COLLEGE: COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY (CEST)

SCHOOL: SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

PROGRAMME: BACHELOR OF ENGINEERING (YEAR 2)

UNIT CODE: EEE 681

TITLE: ELECTRO TECHNOLOGY

FINAL EXAMINATION – SEMESTER 1, 2014

ROOM: AS PER TIMETABLE

TIME: 3 HOURS & 10 MINUTES

INSTRUCTIONS TO STUDENTS

1. You are allowed **10 minutes** extra **reading time** during which you are **NOT** to write.
2. Begin each SECTION on a fresh page and use both sides of the sheet.
3. Write your candidate number at the top of each attached sheet.
4. Insert all written foolscaps, graph paper, drawing paper, etc. in their correct sequence and secure with a string.
5. For all sheets of paper on which rough/draft work has been done, cross it through and ATTACH these to your answer scripts.
6. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
7. Use of programmable calculator(s) is prohibited.
8. **ANSWER ALL SECTIONS.**
9. Show all working where necessary.
10. **ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE EXAM ROOM.**

SECTION A (30 MARKS)

Note – Attempt any five questions. Each question is of 6.0 marks.

1. Determine the resistance between nodes A & E and current supplied by the 24 Volt supply shown in Fig. 1.

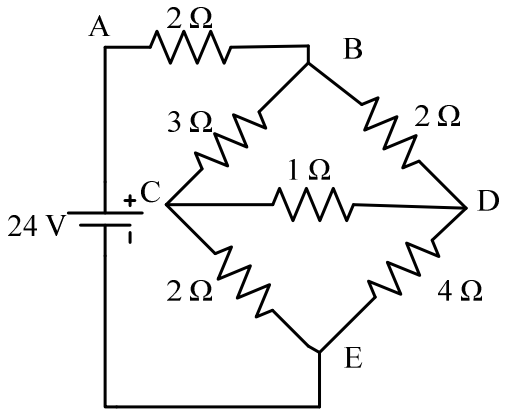


Fig. 1

2. Determine the current through all branches and power supplied by the current source shown in Fig. 2.

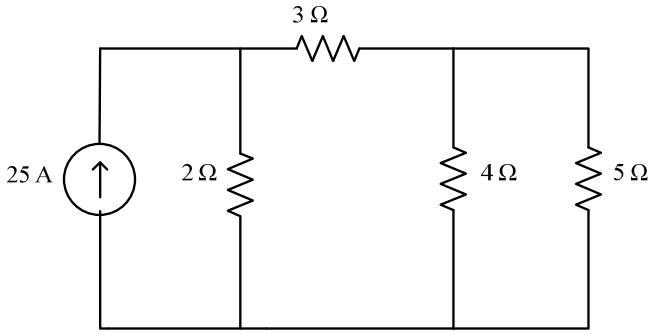


Fig.2

3. Determine the current through branch AB by Norton's theorem or Thevenin's theorem.

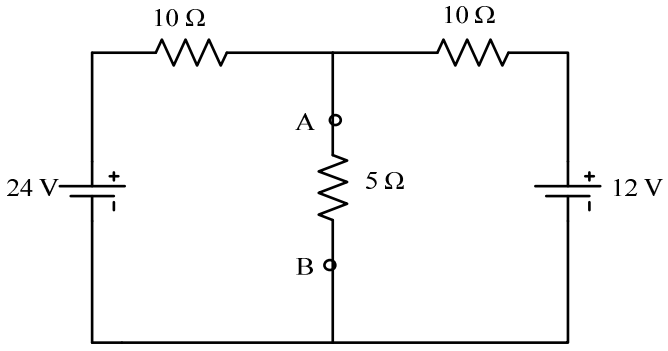


Fig. 3

4. Determine the resistance between nodes A&B by using star delta transformation method given in Fig. 4 (a) & Fig. 4 (b).

