

Examination Control Division

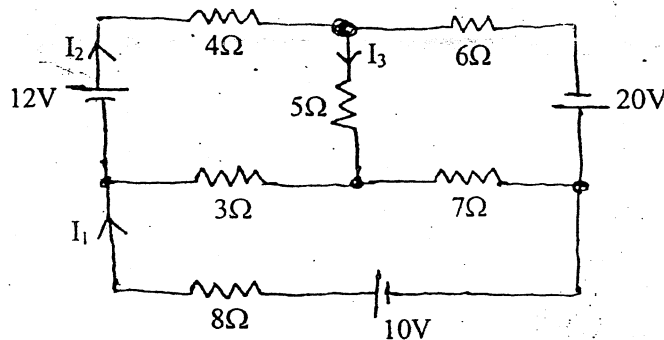
2068 Baishakh

Exam.	Regular / Back		
Level	EE	Pass Marks	32
Programme	BEL, BEX, BCT, BIE, B.Agr	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

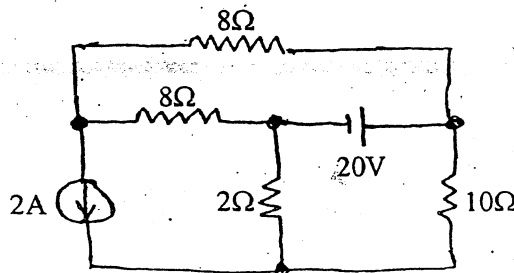
Subject: - Basic Electrical Engineering

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt any Five questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

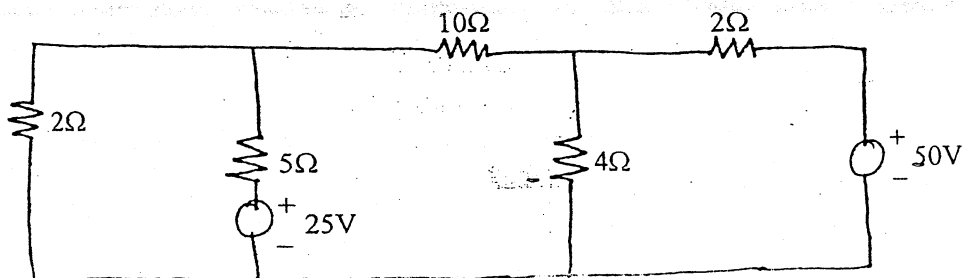
1. a) The temperature rise of a m/c field winding was determined by the measurement of the winding resistance. At 20°C the field resistance was 150Ω. After running the m/c for 6 hours at full load, the resistance was 175Ω. The temperature coefficient of resistance of the copper winding is $4.3 \times 10^{-3}/^{\circ}\text{C}$. Determine the temperature rise of the m/c. [6]
- b) Find I_1 , I_2 , and I_3 , in the circuit shown in the figure using Kirchhoff's law. [10]



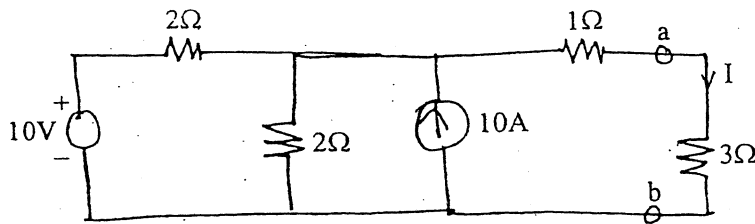
2. a) Use Superposition theorem to find the current flowing through the 10Ω resistor shown in the figure. [8]



- b) State Thevenin's theorem and give the procedure for Thevenizing a circuit. Explain the major advantages offered by use of this theorem. [8]
3. a) Use the node voltage method (Nodal) to find the current flowing through 10Ω resistor in the network shown below. [8]



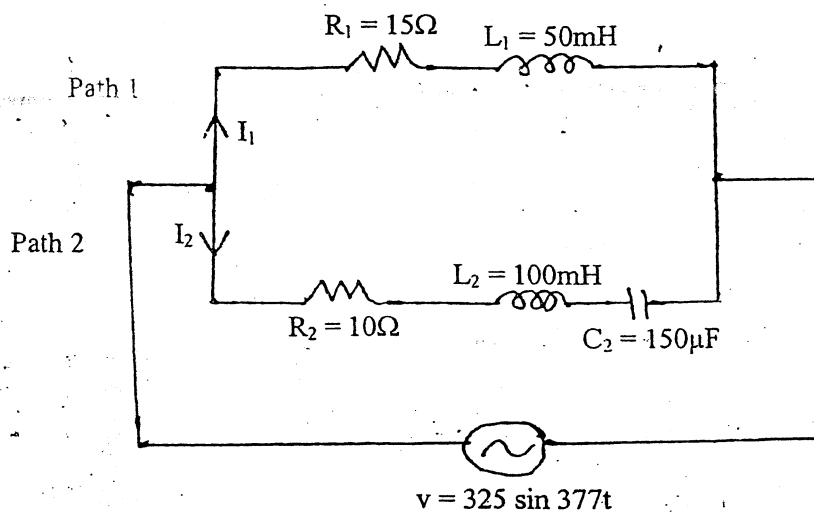
- b) Determine the power dissipated in 3Ω resistor in the circuit shown below using Norton's theorem. [8]



4. a) An rms voltage of $100\angle 0^\circ$ is applied to the series combination of \bar{Z}_1 and \bar{Z}_2 where $\bar{Z}_1 = 20\angle 30^\circ$. The effective voltage drop across \bar{Z}_2 is known to be $40\angle -30^\circ$ V. Find the reactive component of \bar{Z}_2 . [8]

- b) For the parallel circuit shown below, calculate: [8]

- RMS value of current, power factor, active and reactive power of path 1
- RMS value of current, power factor, active and reactive power of path 2
- RMS value of current, power factor, active and reactive power of the whole circuit



5. a) Define cycle, Time period, angular velocity, frequency, average and rms value of an alternating quantity. [6]

- b) A series circuit consists of resistance equal to 4Ω and inductance of 0.01 H. The applied voltage is $283 \sin(300t + 90^\circ)$ V. Calculate the followings: [10]

- Power factor
- Expression for $i(t)$
- The power dissipated in the circuit
- Voltage drop across each elements and
- Draw a phasor diagram

6. a) A 415V, 3 phase, 50Hz induction motor takes 50kW power from supply mains at 0.72 power factor lagging. Capacitors are connected in delta across the line to improve the overall power factor. Calculate the capacitance per phase in order to raise the power factor to 0.9 lagging. [8]

- b) Three loads $(31 + j59)\Omega$, $(30 - j40)\Omega$ and $(80 + j60)\Omega$ are connected in delta to a 3 phase, 200V supply. Find the phase currents, line currents and total power absorbed. [8]
