

Department of Leather Engineering
Khulna University of Engineering & Technology
 B. Sc. Engineering 1st Year 1st Term Examination-2020
Basic Electrical Engineering
EEE 1119

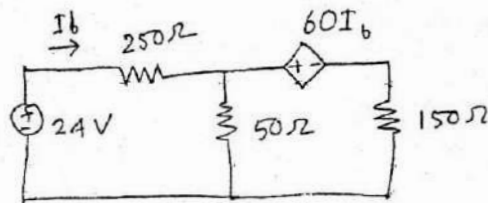
Time: 1.5 Hours

Full Marks: 120

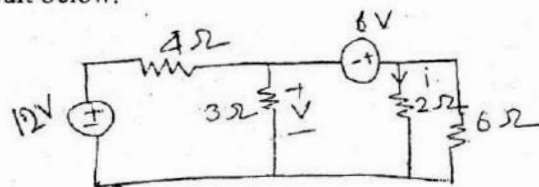
- N.B. i) Answer any **TWO** questions from each section in separate scripts.
 ii) Figures in the right margin indicate full marks.
 iii) Assume reasonable data if any missing.

SECTION-A

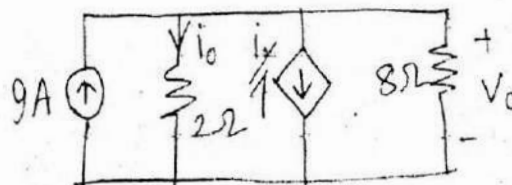
- 1(a) Explain the steps to determine the node voltages. Determine I_b in the following circuit using nodal analysis. 11



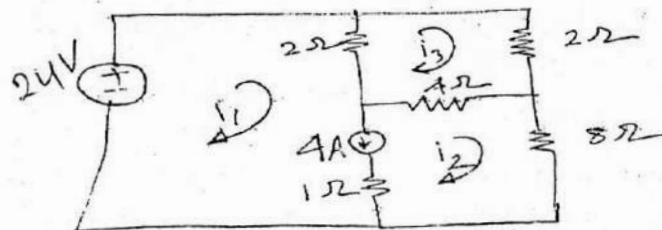
- 1(b) Find V and i in the circuit below. 10



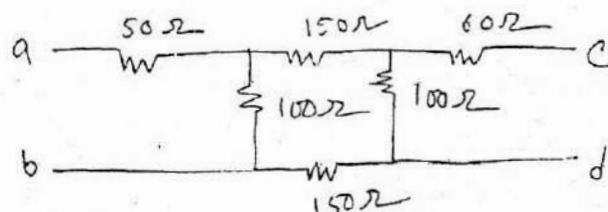
- 1(c) Find V_0 and i_0 in the following circuit. 09



- 2(a) Use mesh analysis to determine i_1 , i_2 and i_3 in the figure given below. 11

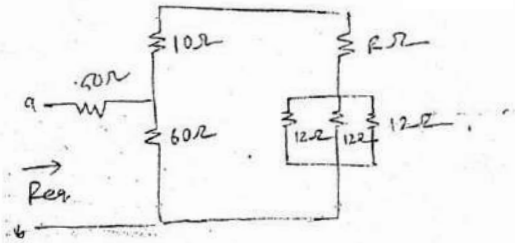


- 2(b) Consider the circuit in the following figure to find the equivalent resistance at terminals:
 i) a-b and ii) c-d 10

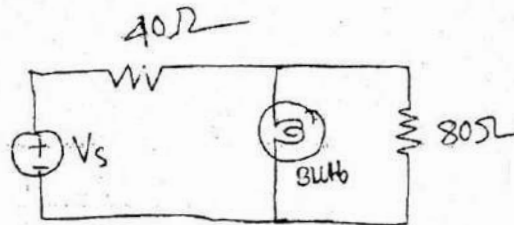


2(c) If $R_{eq}=50\Omega$ in the circuit of the given figure, find value of R.

09



- 3(a) What is meant by alternating current and voltage? Draw the wave shape of a sinusoidal voltage whose maximum voltage is 10V and period is 5 Sec. Also calculate the form factor and peak factor of this sinusoidal voltage. 12
- 3(b) Draw the circuit diagram of a series and parallel R-L-C circuit, where $R = 10\Omega$, $L = 2H$, and $C = 1F$. Calculate the resistance, inductive reactance, capacitive reactance and impedance of the series R-L-C circuit when frequency is 50Hz. 10
- 3(c) The 60w light bulb in the following figure is rated at 120 volts. Calculate V_s to make the light bulb operate at the rated conditions. 08



SECTION-B

- 4(a) Write down the basic principle of generating action of a DC machine. Also classify DC generator on the basis of field excitation with proper circuit diagram. 12
- 4(b) A short-shunt DC generator delivers a power of 5kw to five electric sewing machine. The terminal voltage of the generator is 250V and has armature series-field and shunt-field resistance of 0.08Ω , 0.50Ω and 300Ω , respectively. Calculate the induced EMF and the armature current of the generator. Allow 0.5V per brush for contact drop. 10
- 4(c) What is alternator? Lists five basic differences between DC generator and alternator. 08
- 5(a) How can we control the speed of a DC motor? Explain mathematically. Also draw the electrical and mechanical characteristics curve for DC series, shunt and compound motors. 14
- 5(b) Lists the name of different connections in three phase transformer. An 11 KVA transformer has 220 turns on the primary and 440 turns on the secondary winding. The primary is connected to 5500V, 50Hz supply. Find the full-load primary and secondary currents, the value of the secondary EMF and the maximum value of flux in the core. 10
- 5(c) Write short notes on: (i) Why transformer rating is in KVA (ii) Significance of back emf in DC motor. 06
- 6(a) A 3- ϕ induction motor is wound for 4-poles and is supplied from 50 Hz system. Calculate (i) The synchronous speed (ii) The rotor speed, when slip is 4% (iii) Rotor frequency when rotor runs at 600rpm. 10
- 6(b) Write down two basic differences and two applications of: (i) Synchronous motor and induction motor (ii) Stepper motor and servo motor. 09
- 6(c) Briefly explain the open and short circuit tests of a transformer. Also draw the circuit diagram. 11