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3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following: **10**

a) Define –

i) Kirchoff's voltage law

ii) Kirchoff's current law.

b) Draw –

i) Practical voltage source

ii) Ideal current source.

c) State –

i) Maximum Power transfer theorem

ii) Reciprocity theorem.

Marks

d) Write equation for ABCD parameters in terms of voltage and current.

e) Define and state equations for –

i) Active power

ii) Reactive power

f) Draw phasor diagram for RL series circuit. Give equation for resultant impedance.

g) State condition for resonance in R-L-C series circuit.

2. Attempt any <u>THREE</u> of the following: **12**

a) Define superposition theorem. Write the steps for finding current through an element using super position theorem.

b) Draw the phasor diagram, impedance triangle and power triangle for series R-L-C circuit for condition $X_L < X_C$.

c) Derive expression for resonant frequency for series RLC resonant circuit.

d) Give steps to convert practical voltage source to practical current source.

3. Attempt any <u>THREE</u> of the following: **12**

a) Draw star and delta circuits. Write equation to convert a star circuit to corresponding delta circuit.

b) State Thevenin's theorem. Give steps to find current through resistance using Thevenin's theorem.

c) Define low pass filter. Draw its frequency response. Give circuit of RC low pass filter and expression for cut off frequency.

d) Compare series and parallel resonant circuits on the basis of –

i) Resonating frequency

ii) Impedance

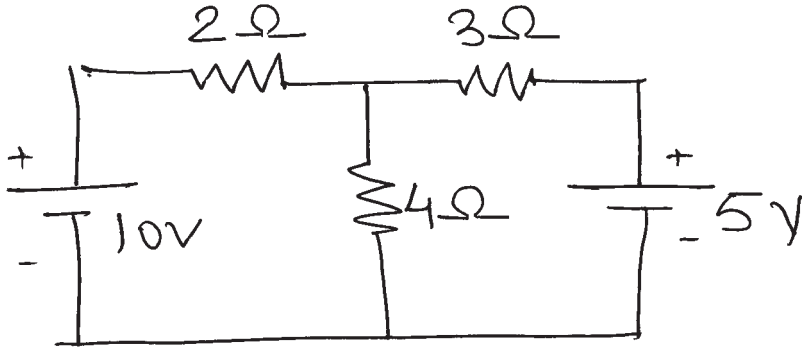
iii) Current

iv) Magnification.

Marks

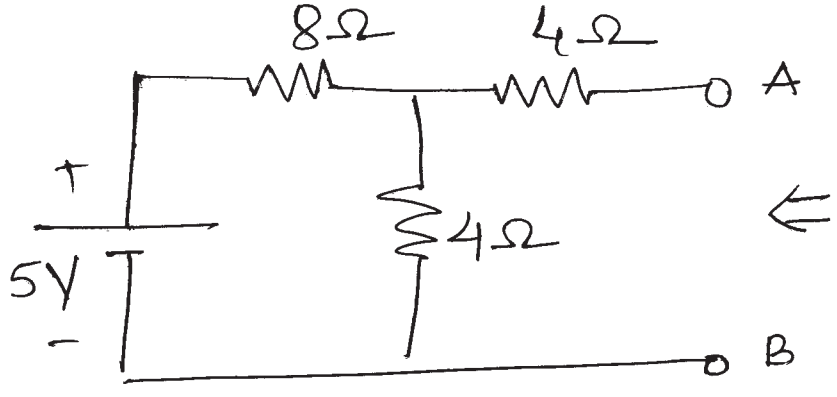
4. Attempt any <u>THREE</u> of the following: **12**

a) Using Mesh analysis find current through 4Ω resistance. Refer Figure No. 1.



<u>Fig. No. 1</u>

b) Obtain Thevenin's equivalent circuit at A and B for the network shown in Figure No. 2



<u>Fig. No. 2</u>

c) Explain Z parameter of two port network in detail.

d) A coil of resistance 50Ω and inductance 0.1 H are connected in series with 100μf capacitor supplied with 230V, 50Hz A.C. supply. Calculate voltage across each and draw complete phasor diagram.

Marks

e) A coil having 10Ω resistance and 0.1H inductance is connected across 230V, 50Hz A.C. supply.

Calculate –

i) Impedance

ii) Current

iii) Power factor

iv) Power absorbed by the coil.

5. Attempt any TWO of the following: **12**

a) Draw two port network for the following configurations –

i) Cascade configuration

ii) Series configuration

iii) Parallel configuration.

b) Calculate current through 6Ω resistance using Norton's theorem Refer Figure No. 3.

