

SCT 162-1/SCT 161-1 Basic Electricity and Electronics

Number of questions: three (03)

Answer all questions

Time allocation: One (01) hour

Total allocated marks: 100

All symbols used have their standard definitions

1.

a. Explain the following terms used in electrical networks.

- i. loop
- ii. node
- iii. junction
- iv. active element
- v. passive element

(10 marks)

b. Briefly explain the branch current method used to solve problems in electrical networks

(10 marks)

c. Transform the following Wye (Y) networks given in Figure 1 into equivalent Delta (Δ) networks.

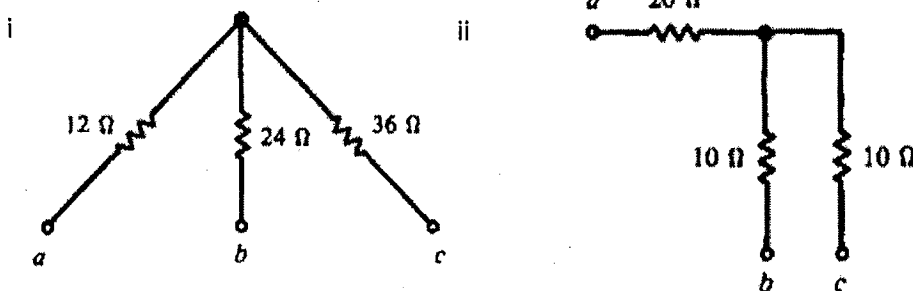


Figure 1

(20 marks)

2.

2.

- a. Describe the functionality of the commutator in a DC generator? (05 marks)
- b. Briefly explain types of armature winding of DC machines. (05 marks)
- c. A DC generator develops an e.m.f. of 220V when driven at 1100 rpm with a flux per pole of 0.02 Wb. It is desired that this e.m.f. be increased to 240V at 1200 rpm. What should be the value of the flux per pole under the new circumstances? (25 marks)

3.

- a. Write down four (04) problems occurred in DC motors. (04 marks)
- b. Write down the EMF equation for a DC generator. State the terms denoted by the symbols of your equation. (06 marks)
- c. A shunt generator in Figure 2 supplies a 20 kW load at 200 V through cables of resistance, $R = 100 \text{ m}\Omega$. If the field winding resistance, $R_f = 50 \Omega$ and the armature resistance, $R_a = 40 \text{ m}\Omega$.

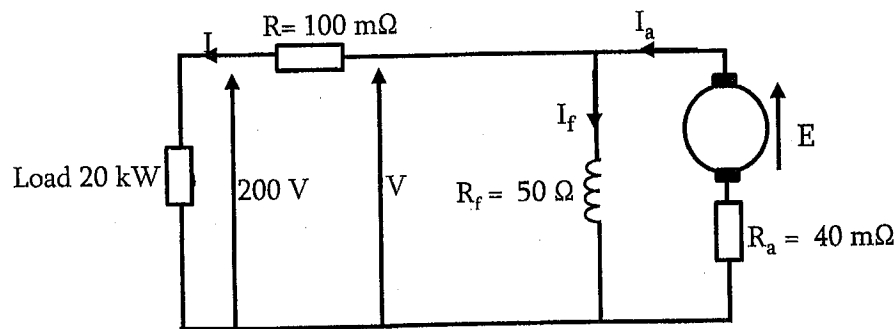


Figure 2

Determine the followings.

- i. the terminal voltage
- ii. the e.m.f. generated in the armature

(15 marks)