

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree (S,FE) Examination January 2022 (2015 Scheme)

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) | With neat sketches explain armature reaction in a dc machine. | (6) |
| | b) | Derive the emf equation of a dc machine. | (4) |
| 2 | a) | Compare self-excited and separately excited dc generator. | (5) |
| | b) | Compare short shunt and long shunt compound wound generators with necessary equations. | (5) |
| 3 | a) | Derive the condition to maximize the power developed in a motor. Also list the limitations to achieve the maximum power. | (4) |
| | b) | Explain the losses that occur in a dc motor. | (6) |
| 4 | a) | Compare the mechanical characteristics of a d.c series motor and d.c shunt motor | (6) |
| | b) | What makes d.c motor a self-regulating machine? Explain. | (2) |
| | c) | In a brake test on a small shunt motor, the speed was 1800 r.p.m, the load on one side of the brake band was 29.8 N and on the other side 2.54 N. The diameter of the brake pulley was 15.4 cm. If the input current was 2.5 A at 220V, calculate (i) the brake horse power and (ii) the efficiency. | (2) |

PART B*Answer any three full questions, each carries 10 marks.*

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| 5 | a) | With neat phasor explain working component and magnetizing component of the input current in a transformer. | (3) |
| | b) | Compare a practical transformer on load with and without winding resistance and leakage flux with necessary figures. | (7) |

- 6 a) Draw the equivalent circuit of a transformer referred to its secondary. (2)
b) List the advantages of conducting OC and SC test in a transformer. (2)
c) With neat figure explain the operation of an autotransformer (6)
- 7 a) Explain the principle of operation of a three phase induction motor with neat figure. (5)
b) With neat sketch explain how an induction motor is started using an autotransformer (5)
- 8 a) Explain the various tests carried out in an induction motor to obtain the circle diagram. (10)

PART C

Answer any four full questions, each carries 10 marks.

- 9 a) With neat diagrams explain in detail a capacitor start Induction motor (6)
b) List any four characteristics of split phase induction motor (4)
- 10 a) With neat figure explain the operation of a universal motor. (5)
b) Compare salient pole and non-salient pole of an alternator (5)
- 11 a) Explain how continuous unidirectional torque is obtained in a synchronous motor with neat figure (5)
b) With neat figure list the merits and demerits of synchronous condenser (5)
- 12 a) Explain half step and full step operation of variable reluctance stepper motor (6)
b) Explain step angle and stepping rate (4)
- 13 a) Explain machine tool controllers (5)
b) Explain axis controllers (5)
- 14 a) With neat figure explain multi-stack variable reluctance stepper motor. (5)
b) Explain linear stepper motor (5)
