

3 Yr. Degree/4 Yr. Honours 1st Semester Examination, 2023 (CCFUP)

Subject : Electronics

Course: ELEC1021 (MINOR)
(Circuit Theory & Net Analysis)

Time: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words
as far as applicable.*

1. Answer any five questions from the following:

2×5=10

- (a) Find out the value of the effective capacitance if two capacitors $4\mu\text{f}$ and $6\mu\text{f}$ are connected in series.
- (b) A resistor has color band sequence brown, black and yellow. What is its value?
- (c) Name different types of capacitors used in circuits.
- (d) Define dielectric constant.
- (e) What do you mean by time constant of an RC circuit?
- (f) Draw circuit symbols of star network and delta network.
- (g) State Lenz's law of electromagnetic induction.
- (h) Draw the frequency response of an ideal low pass filter. Indicate its pass band, stop band and cut off frequency.

2. Answer any two questions of the following:

5×2=10

- (a) State and explain Norton's theorem.

- (b) An alternating current is expressed by

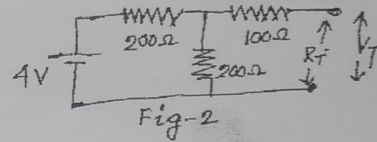
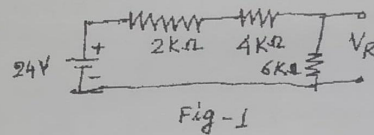
$$i = i_0 \cos \omega t$$

Find the expressions of average current and r.m.s. current.

- (c) In a circuit one R, one L, one dc voltage source v_0 and one switch S are connected in series. At time $t = 0$, S is closed. Derive the expression of current through the circuit for $t > 0$ mathematically and show graphically the nature of variation of current with time.
- (d) Define self inductance, mutual inductance and coupling co-efficient. Find the mutual inductance (M) between two coils of self inductances L_1 and L_2 connected in series.

3. Answer *any two* questions of the following:

- (a) (i) Using Kirchhoff's voltage law find out V_R shown in Fig-1.
 (ii) Find out the value of Thevenin's equivalent voltage (V_T) and resistance (R_T) of the circuit shown in Fig-2.



- (b) One C, one R and one L are connected in series. A d.c. voltage source is suddenly applied to the circuit. Investigate the growth of charge across C with time. Find the condition of oscillatory growth of charge.
- (c) What is series resonant circuit? Why is it called 'acceptor' circuit? Find the expression of instantaneous current of this circuit. Find the condition of resonance and the expression of resonant frequency.
- (d) Write short notes on:
- (i) Impedance parameters
 - (ii) Superposition theorem