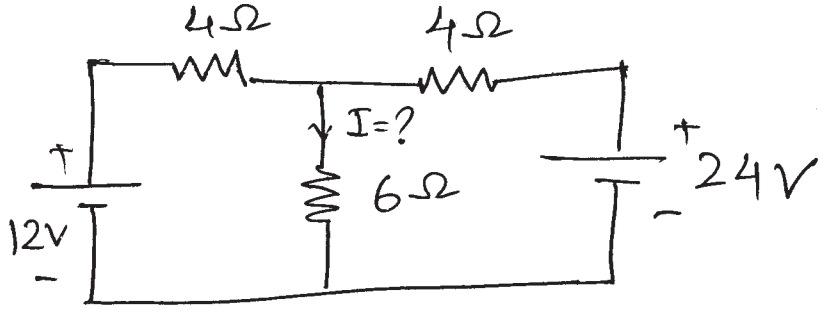


Fig. No. 3

c) A series RC circuit takes a current of 2.7A when connected 240V, 50Hz A.C. Supply and consumes 350 watts.

Calculate –

i) Resistance

ii) Capacitance

iii) Power factor.

Marks

6. Attempt any TWO of the following: **12**

a) For the following circuit; find value of R using NODAL analysis Refer Figure No. 4

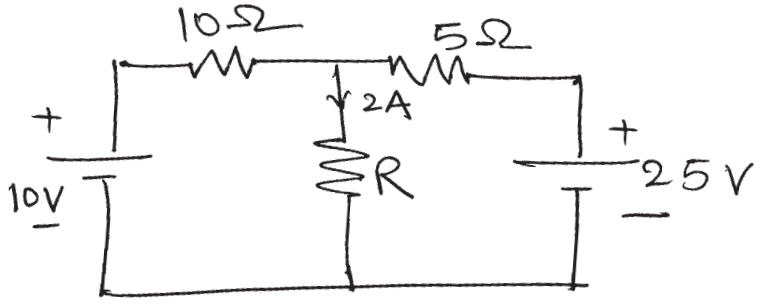


Fig. No. 4

b) Using superposition theorem find current in 3Ω resistor in Figure No. 5. State any two drawbacks of super position theorem.

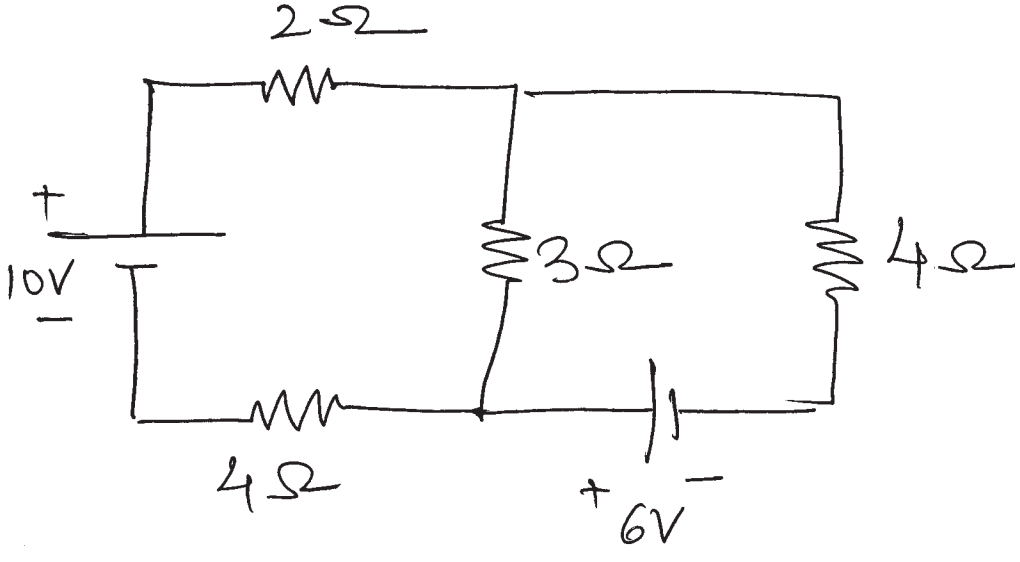


Fig. No. 5

c) A coil of resistance 20Ω and inductance 2000 mH is in parallel with variable capacitor. The voltage of supply is 200V and frequency 10^6Hz.

Calculate –

i) Value of C to give resonance

ii) Q of the coil

iii) Dynamic resistance of circuit.