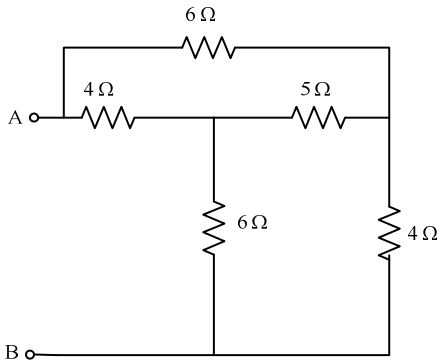


Fig. 4(a)

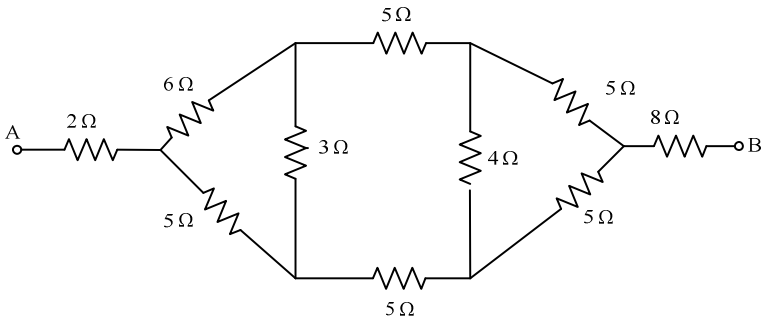
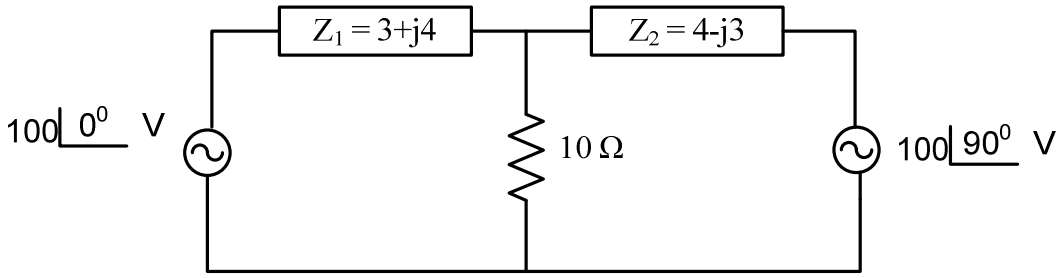
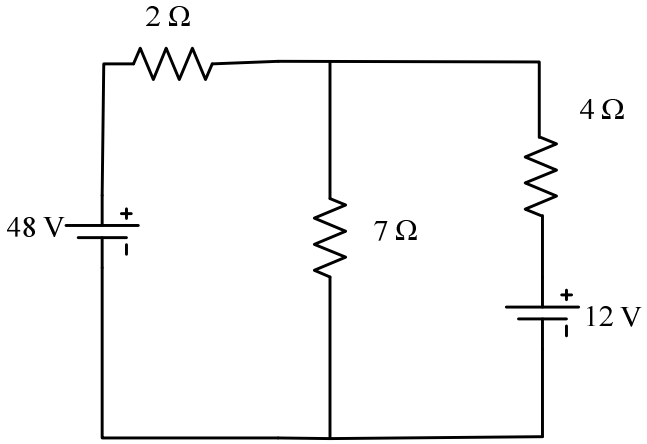


Fig. 4(b)

5. Determine the current in the 10Ω resistor in the circuit by mesh current analysis.



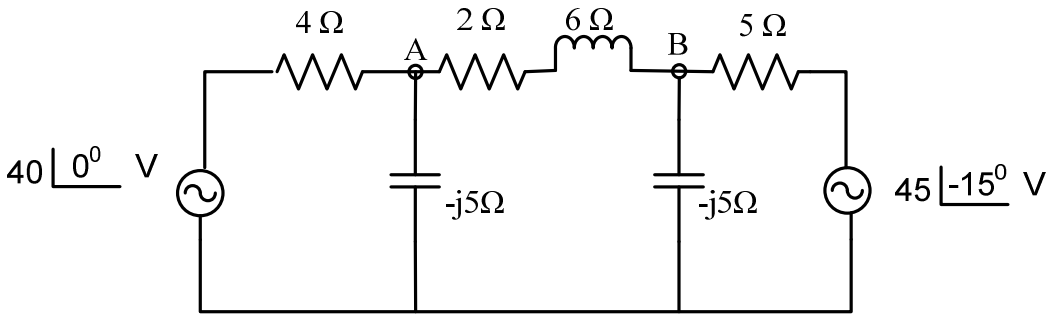
6. Determine the current through 7Ω resistance and the voltage drop across it.



