



### End Term Examination (December 2019)

School: School of Engineering

Program: B.Tech-Mechatronics

Course: Electrical Machines and Drives

Course Code: MTE 205

Semester: III

Max Marks: 40

Duration (mins): 90

Figure in the left indicate full marks for the questions

#### PART A

**Q1. Answer ALL questions**

**[10]**

**(Each Question carries 1 mark)**

- Why transformer rating is in KVA?
- Why starter is necessary for DC motor starting
- Define synchronous speed and Write the expression.
- Define slip? What is the frequency of rotor of a three phase Induction motor if the supply frequency is 50 Hz and slip is 0.2?
- What is the relation between rotor resistance and reactance for maximum developed torque of a three phase induction motor?
- Why the transformer core is made of Cold Rolled Grain oriented Silicon Steel?
- Why wattmeter in OC test of transformer reads core loss and SC test reads copper loss?
- Give the expression for hysteresis and eddy current loss in transformer. Which loss is independent of the frequency?
- What are the applications of DC motor?
- Rotor resistance speed control method of Induction motor is applicable to which type of motor and why?

#### PART B

**Q2. Answer ALL the questions**

**Explain the following (ANY TWO)**

**[10]**

**(Each question carries 5 marks)**

- a) Full Load phasor diagram of Transformer. Explain with proper equation?
- b) Open circuit and Short circuit test of transformer with proper equation and circuit diagram.
- c) Explain the different conventional methods control of DC Shunt and DC series motors. Also discuss some advance techniques applicable now a day for speed control of these motors.

**Q3. Answer ALL the following (Any TWO)**

**[10]**

**(Each question carries 5 marks)**

- a) A shunt wound motor has an armature resistance of 0.1 ohm. It is connected across 220V supply. The armature current taken by the motor is 20 A and the motor runs at 800rpm. Calculate the additional resistance to be inserted in series with the armature to reduce the speed to 520 rpm. Assume that there is no change in armature current.
- b) A series motor with an unsaturated magnetic circuit and 0.5 ohm total resistance, when running at a certain speed takes 60 A at 500 V. If the load torque varies as the cube of the speed, calculate the resistance required to reduce the speed by 25%.
- c) A three phase 6 poles, 50 Hz Induction motor has a slip of 1% at no load and 3% at full load. Determine :a) Synchronous speed b) No load speed c) Full load speed d) frequency of the rotor current at standstill e) frequency of the rotor current at full load.

**Q4. Answer the following Questions (Any TWO)**

**(Each question carries 5 marks)**

**[10]**

- a) Explain the Torque-Speed and Torque-Slip of three phase Induction motor? Derive the condition for maximum torque.
- b) Is Single phase Induction motor a self-starting motor? Justify your Answer? What are the different types of Induction motor? Explain any one?
- c) Write Short note on (Any ONE)
  - i. Synchronous motor
  - ii. BLDC motor
  - iii. Universal motor

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