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International Islamic University Chittagong

Department of Computer Science and Engineering

Mid-term Examination, Spring-2022

Program: BSc in CSE

Course Title: Electrical Drives and Instrumentation

Course Code: EEE-2421

Time: 1 hour 30 minutes

Full Marks: 30

- 1(a) State Fleming's Left Hand Law. Why Motor sizing is important? U CO2 1
- 1(b) Describe the different types of motor duty class with proper timing diagram. R CO2 4
- 1(c) State the four basic principle of magnetic fields applied on electrical machines and justify the statement - 'Magnetic fields are the fundamental mechanism by which energy is converted from one form to another in transformer'. An CO1 4
- 2(a) "A DC machine can work as both the generator and the motor" -Justify the statement. U CO2 2
- 2(b) The load torque profile shown in Fig. 2(b) is measured for a constant speed load. Choose an appropriately sized motor to drive this load. (Assume a service factor of 25%). You do not need to consider starting performance. An CO1 3

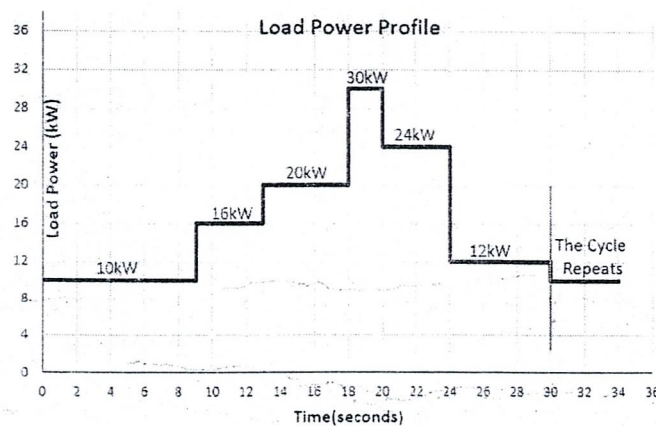


Fig. 2(b)

- 2(c) "A DC generator can be made from an AC generator" Describe the operation of DC generator with neat sketch and also justify the statement. An CO1 5
- OR
- 2(c) Draw the equivalent circuit of a transformer with proper notation. You build a 220V/9V transformer by yourself and want to draw an equivalent circuit of your transformer. How do you get values of all the parameters of the equivalent circuit? Write in detail. An CO1 5

- 3(a) "We cannot think of our modern power system without transformer." U CO2 2
Justify the statement.
- 3(b) Briefly explain the different types of losses in a transformer. Draw a three phase delta-wye connection. R CO2 3
- 3(c) The open circuit test and short circuit test were performed on the primary side of a 20-KVA, 8000/240-V, 50-Hz transformer and the following data were taken: An CO1 5

Open circuit test (on primary)

$$V_{OC} = 6000 \text{ V}$$

$$I_{OC} = 0.214 \text{ A}$$

$$P_{OC} = 300 \text{ W}$$

Short circuit test (on primary)

$$V_{SC} = 367 \text{ V}$$

$$I_{SC} = 2.5 \text{ A}$$

$$P_{SC} = 180 \text{ W}$$

Find the impedances of the approximate equivalent circuit referred to the primary side and sketch the circuit.

OR

- 3(c) A 100-KVA, 2000/440-V transformer has $R_1 = 3 \Omega$, $R_2 = 0.07 \Omega$. An CO1 5
The values of reactances are $X_1 = 5.2 \Omega$, $X_2 = 0.075 \Omega$.
- Calculate equivalent impedance referred to primary.
 - Calculate equivalent impedance referred to secondary.