



R18 Regulation

Subject code:2E5BA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, May 2025

ELECTRICAL MACHINE DESIGN

(EEE)

Maximum Marks: 70

Date: 24.06.2025

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

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	What is cogging.	2M	1	L1
2	Define window space factor.	2M	1	L1
3	Define core area factor.	2M	2	L1
4	Write the different types slots used in induction machine	2M	2	L1
5	List the CAAD software used for designing machines	2M	3	L1
6	Define window space factor.	2M	3	L1
7	What are the disadvantages of low specific magnetic loading.	2M	4	L1
8	What are the desirable characteristics of thermal circuit..	2M	4	L1
9	Write about synthetic method in CAAD.	2M	5	L1
10	Give the expressions for rotor bar current and end ring current.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	a) What are design limitations in machines design. b) Explain briefly about electrical materials and their properties.	5M 5M	1	L2
OR				
12	a) What is meant by specific loadings. What are the parameters depending on the designing of the machine. b) what are the main factors to be considered for designing of electrical machines.	5M 5M	1	L2
13	a) Derive the output equation 3 phase transformer b) A 250KVA, 6600/400v, 3phase core type transformer has a total loss of 480w on full load. The transformer tank is 1.25m in height and 1mx0.5m in plan. Design the suitable scheme for cooling tubes if the average temperature rise is to be limited to 35 ⁰ c. the diameter of the tube is 50mm and are spaced 75mm from each other. The average height of the tube is 1.05m.	5M 5M	2	L2
OR				
14	a) explain different cooling methods used in transformer.	5M	2	L2

	b) Calculate approximate overall dimensions for 200KVA, 6600V, 50Hz, 3 phase core type transformer. The following data may be assumed: EMF per turn=1.0V; maximum flux density=1.3Wb/m ² current density=2.5A/mm ² ; window space factor =0.3, overall height = overall width; stacking factor=0.9. use a 3 stepped core. Width of largest stamping=0.9d and net iron area=0.6d ²	5M		
15	a) What are the factors effects the choice of air gap length? b) Define specific magnetic loading (B _{av}) and specific electric loading (a _c) and obtain an expression for the “output co-efficient for induction machine.	5M 5M	3	L2
	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 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.	10M	3	L2
17	a) List the factors to be considered for the choice of air gap length in synchronous machines. b) Calculate the stator core dimensions for a 10MVA, 11KV, 50Hz, 3Ph, 2pole turbo alternator based on the following information. B _{av} =0.63T, a _c =48,000 amp cond/mt. Limiting periphery speed v _a =120m/sec, length of air gap l _g =2cm , K _{ws} =0.955.	5M 5M	4	L2
	OR			
18	a) Calculate the stator core dimensions for a 10MVA, 11KV, 50Hz, 3Ph, 2pole turbo alternator based on the following information. B _{av} =0.63T, a _c =48,000 amp cond/mt. Limiting peripheral speed v _a =120m/sec, length of air gap l _g =2cm , K _{ws} =0.955. b) define the short circuit ratio(SCR) of a synchronous machine and discuss its effect on machine performance.	5M 5M	4	L2
19	a) Explain on analysis method of solving electrical machine using CAD with a flow chart. b) What are the advantages of analysis methods?	5M 5M	5	L2
	OR			
20	a) Describe the salient features of computer aided design of electrical machine. b) List the advantages of machine design by using CAAD.	5M 5M	5	L2