Code: 13A02101 R13

B.Tech I Year (R13) Regular Examinations June/July 2014

ELECTRICAL CIRCUITS

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 70

Part – A
(Compulsory Question)

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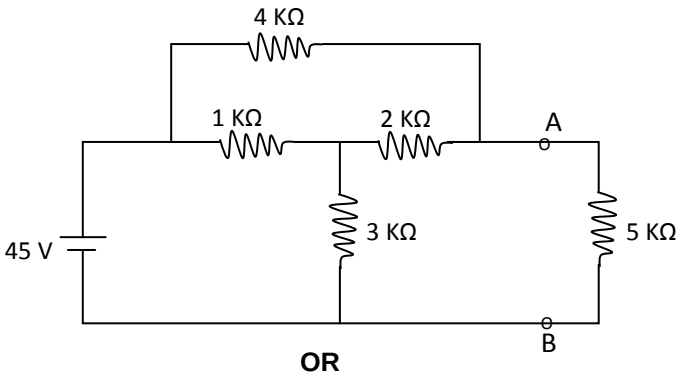
Answer the following:(10 X 02 = 20 Marks)

1 (a) What is passive element? Give examples for passive elements.
(b) Define and explain coefficient of coupling.
(c) Define the terms RMS value and form factor.
(d) If R_a, R_b, R_c connected in star, write down the expressions for equivalent delta connection.
(e) Define the band width and Q-factor.
(f) Write short notes on Tieset and cutset.
(g) State the Milliman's theorem.
(h) Define and explain two port networks.
(i) Define the time constant of RL and RC circuits.
(j) Write down any two applications of Fourier transforms.

Part – B
(Answer all five units, 05 X 10 = 50 Marks)

UNIT - I

2 (a) Derive an expression for total inductance of two coupled coils connected in:
(i) series aiding mode and
(ii) series opposing mode.
(b) Find the current through each element in the network as shown in figure given below using star delta transformation.



OR

3 (a) Explain in detail about the active elements.
(b) In a coupled circuit $L_2 = 4L_1$ and coupling coefficient K = 0.6. When L_1 and L_2 are connected in series opposing the equivalent inductance is 44.2 mH. Find L_1, L_2 and M.

UNIT - II

4 (a) Derive the expression for form factor a sinusoidal voltage wave excited by $V = V_m \sin\omega t$.
(b) A sinusoidal current wave is given by $I = 50\sin 100\pi t$. Determine:
(i) The greatest rate of change of current.
(ii) Average and rms values of current.
(iii) The time interval between a maximum value and the next zero value of current.

OR

5 (a) Show that two wattmeters are sufficient to measure power in a balanced or unbalanced three-phase load connected to a balanced supply with neat circuit diagram.
(b) A balanced mesh connected load of (8+j6)Ω per phase is connected to a 3-phase, 50 Hz, 230 V supply. Calculate:
(i) Line current.
(ii) Power factor.
(iii) Reactive volt-ampere.
(iv) Total volt-ampere.

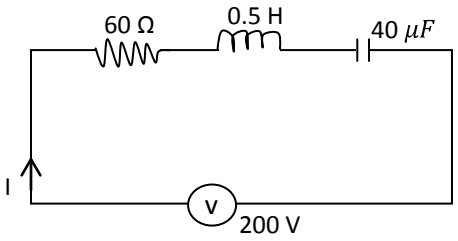
Contd. in page 2

Code: 13A02101

UNIT-III

6 (a) What is duality? Write down the procedure to obtain dual network by taking any one example.

(b) A series RLC circuit shown in figure R = 60 ohms, L = 0.5 H and C = 40 μF is connected across an AC variable frequency supply of 200 V. Calculate the resonant frequency and lower and upper half frequencies.



OR

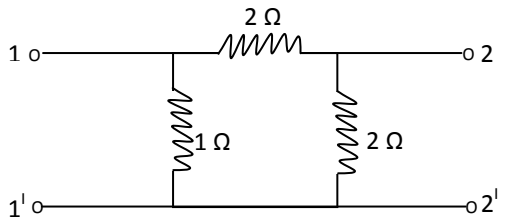
7 (a) Define and explain bandwidth, Q-factor, cutset, tieset and tree.

(b) A coil having an inductance of 50 mH and resistance 10 Ω is connected in series with a 25 μF capacitor across 200 V AC supply. Calculate:
(i) Resonant frequency of the circuit.
(ii) Current flowing at resonance.
(iii) Quality factor.

UNIT - IV

8 (a) State and explain Thevinen's theorem.

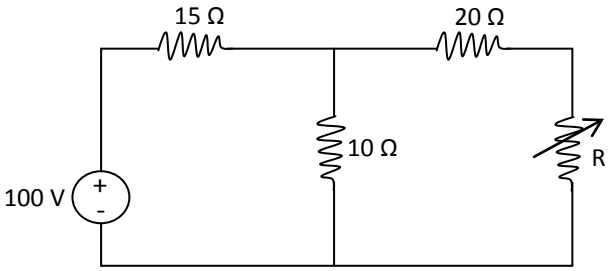
(b) Find the Z parameters for the resistance network shown in figure given below.



OR

9 (a) Derive the expressions for hybrid parameters in terms of admittance parameters.

(b) In the circuit shown in figure given below, find the value of adjustable resistor R for maximum power transfer to R. Also calculate the maximum power.



UNIT - V

10 (a) Derive the expression for exponential form of Fourier series. Mention the application of Fourier transform.

(b) A series RLC circuit has R = 50 Ω, L = 0.2 H and C = 50 μF constant voltage of 100 V is impressed upon the circuit at t = 0. Find the expressions for the transient current assuming initially relaxed conditions.

OR

11 (a) Explain the properties of Fourier transforms.

(b) A series RL circuit with R = 10 Ω, L = 0.2 H has a constant voltage of a V = 50 V applied at t = 0. Find the time response of the current.

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