22324

12425

03 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 Active and Reactive power with unit.

b) Draw the power triangle for R.C. Series circuit.

c) Calculate admittance if $z = 6 + j4\,\Omega$

d) State the relationship between line and phase values of voltage and current in star connection.

e) Draw the symbol of Ideal and practical current source.

f) State Norton's Theorem.

g) State maximum power transfer theorem.

Marks

2. Attempt any THREE of the following : **12**

a) State the meaning of term lagging and leading with necessary waveforms.

b) Define Quality factor and Bandwidth with its mathematical expression.

c) State any four advantages of polyphase circuit over single phase circuit.

d) Using Mesh analysis find current I_1 and I_2 of given circuit below. Refer Fig. No. 1

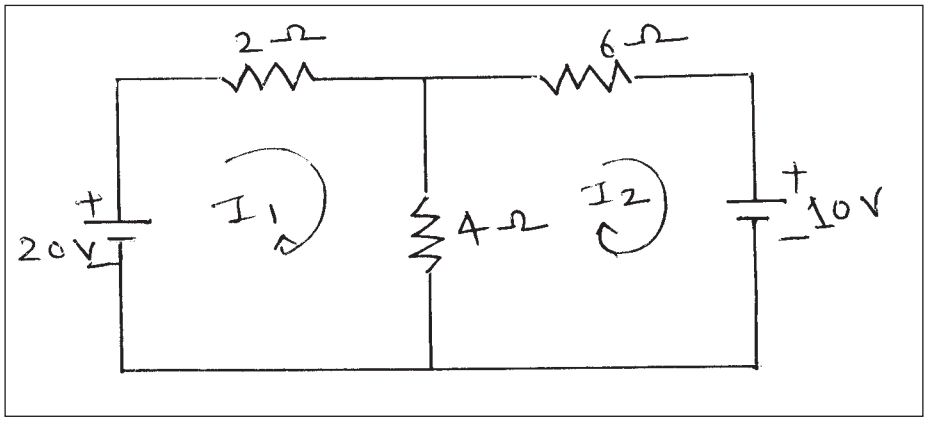

Fig. No. 1

3. Attempt any THREE of the following : **12**

a) If a resistance of 50Ω and an inductance of 0.1 H are connected in series and the combination is supplied with 230V, 50Hz supply. Calculate impedance, current and power factor.

b) Impedances $Z_1 = (2 + j4)\Omega$ and $Z_2 = (4 + j3)\Omega$ are connected in parallel across 230V, 50 Hz supply. Calculate supply current and power factor.

c) Compare star connection with delta connection.

Marks

d) Using nodal analysis, Find current in the 4Ω and 5Ω resistance of the circuit given below. Refer Fig. No. 2

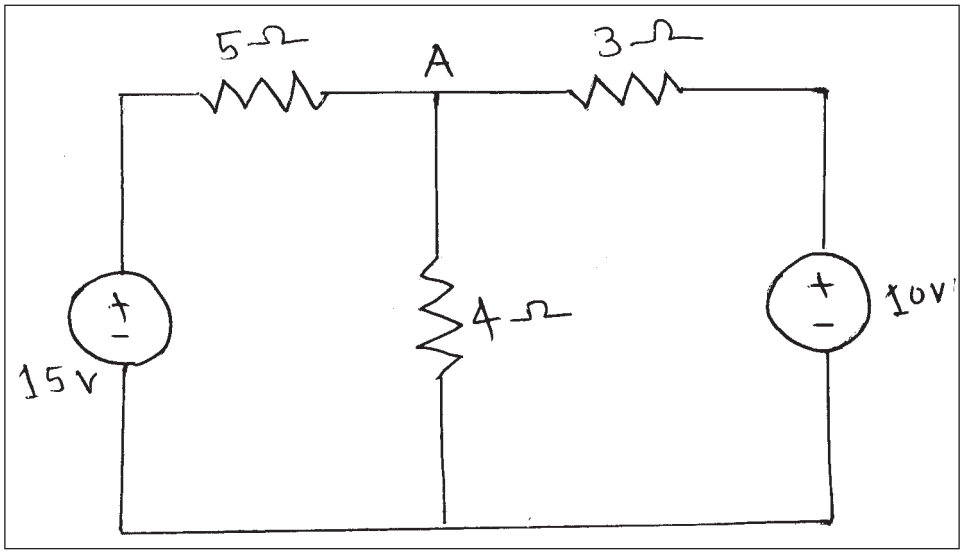

Fig. No. 2

e) Define duality of electric circuits and write duality of electrical elements.

4. Attempt any THREE of the following : **12**

a) A R–L–C series circuit with resistance of 20Ω, inductance of 0.25H and and capacitance of 100 μF is supplied with 240V A.C. supply Calculate -

i) Resonance frequency

ii) Current at this condition

iii) Power factor

iv) Quality factor

b) Define the following terms –

i) Admittance

ii) Conductance

iii) Susceptance

iv) State the unit of conductance and susceptance.

