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Question Paper Code: 31362

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

Sixth Semester

Electrical and Electronics Engineering

01UEE602 - ELECTRICAL MACHINE DESIGN

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Define space factor.

2. Mention the different types of duties of a machine.

3. List the advantages and disadvantages of large number of poles.

4. Mention the factors governing the choice of armature slots in a dc machine.

5. List the different methods of cooling of transformer.

6. What are the advantages of stepped core?

7. Where the mush winding is used?

8. Why induction motor is called as rotating transformer?

9. Define short circuit ratio of synchronous machine.

10. State the factors for separation of D and L for cylindrical rotor machine.

PART - B (5 x 16 = 80 Marks)

11. (a) State and explain the general factors that influence the choice of specific electric and magnetic loadings for rotating machines. (16)

(b) State and explain the various classes of insulating materials, employed in electrical machines, according to temperature limits. (16)

12. (a) (i) Derive the output equation of a dc machine. (8)

(ii) State and explain the factors which govern the choice of specific magnetic loadings. (8)

Or

(b) Explain the guiding factors for:

(i) Design of commutator and brushes. (8)

(ii) Selection of number poles. (8)

13. (a) Determine the dimensions of core and yoke for a 200 KVA, 50Hz, single phase core type transformer .A cruciform core is used with distance between adjacent limbs equal to 1.6 times the width of core laminations. Assume voltage per turn 14V, maximum flux density 1.1 Wb/m^2, and current density 3 A/mm^2, and stacking factor =0.9.The net iron area is 0.56 d^2 in a cruciform core where as d is the diameter of circumscribing circle. Also the width of largest stamping is 0.85 d. (16)

Or

(b) Discuss about temperature rise and methods of cooling of transformer. (16)

14. (a) A 11KW, 3-phase, 6 pole, 50Hz, 220V, star connected induction motor has 54 stator slots, each containing 9 conductors. Calculate the current in rotor bars. The number of rotor bars is 64.The machine has an efficiency of 0.86 and a power factor of 0.85.The rotor mmf may be assumed as 85% of stator mmf. Also find the bar and end ring sections if the current density is 5A/mm^2. (16)

Or

(b) (i) Discuss the factors to be considered for selection of rotor slots of squirrel cage machine. (10)

(ii) Explain how the magnetizing current and short circuit current influence the performance of induction motor drive. (6)

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15. (a) (i) Explain all the valid points regarding armature design of synchronous machine.

(10)

(ii) Discuss the design of damper windings for synchronous drive. (6)

Or

(b) Find the main dimensions of a 2500 KVA, 3 KV, 50Hz, 3Phase, 187.5 rpm, three phase Salient pole synchronous generator. The generator is to be a vertical water wheel type. The specific magnetic loading is $0.6wb/m^2$ and specific electric loading 34000 A/m. Use circular poles with ratio of core length to pole pitch = 0.65.Specify the type of pole construction used if the runaway speed is about 2 times the normal speed. (16)

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