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Question Paper Code: 36302

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Sixth Semester

Electrical and Electronics Engineering

01UEE602 - ELECTRICAL MACHINE DESIGN

(Regulation 2013)

Duration: 1:15hrs

Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

- Sheet steels possessing higher silicon content are called
 - Dynamo grade steel
 - Transformer grade steel
 - Cold rolled steel
 - Stainless steel
- The value of specific electric loading can be increased in machines with
 - better ventilation conditions
 - Less value of maximum temperature rise
 - high value of current density
 - all the above
- _____ is defined as the ratio of actual length of iron in stacks of assembled core plates to total axial length of the stack.
 - Stacking factor
 - Gap contraction factor
 - Field form factor
 - Space factor
- The maximum value of voltage between adjacent commutator segments at load to avoid flash over is
 - 15
 - 70
 - 50
 - 30
- Utilisation factor is high for a transformer with
 - rectangular core
 - square core
 - 4 stepped core
 - 2 stepped core

6. For designing a transformer with minimum cost the cost of copper must be _____ to cost of iron.
- (a) greater than (b) less than (c) equal to (d) two times
7. For designing an induction machine with good efficiency, the ratio of core length to pole pitch must be equal to
- (a) 1 (b) 2 (c) 1.25 (d) 1.5
8. If the value of Dispersion coefficient is large, then the induction machine will have
- (a) unity power factor (b) low power factor
(c) good power factor (d) best power factor
9. What type of pole construction is used for a synchronous machine with the diameter 1.36m and speed 6.25 rps with the runaway speed 1.8 times the normal speed.
- (a) T head construction (b) Bolted on pole construction
(c) Dove tailed construction (d) both a and c
10. What is the range of SCR (Short Circuit Ratio) for turbo alternators?
- (a) 0.5 to 0.7 (b) 0.05 to 0.07
(c) 0.15 to 0.17 (d) 0.25 to 0.27

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. For a certain DC generator the core loss is 1000 W and the armature resistance is 0.025 Ω . The core and windings form a cylinder 0.25 m long and 0.25 m in diameter. Specific loss dissipation is 230 $W/m^2-^{\circ}C$. Calculate the specific electric loading which would result in windings and core having a temperature rise of 40 $^{\circ}C$. The machine is wave wound with 270 armature conductors. Assume that the heat is dissipated from the cylindrical surface only. (8)
12. State and explain the factors which govern the choice of specific magnetic loadings. (8)
13. A 250kVA, 6600/400V, 3 phase core type transformer has a total loss of 4800Watts on full load. The transformer tank is 1.25m in height and 1m x 0.5m in Plan. Design a suitable scheme for cooling tubes if the average temperature rise is to be limited to 35 $^{\circ}C$. the diameter of the tube is 50mm and spaced 75mm from each other. The average height of the tube is 1.05m. (8)

14. Evaluate the main dimensions, turns per phase, number of slots, conductor cross section and slot area of a 250 HP, 3- Phase, 50 Hz, 400 V, 1410 rpm slip ring induction motor. Assume average flux density in the air gap = 0.5 Wb/m^2 , ampere conductor/meter = 30,000 A/m, efficiency = 0.9 and power factor = 0.955, current density = 3.5 A/mm^2 . The slot space factor is 0.4 and the ratio of core length to pole pitch is 1.2. The machine is delta connected. (8)
15. Explain all the valid points regarding armature design of synchronous machine. (8)
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