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B.Tech I Year II Semester (R15) Supplementary Examinations December 2019 ELECTRICAL CIRCUITS – I

(Electrical and Electronics Engineering)

Time: 3 hours

PART – A

Max. Marks: 70

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
 - (a) Two capacitors having capacitances of $10\mu F$ and $15\mu F$ respectively are connected in series across a 200 V d.c supply. Calculate: (i) Voltage across each capacitor. (ii) Equivalent capacitance of the circuit.
 - (b) State the faradays first law of electromagnetic induction.
 - (c) Two impedances $(5+j7)\Omega$ and $(10-j7)\Omega$ are connected in series across a 200 V supply. Calculate the current and power factor.
 - (d) Define power factor.
 - (e) A series RLC circuit with L = 1 mH and C = 1000 pF is connected across a sinusoidal source of 20 V with variable frequency. Compute the resonant frequency.
 - (f) In a series RLC circuit, if the value of L and C are 100mH and $0.1\mu F$. Determine the value of R to give critical damping.
 - (g) What is the condition for maximum power transfer in DC circuits?
 - (h) List the applications of Thevenin's theorem.
 - (i) A two port network is characterized by $V_1 = 10 I_1 + 5 I_2$ and $V_2 = 5 I_1 + 12 I_2$. Find the transmission parameters A and C.
 - (j) The impedance parameters of a two port network are $Z_{11} = 6 \Omega$; $Z_{22} = 4 \Omega$; $Z_{12} = 3 \Omega$; $Z_{21} = 3 \Omega$. Compute the Y parameters of network.

(Answer all five units, 5X 10 = 50 Marks)

- 2 (a) Define Faraday's laws of electromagnetic induction.
 - (b) An iron ring of mean length 40 cm has an air gap of 2 mm and a winding of 300 turns. If the permeability of the iron core is 300, when a current of 1A flows through the coil, find the flux density.
 - OR
- 3 Determine the equivalent resistance of the circuit shown below.



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UNIT – II

- A 10Ω resistor and a 20 mH inductor are connected in series across a 250 V, 60 Hz supply. Find:
 (i) Impedance of the circuit.
 - (ii) Voltage across the resistor.
 - (iii) Voltage across the inductor.
 - (iv) Active power.
 - (v) Reactive power.

OR

5 A coil of power factor 0.6 is in series with a $100\mu F$ capacitor. When connected to a 50 Hz supply, the potential drop across the coil is equal to the potential drop across the capacitor. Find the resistance and inductance of the coil.

UNIT – III

6 For the circuit shown in below. Determine the frequency at which the circuit resonates. Also find the quality factor, voltage across the inductor and capacitor at resonance.



OR

- 7 (a) Derive the Quality factor of the parallel RLC circuit at Resonance.
 - (b) Derive the Quality factor of the series RLC circuit at Resonance.

UNIT-IV

8 State Thevenins theorem. Write the steps to be followed in applying Thevenins theorem.

OR

9 Verify the reciprocity theorem in the circuit shown in figure below and also calculate the transfer resistance.



10 Derive the relation between transmission parameters and admittance parameters.



11 For the h-parameter for the network shown below.

