forward resistance of diodes to be zero.	4	CO1
Q2	Explain the significance of Superposition Theorem for circuit analysis.	4	CO2
Q 3	For an inductive circuit draw the effective impedance and draw the phasor diagram for the same.	4	CO3
Q4	Explain the working principle of DC Generator.	4	CO1
Q 5	Why NAND gate is considered as a universal gate? Explain with the help of an example.	4	CO4

SECTION B
(4Qx10M= 40 Marks)

Q 6	Write short note on the following (i) advantage of transistors (ii) Operating point (iii) D.C. load line (iv) Current gain	10	CO4
Q7	Explain the electromechanical energy conversion (EMEC) principle. Analyze the operation of DC motor, constructional details of all the main parts.	10	CO1
Q 8	Find the current through 100 ohm resistor using Mesh/Nodal analysis.	10	CO3

Q 9	A 4– pole DC Shunt Generator running at 1500 rpm has an armature with 90 slots having 6 conductors per slot. The flux per pole is 6×10^{-2} Wb. Determine the induced EMF of the DC Generator if the coils are lap connected. **OR** Explain working of CB-Configuration Transistor (NPN), draw the input and output characteristics.	10	CO2

SECTION-C
(2Qx20M=40 Marks)

Q10 (A)	Minimize the SOP expression using K-map. $Y= \sum m(1,25,7,9,12,14,15)$	10	CO4
(B)	Obtain the expression for Full adder using truth table.	10	
Q11 (A)	A transformer is rated at 100 kVA. At full load its copper loss is 1200 W and iron losses are 850W. Calculate: **(i)** The efficiency at full load, unity power factor. **(ii)** The efficiency at half load, 0.7 power factor lagging.	10+10	CO3
(B)	The armature of 4 pole 230 V wave wound generator has conductors and runs at 400 rpm. Calculate the useful flux per pole. **OR** A transistor is connected in common emitter (CE) configuration in which collector supply is 8V and the voltage drop across the resistance R_C connected in the collector circuit is 0.5V. The value of $R_C = 800$ ohm. If $\alpha = 0.96$, Determine (i) collector-emitter voltage (ii) base current.	20	