Reg. No._____ Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SIXTH SEMESTER BTECH DEGREE EXAMINATION APRIL 2018

Course Code: EE312

Course Name: ELECTRICAL AND ELECTRONICS ENGINEERING (MA, PE, MP)

Max Marks: 100 Duration: 3 hours

PART A

Answer any three full questions, each carries 10 marks.

1. a) What are the features of an ideal transformer? (4)

   b) A transformer has 500 turns of the primary winding and 10 turns of the secondary winding.

   i) Determine the secondary voltage if the secondary circuit is open and the primary voltage is 110 V.

   ii) Determine the current in the primary and secondary winding, given that the secondary winding is connected to a resistance load 22 Ω? (6)

2. a) Draw the equivalent circuit of a transformer referred to primary side and mention what are the circuit parameters. (4)

   b) A 250 kVA, 11,000 V/415 V, 50 Hz single phase transformer has 40 turns on the secondary. Calculate:

   i) The approximate values of full load primary and secondary currents.

   ii) The approximate number of primary turns.

   iii) Maximum value of flux. (6)

3. What are the factors determining the torque of a three phase induction motor? Draw the torque slip characteristics of a three phase induction motor. (10)

4. a) Why do the shaded pole motors have low ratings? (3)

   b) Explain how torque is produced in three phase induction motor. Derive the equation for frequency of rotor current. (7)

PART B

Answer any three full questions, each carries 10 marks.

5. a) What is meant by armature reaction? What is the effect of armature magnetic field on the main flux? What is meant by leading and trailing pole tip? (6)

   b) Explain why sparking occurs in a DC generator during commutation. Show the commutation process with the help of current vs. time plot for a given coil. (4)

6. a) A 4-pole, lap wound, d.c machine has a total number of 800 armature conductors and an armature resistance of 0.4 Ω. If the machine is found to run steadily as motor at 1000 rpm and drawing an armature current of 10 A from a 220 V D.C supply, calculate the flux per pole. (7)

   b) Explain the torque-armature current characteristics of a dc series motor. (3)

7. a) Briefly explain the operation of a Geneva Cam. (4)

   b) With a neat figure explain the operation of permanent magnet stepper motor. (6)

8. a) Explain the operation of a typical drive circuit for stepper motor phase winding.(4)

   b) A hybrid stepping motor has a step angle of 1.8°. Determine the number of rotor teeth if the stator has eight poles. (6)

PART C

Answer any four full questions, each carries 10 marks.

9. a) Explain how the hysteresis loss is determined from B-H curve. (4)

   b) The armature of a four-pole d.c. motor has an armature eddy-current loss of 400 W when driven at a given speed and field excitation. If the speed is increased by 12 per cent and the flux is increased by 11 per cent, calculate the new value of the eddy-current loss. (6)

10. a) Draw and explain the fan type load characteristics. (5)

    b) While selecting motors for use in mines squirrel cage induction machines are preferred over slip-ring induction machines. Give the reasons. (5)

11. What are the factors affecting the selection of a motor? Explain. (10)

12. Draw the VI characteristics of an SCR and explain its modes of operation. (10)

13. a) Derive the expression for average output voltage of half wave rectifier using thyristor with a firing angle of ‘α’. Assume a resistive load. (6)

    b) Compare the operation of transistor and thyristor. (4)

14. a) Write short notes on i) GTO’s and, ii) IGBT’s. (4)

    b) Explain the operation of single phase inverter with relevant waveforms. (6)

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