Marks

c) A 3 phase star connected load having phase impedance of $(6 + j10)\Omega$ and is supplied from 3ϕ, 400 V, 50 Hz, AC supply. Determine –

i) Phase voltage

ii) Current drawn by the load

iii) Active power

iv) Reactive power

d) Calculate the current flowing through 10Ω resistance using superposition theorem. Refer Fig. No. 3

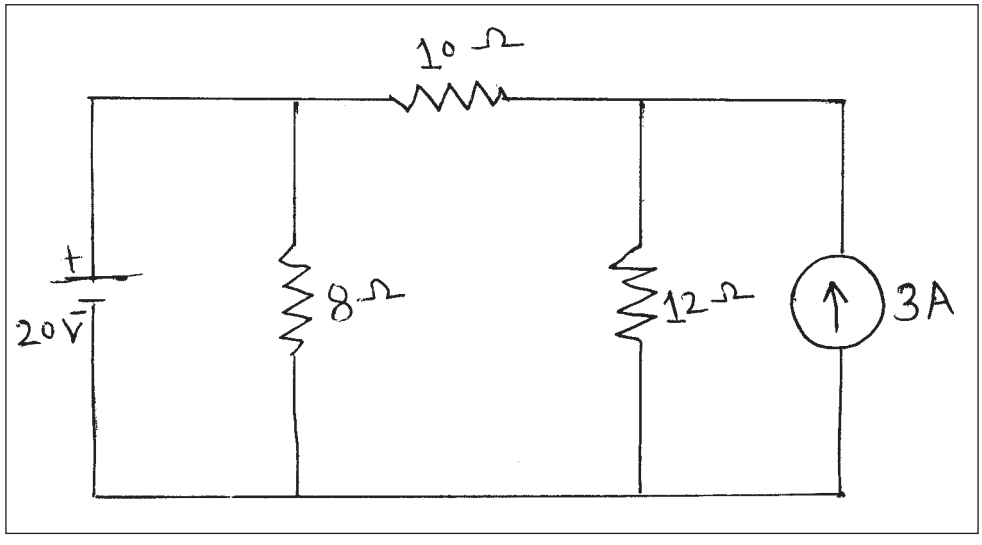

Fig. No. 3

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

a) Two impedance $(12 + j16)\Omega$ and $(10 - j20)\Omega$ are connected in parallel across a supply of $200\angle 60°$. Using admittance method calculate branch current, total current and power factor of the whole circuit.

Marks

b) Write the node voltage equation and determine the currents I_1 and I_2 for the network given below. Refer Fig. No. 4

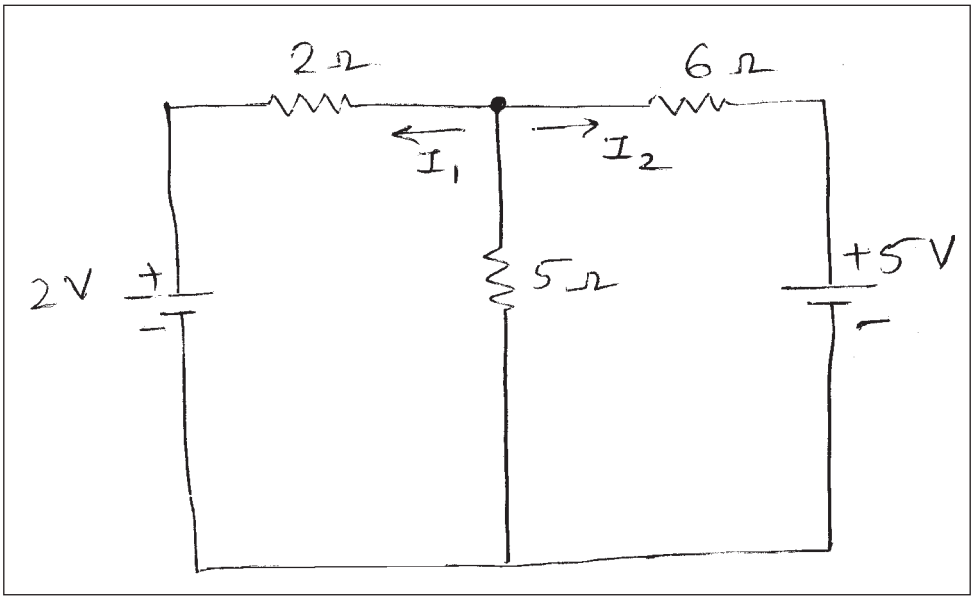

Fig. No. 4

c) Determine the current through AB in the given circuit using Norton's theorem. Refer Fig. No. 5

