

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: EE205

Course Name: DC MACHINES AND TRANSFORMERS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks.

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| 1 | Name the parts of dc machine and state the functions of any two parts. | (5) |
| 2 | Derive the emf equation of dc generator. | (5) |
| 3 | With the help of speed-armature current characteristics, explain why the series motors should not be started without any load. | (5) |
| 4 | Why the rating of transformer in kVA? | (5) |
| 5 | List out the necessary and desirable conditions for parallel operation of two single phase transformers. | (5) |
| 6 | Define all day efficiency. How this efficiency of a transformer varies with load? | (5) |
| 7 | A 10 kVA, 1500/150 V, single phase transformer has following parameters:
<i>HV side: $r_1 = 4.2\Omega$ $x_1 = 5.1\Omega$ LV side: $r_2 = 0.05\Omega$ $x_2 = 0.062\Omega$ Find the per unit values of equivalent resistance and inductive reactance.</i> | (5) |
| 8 | What is the purpose of tertiary winding in three winding transformer? | (5) |

PART B

Answer any two full questions, each carries 10 marks.

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| 9 | a) Draw the winding diagram of a dc machine with 4 poles, 12 slots progressive double layer lap winding. | (7) |
| | b) Name the different losses occur in dc machine. How the magnetic losses are minimized in dc machine? | (3) |
| 10 | a) A 4 pole wave connected armature of a dc generator has 120 conductors and runs at 1200 rpm. If the flux per pole is 0.015 Wb, find the emf generated. Keeping the flux constant, suggest a change in the armature of the generator so that the generator is capable to generate half of the no load voltage when running at the same speed. | (7) |
| | b) What is self excitation? What are the conditions for building up of voltage in dc shunt generator? | (3) |
| 11 | a) A 10 KW shunt generator having resistances 1Ω and 100Ω , delivers full load at a | (7) |

terminal voltage of 230 V. Determine the efficiency of the generator at full load, assuming the iron, friction and windage losses amount to 500 W.

- b) Write any three differences between wave winding and lap winding. (3)

PART C

Answer any twofull questions, each carries 10 marks.

- 12 What is the necessity of a starter for motor? With a suitable diagram, explain the working of 3 point starter. (10)
- 13 a) With suitable diagram, how the Swinburne's test can be employed to predetermine the efficiency at full load condition when running as a generator (6)
- b) Differentiate between core type and shell type transformers. (4)
- 14 Explain the working of a transformer on no-load and load condition. (10)

PART D

Answer any twofull questions, each carries 10 marks.

- 15 a) Derive the condition for maximum efficiency of transformer. How the efficiency of a transformer depends on load? (5)
- b) Why the star delta three phase transformer is used to step down the voltage in transmission system (5)
- 16 A 600W single phase transformer working at unity power factor has an efficiency of 95 percent at both half full load and full load. Determine the efficiency at 70 percent of full load. (10)
- 17 With neat circuit diagram, explain how a two phase supply can be obtained from a three phase supply. Prove that three phase currents will be balanced, for a balanced upf load on 2-phase side. (10)
