

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  $\Omega$ . (You can find the answers by carefully observing the table. If necessary you may draw a rough sketch. Graph sheet is not required)

I <sub>f</sub>	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  $\Omega$  and 250  $\Omega$ . 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  $10 \Omega$  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  $250 \Omega$  and  $0.2 \Omega$ . 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)

\*\*\*\*