TERM END EXAMINATIONS (TEE) – December 2023- January 2024

Programme	: B.Tech.	Semester	: Fall 2023-24
Course Title/ Course Code	: Electric Circuits and Systems / EEE1001	Slot	: F11+F12+F14
Time	: 3 Hrs.	Max. Marks	: 100

Answer ALL the Questions

Q. No.	Question Description	Marks

PART A – (60 Marks)

1. (a) A network with three meshes in shown in figure, use superposition theorem in the network and determine the current I flowing through the 5Ω resistor. **8**

(b) Draw the equivalent Thevenin and Norton circuit for circuit shown in figure and determine the voltage v_o in the circuit shown. **4**
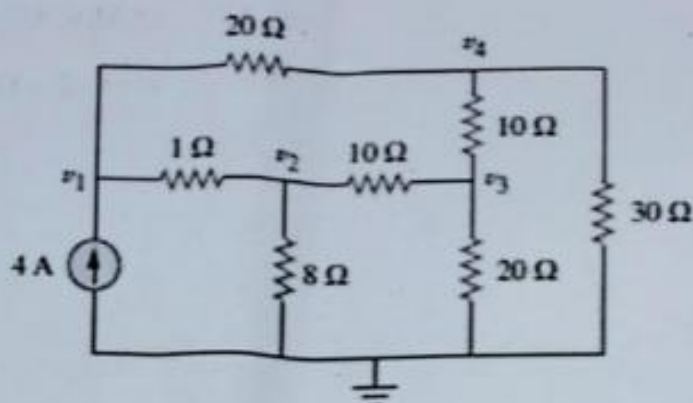

OR

(c) Apply nodal analysis for the network shown in figure and determine the node voltages v_1, v_2, v_3 and v_4 then each branch current. **12**

2 (a) In the series-parallel circuit shown in figure, the parallel branches A and B are in series with branch C. The impedances are $Z_A = (4+3j)$ Ω, $Z_B = (10-7j)$ Ω and $Z_C = (6+5j)$ Ω. If the voltage applied to the circuit is 200 V at 50Hz, calculate (a) current I_A, I_B, I_C (b) power factor for the whole circuit. Draw the phasor diagram. **12**
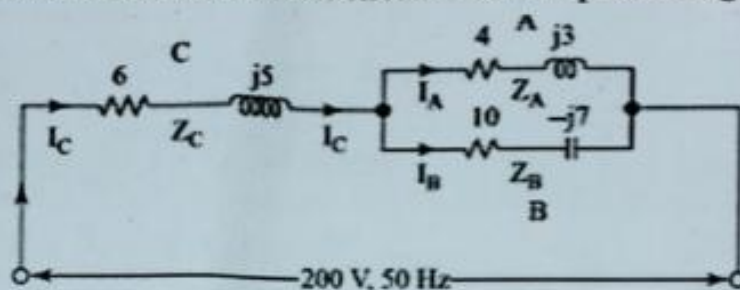

OR

(b) Calculate the flux produced in the air gap in the magnetic circuit shown in figure which is excited by the MMF for the two windings. The mean length of the flux path is 40 cm the permeability of iron is 2000. The uniform core cross sectional area is 10 cm^2. Assume the $N_1=100$, $N_2=80$, $I_1= 10A$ and $I_2=1.5A$. **12**
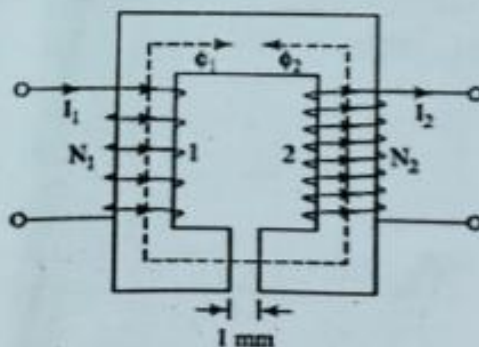
3 (a) Show the three types of transistor configurations. Explain the input and output characteristics of BJT in common emitter configuration with the help of a neat sketch. **8**

(b) Predict biasing condition for the circuit shown below for the maximum current to flow through it and reason out the same. **4**
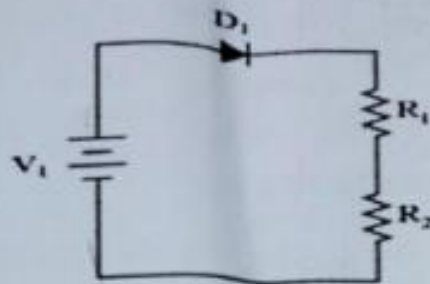
OR

(c) Exemplify the different modes of operation of SCR with the help of its VI characteristics.   12

4 (a) Design a synchronous MOD-8 3-bit grey code counter using J-K flip flop.   12

OR

(b) Compare and contrast SR Flip flop and JK Flip flop based on its operation, characteristic table, excitation table. Justify why the output SR flip flop is invalid for the input "1 1".   6

(c) Design a Full Adder combinational circuit from its truth table.   6

5 (a) Mention the motor that is used in car for automatic windscreen wiper and interpolate its working principle and operation with a neat diagram.   12

OR

(c) (i) Identify the motor used in the printer machine, and outline its working principle and operation with neat diagram.   6

(ii) The armature of a 8-pole d.c. generator has 960 conductors and runs at 400 rpm. The flux per pole is 40 mWb. (i) Calculate the induced emf, if the armature is lap-wound. (ii) At what speed should it be driven to generate 400 V, if the armature were wave-connected?   6

PART B – (40 Marks)

6 A 12V battery is supplying power to the resistive load RL through aa network shown in figure. Calculate what value of RL power transferred to load will be maximum and what would be the value of the maximum power.   8
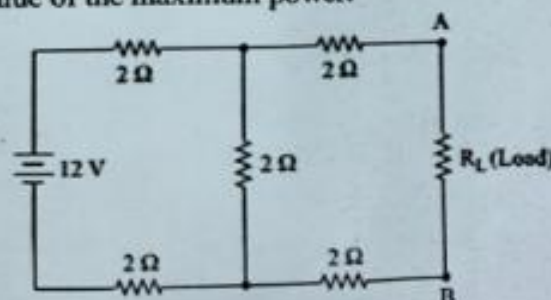
7 An inductor, a variable capacitor and resistor are connected in series across constant voltage 100 Hz power supply. When the capacitor value is fixed to 100F, the current reaches its maximum value. Current gets reduced to half of its maximum value when capacitor value is 200F. Calculate the value of circuit parameters and the Q-factor of the circuit.   8

8 What is pinch –off voltage and what happens to the drain to source current at this pinch –off voltage and what is to be done to increase the value of the drain to source current once if it reaches its saturation value? Explain the working of N Channel   6

Depletion type MOSFET with the help of a neat sketch.

Derive a simplified expression for the minterms $F(A,B,C,D) = (0,6,8,13,14)+d(2,4,10)$ and a logic diagram using logic gates.   8

A single-phase 5 kVA transformer has 500 primary turns, and 1,000 secondary turns. The net cross-sectional area of the core is 50 cm². When the primary winding is connected to 250V, 50 Hz supply, calculate the following   10
(i) the maximum value of flux density in the core;
(ii) the voltage induced in the secondary winding, and
(iii) the secondary full-load current.

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