

**International Islamic University Chittagong**  
**Department of Computer Science and Engineering**

Final Examination Autumn -2021

B.Sc. inCSE

Course Code: EEE 2421

Course Title: Electrical Drives and Instrumentation

Time: 2 hours and 30 minutes

Full Marks: 50

[Answer All the questions; figures in the right margin indicate full marks.]

**Part A**

- 1(a).** Briefly Explain the working principle of the induction motor. Also draw a neat diagram of its Exact equivalent circuit. **CO1 5**
- 1(b).** A 480-V, 50-Hz, 50-hp, three-phase induction motor is drawing 60 A at 0.85 PF lagging. The stator copper losses are 2.1 kW, and the rotor copper losses are 300 W. The friction and windage losses are 500 W, the core losses are 1800 W, and the stray losses are negligible. Find the following quantities: **CO3 5**  
(a) The air-gap power            (b) The power converted  
(c) The output power            (d) The efficiency of the motor
- or** A 208-V, 10-hp, four-pole, 60-Hz, Y-connected induction motor has a full-load slip of 5 percent **CO3 5**  
i. What is the synchronous speed of this motor?  
ii. What is the rotor speed of this motor at rated load?  
What is the rotor frequency of this motor at rated load?
- 2(a).** Write down the advantages of a Hybrid-stepper motor over Variable reluctance and permanent magnet stepper motor. **CO1 5**
- or** Discuss in brief about different types of stepper motor driving techniques. **CO1 5**
- 2(b).** What do you understand by the term "Slip"? A 6-pole, 3-phase induction motor operates from a supply whose frequency is 60 Hz. Calculate: **CO2 5**  
1. Magnetic field speed  
2. Rotor speed  
Frequency of rotor current at standstill.

**Part B**

- 3(a).** What A voltmeter having sensitivity of 1000 ohm/V reads 100 volts on its 150 Volts scale connected across an unknown resistor in series of an ammeter which reads 5 mA. **CO5 4**  
i. Apparent resistance of unknown resistor  
Error during measurement due to loading effect.
- or** An op-amp has a common mode gain 5. If 20v and 16v signals are given to input terminal, then a 40v output has come. Write your comments on whether this is a good op-amp or not good op-amp based on your analysis. **CO5 4**
- 3(b).** What are the Errors in Measurement? Explain in brief about different types of Errors. **CO4 6**
- 4(a).** Explain Photo-Voltaic effect briefly. **CO4 4**
- 4(b).** Describe the Seven Segment Display (SSD) and draw the truth table of SSD decoder. **CO4 6**  
**or** What is CMRR? Draw and explain the mechanism of Light Activated Differential Amplifier. **CO4 6**
- 5(a)** Describe solar cell as a optoelectronic transducer and also mention the Applications of PV cell. **CO4 6**
- 5(b)** What is transducer? Why Transducer is important? Explain Piezo-electric transducer in brief. **CO4 4**