

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: EE205

Course Name: DC MACHINES AND TRANSFORMERS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks.

- | | | Marks |
|---|---|-------|
| 1 | The armature of a 250 V, 10kW, 4 pole lap connected generator was reconnected in wave. Find the new voltage, current and power ratings. | (5) |
| 2 | Derive the E M F equation of a DC generator. | (5) |
| 3 | Why a starter is required to start a DC motor? What is the essential element of a starter? | (5) |
| 4 | Draw the phasor diagram of a transformer on no load. Show the two components of the no load current and write their names. | (5) |
| 5 | What is meant by negative voltage regulation? For what type of load you may get negative voltage regulation? | (5) |
| 6 | A 1000/800V, 8kVA autotransformer supplies rated current to a load on low voltage side. Draw a schematic diagram and mark input current, output current and current in the section of the winding common to high voltage and low voltage sides. | (5) |
| 7 | Find the rated line currents on high voltage and low voltage sides of a 500kVA 11kV/400V delta-star transformer. | (5) |
| 8 | What is meant by vector group? What is Yd1 vector group? | (5) |

PART B

Answer any two full questions, each carries 10 marks.

- 9 Draw the developed view of a double layer lap winding of a 4 pole 12 slot armature. Commutator and brushes need not be drawn. (10)
- 10 Draw the developed view of mmf and flux distribution of a loaded 2 pole machine. (10)
- 11 The table shows OCC of a dc shunt generator at a speed 1000 rpm. What is the residual voltage? Find the critical resistance. Also find the maximum voltage build up at 1000 rpm and critical speed for a field resistance of 300 Ω . (You can find the answers by carefully observing the table. If necessary you may draw a rough sketch. Graph sheet is not required)

| | | | | | | | | | | | |
|-------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| I_f | 0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1 |
| E | 10 | 50 | 100 | 150 | 190 | 220 | 245 | 260 | 275 | 285 | 300 |

(10)

PART C

Answer any two full questions, each carries 10 marks.

- 12 A 250 V shunt motor has resistances 0.2 Ω and 250 Ω . The motor is driving a (10)

- constant load torque and running at 1000 rpm drawing 10 A current from the supply. Calculate the new speed and armature current if an external armature resistance of value 10Ω is inserted in the armature circuit. Also find the stalling current. Neglect armature reaction and saturation.
- 13 a) During Swinburne's test a 250V DC machine was drawing 3A from the 250V supply. The resistances are 250Ω and 0.2Ω . Find the constant loss of the machine. Also find the efficiency of the machine when it is delivering a 20A at 250V. (5)
- b) Why transformers are rated in kVA not in KW? (5)
- 14 Develop the equivalent circuit of a transformer. (10)

PART D

Answer any two full questions, each carries 10 marks.

- 15 Two standard tests were conducted on a 10kVA, 1000/200V transformer. Current in one test was 2A. Voltage in one test was 15V. Power factors were 0.8 and 0.2. Find the efficiency at 90% full load and 0.8 power factor. (10)
- 16 a) What are the necessary and desirable conditions for successful parallel operation of two single phase transformers? (5)
- b) Can a Yd transformer be operated in parallel with a Dy transformer? What additional condition is to be satisfied over and above the conditions listed in question 16 a). (5)
- 17 In Scott connection prove that the 3-phase currents will be balanced if the 2-phase currents are balanced. Assume upf load. (10)
