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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	: B11+B12+B13
Time	: 3 Hrs.	Max. Marks	: 100

Answer ALL the Questions

Q. No.	Question Description	Marks

PART A – (60 Marks)

1 (a) Find the current flowing through 20 Ω resistor of the following circuit using superposition theorem after adding 2 more resistors (parallel to 20 Ω) in the circuit. Assume the missed data. — **8**

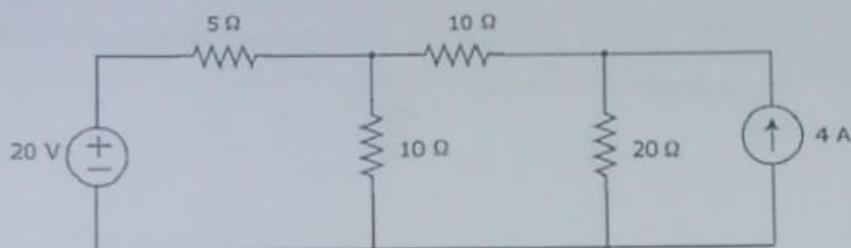
Fig.1

(b) Discuss about the KVL with one numerical? — **4**

OR

(c) Design the DC circuit by using minimum 28 (less series and more parallel combinations) resistors and 1 DC voltage source. The circuit must have 5 delta-star transformations. Calculate the equivalent resistance and total current? Assume the DC voltage and resistance values. Note: All resistor values should be different. — **12**

2 (a) Draw magnetic circuit by using minimum 20 (series and parallel combination) inductors. Calculate the equivalent inductance? Assume the all inductance, dot convention and mutual inductance values. — **12**

OR

(b) In a RLC parallel circuit, one branch R and L are connected in series, second branch R and C are connected in series and the third branch R, L and C are connected in series. All three branches are connected in parallel. A $250\angle 0^0$V AC supply is connected to the circuit. Find out the current flowing through each branch, phase angle in each branch and resonance. Also draw the phasor diagrams of each branch. Assume the missing data. — **12**

3 (a) Discuss the BJT construction, characteristics, configurations and operation with neat diagrams? — **12**

OR

(b) Differences between half-wave and Full wave rectifier circuits with one numerical on both the circuits? **12**

4 (a) Design 16×1 Multiplexer using two 8×1 and 2×1 Mux with truth table and logic diagram? **7**

OR

(b) Design 1×16 De-multiplexer using one 1×2 and two 1×8 De-Mux with truth table and logic diagram? **12**

5 (a) A 200/27.5 V, 400 H, step-down transformer is to be operated at 50 Hz. Number of primary turns are 600, Find: (i) the highest safe input voltage, and (ii) transformation ratio in both frequency situations (iii) secondary turns (iv) primary and secondary currents **12**

OR

(b) The armature of 8 pole DC generator has 51 slots, each having 24 conductors and runs at 800 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 500 V, if the armature were wave-connected? **6**

(c) A 4–pole, 500 V DC shunt motor has 720 wave–connected conductors on its armature. The full–load armature current is 60 A and the flux per pole 0.03 Wb. The armature resistance is 1.2 Ω and the brush contact drop is 1 V per brush. Calculate the full–load speed of the motor? **6**

PART B – (40 Marks)

6 Find the current flowing through the 12Ω resistor shown in Fig.2 using nodal analysis. **8**

Fig.2
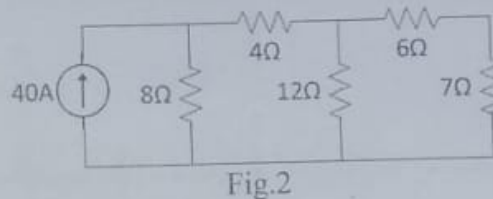
7 In a magnetic circuit, no. of turns in the coil is 450, length of the core and airgap is 50 cm and 1 mm respectively. Cross section area of the core and airgap is 15 cm^2. Relative permeability is 3000. The current flowing in the circuit is 2 A. Find out total flux, flux density in the airgap and inductance of the coil? **8**

8 Write about the SCR working principle with characteristics and solve one numerical to find the minimum width of the gate trigger pulse required to properly turning ON the SCR.? Assume all the data. **8**

9 Design JK Flip-flop diagram, truth, characteristics and excitation tables with logical expressions and diagrams? **8**

10 The design requirement of a 11,000/415 V, 50 Hz, single-phase core-type transformer are approximate emf/turn 15V, maximum flux density 1.5T. Find a suitable number of primary, and secondary turns, and the net cross-sectional area of the core. **8**

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