SECTION B (30 MARKS)

Note – Attempt any five questions. Each question is of 6.0 marks.

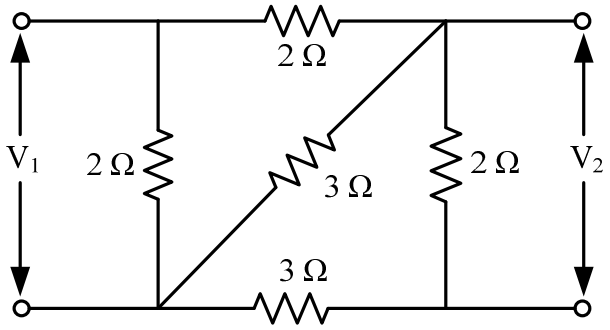
1. Consider the circuit shown in the figure, determine the voltage drop $V_{AB.}$



2. An AC series circuit has a resistance of 10Ω, an inductor of 0.2H and a capacitance of 60 microfarad. Calculate (a) resonant frequency (b) the resonant current (c) the power at resonance (d) the quality factor. Given that the applied voltage is 200V, 50 Hz.

3. Three coils have a resistance of 20Ω and inductor of 0.05H are connected in star connection and delta connection to a three-phase, 50 Hz, 400 V supply. Calculate the total power absorbed and line current in each case.

4. Determine the transmission and hybrid parameters for the circuit in the figure



5. Discuss any four terms associated with series RLC circuit
   (a) Quality factor
   (b) Resonant frequency
   (c) Band width
   (d) Impedance at resonance
   (e) Resonant current

6. The power input to a 200V, 50 Hz, three-phase induction motor running on full load at an efficiency of 90% is measured by two wattmeter which indicate 300W and 100W respectively. Calculate (a) power factor (b) the input power (c) the line current (d) output power.

SECTION C (40 MARKS)

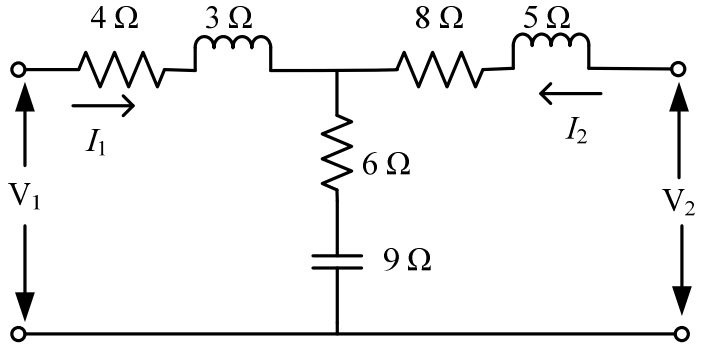
Note – Attempt any four questions. Each question is of 10 marks.

1. Prove that the power in a balanced three phase circuit can be measured from the readings of two wattmeter. Draw the relevant circuit diagram and also derive the expression for the determination of power factor.

2. A balanced delta connected load of (8 + j 6) Ω per phase is connected to a balanced delta connected three-phase 440 V supply. Find line current, power factor, active power, reactive power and total volt ampere.

3. Determine the line current in an unbalanced star connected load supplied from a symmetrical three-phase, 440 V supply system. The branch impedance of the load are $Z_R = 5\angle 30^0\ \Omega$, $Z_W = 10\angle 45^0\ \Omega$ and $Z_B = 10\angle 60^0\ \Omega$. The phase sequence is RWB.

4. Consider the circuit , determine
   (a) Impedance parameter
   (b) Admittance parameter
   (c) Hybrid parameter
   (d) Transmission parameter



5. The unbalanced three-phase load voltages of a star connected circuit are $V_{an} = 312.53\angle 8.69^0$ V, $V_{bn} = 157.4\angle -103.81^0$ V and $V_{cn} = 250.1\angle 98.64^0$ V. Obtain the zero sequence and positive sequence components.

[THE END]