D R3947

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 10 Ω 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 Ω and 0.2 Ω. 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)

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