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D7145

Total Pages: 2

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
THIRD SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: EE205

Course Name: DC MACHINES AND TRANSFORMERS (EE)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks.

- | | | Marks |
|---|--|-------|
| 1 | What is the function of equalizer ring in a lap wound dc machine? | (5) |
| 2 | Derive the emf equation of a dc generator. | (5) |
| 3 | What is starter? What is the necessity of starter in dc motor? | (5) |
| 4 | Distinguish between core and shell type transformer? | (5) |
| 5 | What is an auto transformer? Derive an expression for the saving of copper in an autotransformer as compared to an equivalent two winding transformer? | (5) |
| 6 | Derive the condition for maximum efficiency of transformer. | (5) |
| 7 | What are the necessary conditions for parallel operation of three phase transformer? | (5) |
| 8 | What is the purpose of tertiary winding on transformer? | (5) |

PART B

Answer any two full questions, each carries 10 marks.

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|-------|--|------|
| 9 | With neat diagram explain the construction of dc generator. | (10) |
| 10 a) | A 250V short shunt compound generator is delivering 80A. Armature, series and shunt field resistances are 0.05Ω , 0.03Ω and 100Ω respectively. Calculate the induced emf. | (5) |
| b) | Define commutation. Explain the process of commutation with neat sketches. | (5) |
| 11 | What are the effects of armature reaction on the operation of dc machine? What are the remedial measures taken to counter effects of armature reaction? | (10) |

PART C

Answer any two full questions, each carries 10 marks.

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|-------|---|------|
| 12 a) | Explain with neat sketch how speed control of a dc motor is done. | (5) |
| b) | Draw the phasor diagram of a single phase transformer supplying to inductive load. | (5) |
| 13 | A 6 pole 250V series motor is wave connected. There are 240 slots and each slot has 4 conductors. The flux per pole is 0.175mWb when the motor is taking 80A. The field resistance is 0.05Ω , the armature resistance is 0.1Ω and the iron and frictional loss is 0.1kW . Calculate (a) speed (b) BHP (c) shaft torque (d) the pull in newtons at the rim of the pulley of diameter 25cm. | (10) |
| 14 | What are the different cooling methods used in transformer? | (10) |

PART D

Answer any two full questions, each carries 10 marks.

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|-------|---|-----|
| 15 a) | The following test results were obtained on a 20kVA, 2200/220V, 50Hz single phase transformer | (5) |
| | OC Test(LV side) 220V 1.1A 125W | |
| | SC Test(HV side) 52.7V 8.4A 287W | |

The transformer is loaded at unity power factor on secondary side with a voltage of 220V. Determine the maximum efficiency and load at which it occurs.

- b) Explain the working of Off-Load tap changing transformer with help of neat diagram. (5)
- 16 In detail explain scott connection in three phase transformer. (10)
- 17 a) A 220kVA single phase transformer is in circuit continuously. For 8 hours in a day, the load is 60kW at 0.8 pf. For 6 hours, the load is 80kW at unity pf and for the remaining period of 24 hours it runs on no load. Full load copper losses are 3.02kW and the iron losses are 1.6kW. Find all day efficiency. (6)
- b) What are the advantages and disadvantages of delta-delta connection? (4)

- (2) What is the function of a transformer?
- (2) How is the efficiency of a transformer calculated?
- (2) What is the purpose of a transformer?
- (2) Distinguish between core and shell type transformers.
- (2) What is an auto transformer? Derive an expression for the saving of copper in an auto transformer as compared to an equivalent two winding transformer.
- (2) Define the coefficient of transformation of transformer.
- (2) What are the necessary conditions for parallel operation of three phase transformers?
- (2) What is the purpose of tertiary winding on transformer?

PART B

Answer any two full questions, each carries 10 marks.

9. With neat diagram explain the construction of a generator. (10)
10. A 250V shunt connected generator is delivering 80A. Armature series and shunt field resistances are 0.05Ω, 0.03Ω and 100Ω respectively. Calculate the induced EMF. (2)
11. Define commutation. Explain the process of commutation with neat sketches. (2)
12. What are the effects of armature reaction on the operation of a machine? What are the remedial measures taken to counter effect of armature reaction? (10)

PART C

Answer any two full questions, each carries 10 marks.

12. a) Explain with neat sketch how speed control of a motor is done. (2)
- b) Draw the phasor diagram of a single phase transformer supplying to inductive load. (2)
13. A 6 pole 250V series motor is wave connected. There are 240 slots and each slot has 4 conductors. The flux per pole is 0.125mWb when the motor is taking 80A. The field resistance is 0.05Ω, the armature resistance is 0.1Ω and the iron and frictional loss is 0.1kW. Calculate (a) speed (b) BHP (c) shaft torque (d) the pull in newtons at the rim of the pulley of diameter 25cm. (10)
14. What are the different cooling methods used in transformers? (2)

PART D

Answer any two full questions, each carries 10 marks.

12. a) The following test results were obtained on a 20kVA, 2300/230V, 50Hz single phase transformer. (2)

OC Test (V side) 230V 1.1A 125W
SC Test (V side) 230V 8.4A 287W