R22 Regulation *Subject code:4E3BD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, June 2026

ELECTRICAL MACHINES-I

(EEE)

Maximum Marks: 60 Date:18.06.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 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 (10X1M=10 Marks)		Marks	CO	BTL
1.a)	Compare Lap and Wave winding.	1M	1	L2
b)	Define critical speed.	1M	1	L2
c)	Mention the various losses in a D.C motor.	1M	2	L1
d)	Why a DC series motor cannot be started on no load?	1M	2	L1
e)	What is the purpose of the Brake test?	1M	3	L1
f)	Mention the disadvantages of Field's Test?	1M	3	L2
g)	Compare Core and Shell type Transformers.	1M	4	L2
h)	Why transformer rating is expressed in terms of kVA?	1M	4	L1
i)	The O.C test conducted on L.v side gives iron loss of100w.If the same test is conducted on H.V side , does the iron loss change?	1M	5	L4
j)	Mention the applications 3-phase transformer connections.	1M	5	L2

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	Explain the functions of major parts of a DC generator with neat sketch.	10M	1	L2
	OR			
3	a) What are the possible causes for not building up emf in self excited DC Generators? What are the remedial measures to be taken?	5M	1	L1
	b) A 60 KW, 500 V, 4 – pole generator has a 2 layer simplex lap winding in 36 slots with 10 conductors in each layer. If the brushes are given an actual lead of 100, calculate: i) Demagnetizing AT / pole ii) Cross – magnetizing AT / Pole. iii) Number of turns per pole on the compensating winding if the pole arc to pitch is 0.8 and brushes are placed on geometric neutral plane.	5M	1	L6
4	a) Explain the principle of operation of DC motor in detail.	5M	2	L2
	b) A 250V DC Shunt motor has an armature resistance of 0.5 Ω and a field resistance of 250 Ω. When driving a constant torque load at 600 rpm, the motor draws 21 A. What will be the new speed of the motor if an additional 250 Ω resistance is inserted in the field circuit?	5M	2	L5

	OR			
5	How 4-point starter is different from 3-point starter. With a neat diagram explain the construction and working of 4-point stator.	10M	2	L3
6	a) Explain the procedure of separation of stray losses in a d.c. motor test. b) Hopkinson's test on two similar DC shunt machines gave the following data: Line voltage 230V, line current excluding both the field currents is 50A, motor armature current 360A, field currents 4A and 5A. Calculate the efficiency of each machine. Armature resistance of each machine is 0.15Ω.	5M 5M	3	L2 L5
	OR			
7	With a neat sketch, explain the procedure of Swinburne's test? Mention its advantages and disadvantages.	10M	3	L2
8	a) Derive an expression for induced emf in a transformer. b) A 1-phase transformer has 500 primary and 1200 secondary turns. The net cross-sectional area of the core is 75 cm^2. If the primary winding be connected to a 400-V, 50 Hz supply, calculate. (*i*) the peak value of flux density in the core and (*ii*) voltage induced in the secondary winding.	5M 5M	4 4	L4 L5
	OR			
9	a) Draw the equivalent circuit of single-phase transformer and explain. b) Explain the effect of variation of supply voltage and frequency on iron losses.	5M 5M	4 4	L2 L2
10	a) What is auto transformer? Explain the working principle of auto transformer. b) What are the advantages of poly phase transformers? Give different configurations.	5M 5M	5	L1 L1
	OR			
11	Explain the significance and procedure of a Sumpner's test and draw the necessary connection diagram for it and how it is different from OC and SC test.	10M	5	L2