Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019

Course Code: EE311

Course Name: ELECTRICAL DRIVES & CONTROL FOR AUTOMATION

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks. Marks

1 a) Explain how the OCC of a dc shunt generator is obtained. Define critical resistance and critical speed. (6)

b) List out the applications of dc generator (4)

2 a) What are the various losses occurring in a dc generator (4)

b) In a 120V compound generator, the resistance of the armature, shunt and series windings are 0.06Ω, 25 Ω and 0.04 Ω respectively. The load current is 100 A at 120V.Find the induced emf and armature current when the machine is connected as long shunt (3)

c) What is mean by armature reaction? What are its effects on main field flux (3)

3 a) Explain how the speed is related to flux and back emf for a series and shunt motor (4)

b) With the help of block diagram explain the power stages of dc motor (4)

c) A 250 V shunt motor on no load runs at 1000 rpm and takes 5 amperes .Armature and shunt field resistances are 0.2 and 250 Ω respectively. Calculate the speed when loaded taking a current of 50 A. The armature reaction weakens the field by 3% (2)

4 a) Explain the working of a 3 point starter (6)

b) Explain the procedure for determining the efficiency of a dc motor (4)

PART B

Answer any three full questions, each carries 10 marks.

5 a) Derive the EMF equation of a transformer (4)

b) Explain the vector diagram of transformer under no load (6)

6 a) Draw and explain Instruments transformers (6)

b) Define voltage regulation of a transformer (4)

7 a) With a diagram explain the working principle of a 3 phase induction motor (6)

b) Draw the equivalent circuit of three phase induction motor (2)

c) A 3 phase Induction motor is wound for a 4 poles and is supplied from 50 Hz system calculate i) synchronous speed ii) speed of the rotor when the slip is 4% (2)

8 a) Explain the no load and blocked rotor test of a 3 phase induction motor (6)

b) A 4 pole 50 Hz 3phase induction motor has a rotor resistance of 0.024 Ω/ph and standstill reactance of 0.6 Ω/ph. Determine the speed at which maximum torque is developed (4)

PART C

Answer any four full questions, each carries 10 marks.

9 a) Explain the working of a universal motor? (4)

b) Explain the constructional details of alternator (6)

10 a) Derive emf equation of an alternator (6)

b) Define voltage regulation of an alternator (4)

11 a) Explain the different starting methods of synchronous motor (6)

b) Find the number of armature conductors in series per phase required for the armature of a 3 phase , 50 Hz ,10 pole alternator . The winding is star connected to give a line voltage of 11 kV. The flux /pole is 0.16 Wb. Assume K_c=1 and K_d=0.96 (4)

12 a) Explain with figure the working of multistack variable reluctance stepper motor (6)

b) List out the advantages of variable reluctance motor (4)

13 a) With the help of neat diagram explain the working of hybrid stepper motor (6)

b) Draw and explain the torque speed characteristics of stepper motor (4)

14 a) List out the applications of stepper motors (4)

b) With block diagram explain programmable logic controllers (6)