



CBCS SCHEME

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Fourth Semester B.E. Degree Examination, July/August 2021 Electric Motors

Time: 3 hrs.

Max. Marks:80

Note: Answer any FIVE full questions.

- 1 a. Draw and explain speed-load characteristics of DC series motor, and why this motor should never start without load. (06 Marks)
b. With a neat circuit diagram and characteristics curves, explain the speed of DC shunt motor is controlled by armature voltage method. (05 Marks)
c. A 250V, shunt motor on no load runs at 1000rpm and takes a current of 5Amp. The total armature and shunt field resistances are 0.1ohm and 250 ohm respectively. Calculate the speed when loaded and taking a current of 50Amps if armature reaction weakness the field by 3%. (05 Marks)
- 2 a. Explain in brief the various losses occur in a DC motors. (05 Marks)
b. With a neat sketch, explain the construction and operation of three point starter. List out its advantages and disadvantages. (07 Marks)
c. With usual notation, derive an expression for condition for maximum efficiency of a DC machine. (04 Marks)
- 3 a. With a neat diagram, explain procedure for conducting the brake test on a DC motor. Show how the efficiency can be determined with different loads on the motor. (06 Marks)
b. With neat circuit diagram, explain how the stray losses of DC machines can be determined by retardation test. (06 Marks)
c. In a brake test conducted on a DC shunt motor, the full-load readings are observed as, tension on tight side is 9.1kg, tension on slack side is 0.8kg, total current is 10Amp. Supply voltage is 110V speed is 1320 rpm. The radius of the brake drum is 7.5cm. Calculate its full load efficiency. (04 Marks)
- 4 a. Define the synchronous speed and slip of an induction motor. Explain the significance of slip. (06 Marks)
b. Derive an expression for full load torque of 3 - ϕ . Induction motor and obtain equation for maximum torque to full load torque. (06 Marks)
c. A three phase induction motor is wound for 4 pole and is supplied from 50Hz system. Calculate the speed of motor when slip is 4%. (04 Marks)
- 5 a. Draw and explain phasor diagram of three phase induction motor. (06 Marks)
b. Explain with sketch, the step by step procedure for predetermined the performance parameters of a three phase induction motor from the circle diagram by conducting necessary test. (10 Marks)
- 6 a. Explain with a neat diagram, the construction and operation of Deep bar rotor induction motor and draw its torque slip characteristics. (08 Marks)
b. With a neat diagram, explain the operation of three phase induction generator connected to
i) Standalone operation ii) Grid connected operation. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8=50, will be treated as malpractice.

- 7 a. List out the different types of starters used for protecting the induction motor. Explain with a neat diagram, the construction and operation of Direct On Line (DOL) starter. (08Marks)
- b. Explain with a neat sketches, the following speed control methods of three phase induction motors. i) Supply voltage control ii) frequency control. (08 Marks)
- 8 a. Explain double field revolving theory as applied to a single phase induction motor and hence prove that it is not self-starting motor. (08 Marks)
- b. With neat diagram, explain the construction and operation of split-phase induction motor and also draw its phasor diagram with torque-slip characteristics. (08 Marks)
- 9 a. With a neat diagram, explain working principle of synchronous motor and why it is not self-starting motor. (08 Marks)
- b. With a neat sketch, explain V-and inverted V curves of a synchronous motor. (08 Marks)
- 10 a. Explain with a neat diagram the construction and operation of universal motor and draw its speed – torque characteristics. (08 Marks)
- b. With a neat sketch, explain the construction and working of AC servomotor. List out its advantages, disadvantages and applications. (08 Marks)