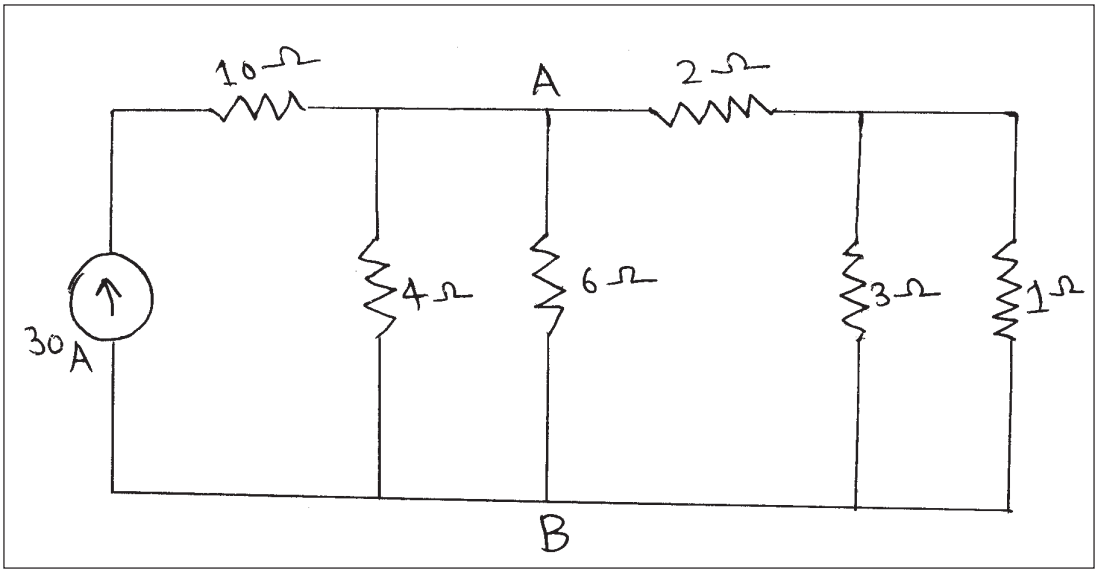

Fig. No. 5

Marks

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

a) A coil of resistance 20 ohms is in series with a coil of 0.04 henry and is connected to ac mains at 200 V and frequency 50 Hz then calculate –

i) Current

ii) Power factor

iii) Voltage drop across resistance

iv) Voltage drop across inductance.

b) Three identical impedances are connected in delta to a 3 phase, 440 V. The line current is 40 A and total power taken from the supply is 20 KW. Calculate resistance and reactance of each phase.

c) Solve the given circuit to find the current through 15 Ω resistance using Thevenin's theorem. Refer Fig. No. 6

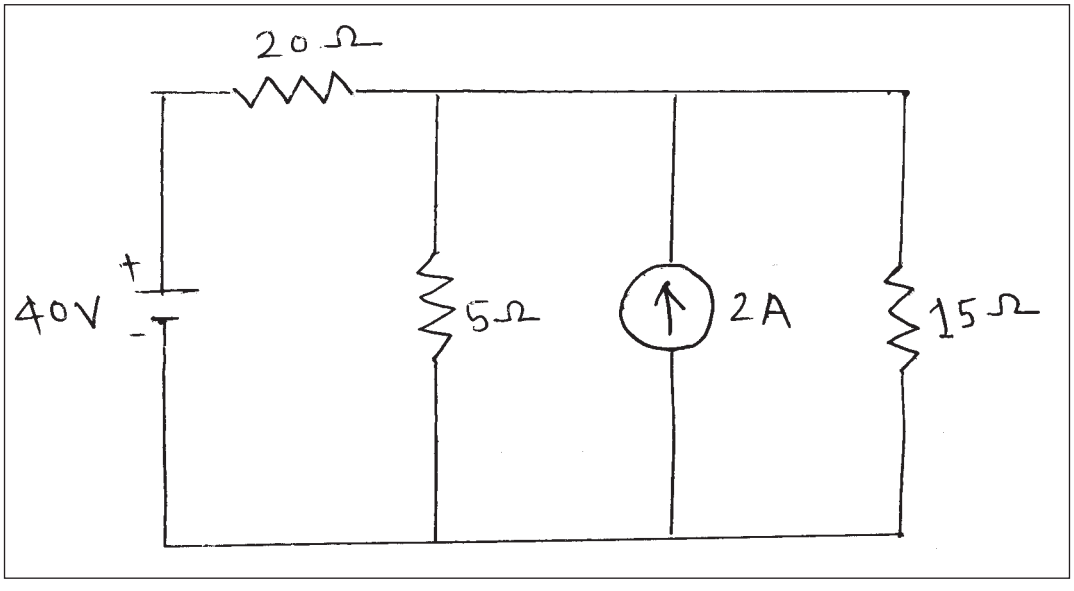

Fig. No. 6