June 12, 2024 10:30 am - 01:30 pm 1T00837 - B.E.(Electrical Engineering)(SEM-VII) (Choice Base Credit Grading System)(R- 2019-20)(C Scheme) / 42280 - Electrical Machine Design (DLOC - IV)   QP CODE: 10056967

Duration – 3 Hours   **Total Marks - 80**

Note:- (1) Question No.1 is compulsory.
   (2) Attempt any three questions out of the remaining five questions.
   (3) Assume suitable data if necessary and justify the same.

Q 1.	Answer the following questions.	20M
	a) Classify different insulating materials based on temperature.	5M
	b) Write about choice of flux density for designing of a transformer.	5M
	c) Explain effect of dispersion coefficient on maximum power factor.	5M
	d) Write a short note on design of EV grade induction motor.	5M

Q 2 a)   Derive the output equation of 3 phase transformer.   10M

Q 2 b)   Determine the overall dimensions of a 200KVA, 6600/400V, 50Hz, 1 phase,   10M
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/turn=14V, maximum flux density = $1.1 wb/m^2$, current density = 3 A/mm^2 , Window space factor =0.32, stacking factor=0.9. For a cruciform core, width of largest stamping =0.85d and Net iron area=0.56 d^2 where d is the diameter of circumscribing circle.

Q 3 a)   Derive the output equation for 3 phase Induction motor.   10M

Q 3 b)   Determine the main dimensions and total no of conductors for minimum cost   10M
design, for a 3.7KW, 400V, 1410 rpm, 3ph, 4 pole, 50Hz, delta connected squirrel cage IM with the data: average flux density in air gap = 0.45 wb/m^2, ampere conductor = 23000A/m, efficiency= 0.85, pf= 0.84, winding factor= 0.955, current density= 3.5 A/mm2, stacking factor= 0.9, slot space factor= 0.4

Q 4 a)   What are the factors considered when estimating the length of air gap?   5M
Explain it in detail

Q 4 b)   What are the rules for selecting rotor slots in induction motor?   5M

Q 4 c)   Write a short note on Short Circuit Ratio (SCR). What is the effect of SCR on   10M
machine performance

Q 5 a)   How would you determine the full load field mmf in synchronous machine?   10M

Q 5 b)   Determine the suitable stator dimensions for a 1000 KVA, 50Hz, 3 phase   10M
alternator to run at 375 rpm. Take mean gap density over the pole pitch as 0.55 Wb/m^2, the specific electric loading as 25000 A/m. Assume winding factor=0.955. The peripheral speed should not exceed 35m/s.

Q 6 a)   What are the limitations of traditional machine design? Explain analysis   10M
method of computer aided design.

Q 6 b)   Write a short note on methods of cooling of Transformer?   10M

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