

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

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|---|--|-----|
| 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 $0.06\Omega$ , $25\ \Omega$ and $0.04\ \Omega$ 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 $250\ \Omega$ 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.*

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|---|--|-----|
| 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  $0.024 \Omega/\text{ph}$  and standstill reactance of  $0.6 \Omega/\text{ph}$ . 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)

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