



Regulation R18

Subject code: 2E5BA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech V Semester Supplementary Examinations, January 2023

ELECTRICAL MACHINE DESIGN

(EEE)

Maximum Marks: 70

18-01-2023

Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

(10x2M=20 Marks)

All the following questions carry equal marks

- 1 What is cogging .
- 2 What are the materials used for magnetic circuit. .
- 3 Define specific electrical loading.
- 4 List the advantages of core type transformer. .
- 5 Explain different types slots used in induction machine
- 6 Distinguish between salient pole and non salient pole alternator .
- 7 What are the disadvantages of high specific magnetic loading.
- 8 What are the desirable characteristics magnetic circuit.
- 9 List the advantages of caad.
- 10 Explain about synchronous impedance.

Part-B

(10M X 5=50Marks)

Answer All the following questions.

- 11 Explain the importance of specific loadings in designing of electrical machines. 10

OR

- 12 What are the main factors to be considered for designing of electrical machines. 10

- 13 3 phase ,60 HZ ,oil cooled core type transformer has the following dimensions : 10

Distance between core centers=0.1m

Height of window $b=0.24\text{m}$

Diameter of circumscribing circle $=0.14\text{m}$

The flux density in the core $=1.20\text{wb/m}^2$

The current density in the conductor $=1.5\text{A/mm}^2$

Assume window space factor $=0.2$ and core area factor $=0.56$ the core is 2 stepped .

Estimate the KVA rating of transformer .

OR

- 14 a) Explain about choice of specific loading while designing a transformer. 03

b) The tank of 1250 KVA ,natural oil cooled transformer has the dimension length ,width and height as $0.65 \times 1.55 \times 1.85\text{ m}$ respectively. the full load loss $=13.1\text{KW}$, loss dissipation due to radiations $=6\text{ W/m}^2\text{-}^\circ\text{C}$, loss dissipation due to convection is 6W , improvement in convection due to provision of tubes by 40%, the temperature rise is $40\text{ }^\circ\text{C}$, length of each tube is 1m , diameter of the tube is 50mm . find the no. of tubes for this transformer . neglect the top and bottom surface of tank as regard the cooling. 07

- 15 a) What are the factors effects the choice of air gap length.. 05
b) Calculate the specific electric and magnetic loading of 100HP, 3000V, 3-phase ,50 Hz,8 pole, star connected ,induction motor having stator core length=0.5m and stator bore =0.66 turns/phase=286.Assume full load efficiency as 0.938 and p.f as 0.86. 05
- OR
- 16 Estimate the stator core dimensions, number of stator slots and no of stator conductors per slot for a 100Kw,3300V,50Hz,12pole, star connected slip ring induction motor. $B_{avg}=0.4 \text{ wb/m}^2$, $a_c=25000$ amp conductors/mn=0.9,PF=0.9.Choose main dimensions to give best power factor .The slot loading should not exceed 500 amp conductors. 10
- 17 a)explain about SCR in alternator. 03
b)Determine the main dimensions for a 1000KVA ,50HZ,3 phase 375 rpm alternator .the airgap flux density is 0.55 wb/m^2 and the ampere conductor per metre are 28000 use rectangular poles and assume suitable value for ratio of core length to pole pitch in order that bolted on pole construction is used for which the maximum permissible peripheral speed is used for which the maximum permissible peripheral speed is 50m/s the run way speed is 1.8 times synchronous speed $K_{ws}=0.955$, $L/T=2$. 07
- OR
- 18 a)Explain about choice of magnetic loading while designing synchronous machine. 04
b) Obtain the suitable values of diameter and core length for a 1500KVA ,3300V,3 phase , delta connected 10 pole alternator which has specific magnetic loading 0.5 T and specific electric loading 34000A/m.the ratio of pole pitch to core length is 0.8 .assume winding factor as 0.958, $F=50\text{HZ}$. 06
- 19 a) Describe the salient features of computer aided design of electrical machine. 05
b) What are the advantages of computer aided design? 05
- OR
- 20 a) What are the hybrid techniques available for computer aided design? 05
b) Explain how synthesis method solving electrical machine using CAAD with flow chart. 05