



R20 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

Subject code:3P3BD

B.Tech III Semester Regular/Supplementary Examinations, March/April 2023

ELECTRICAL MACHINES-I

(EEE)

Maximum Marks: 70

Date:04.04.2023 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

All the following questions carry equal marks

- 1 Write the function of commutator
- 2 Differentiate lap and wave windings
- 3 Write few applications of series motor
- 4 Write the salient points of speed control of induction motors.
- 5 What are stray losses.
- 6 List out few salient points of no-load test of DC motors.
- 7 What are eddy current losses.
- 8 Define efficiency of a transformer.
- 9 List out the advantages of single-phase auto transformer.
- 10 Write the advantages of a 3-phase transformer?

(10x2M=20 Marks)

Part-B

Answer All the following questions.

- 11 (a) Discuss the principle of operation of DC generator. (5X10M=50Marks)
(b) A dc machine has 8 pole, lap connected armature with 960 conductors and flux per pole is 40mWb. Calculate the generated EMF if it is driven at 400 rpm. Calculate the speed of the machine to generate a voltage of 400V, if the lap wound armature is replaced by wave winding. 5M
- 12 (a) Derive an expression for emf induced in DC generator. 5M
(b) Give the classification of DC generators along equivalent circuits and generated voltage expressions. 5M
- 13 (a) Explain speed control of DC motors by armature voltage method? 5M
(b) A DC motor takes an armature current of 100A at 480V. The armature circuit resistance is 0.2Ω. The machine has 6poles and lap wound armature with 864 conductors. The flux per pole is 50mWb. Calculate speed and torque developed in the armature. 5M
- 14 (a) Explain the working of 4-point starter. 5M

- (b) A 250V DC shunt motor has an armature resistance of 0.5Ω and field resistance of 250Ω . When driving a constant torque load at 600 rpm, the motor draws 21A. What will be the new speed of the motor if an additional 250Ω resistance is inserted in the field circuit. 5M
- 15 (a) Explain the different losses occurring in a DC machine. 5M
 (b) Discuss the salient points of brake test. 5M
- OR
- 16 Find the efficiency at full load and half load for a 1000 kW, 600V shunt generator using the following data 10M
 Armature resistance = 0.006Ω , mechanical and iron losses at rated speed = 24kW shunt field resistance = 50Ω brush contact drop = 1V per brush stray load losses = 1% of output
- 17 A single phase transformer is connected to a 230V, 50Hz supply. The net cross sectional area of the core is 60cm^2 . The number of turns in the primary is 500 and in the secondary 100. Determine 10M
 (i) Transformation ratio
 (ii) Maximum value of the flux density in the core
- OR
- 18 (a) Explain the construction of 1-phase transformer. 5M
 (b) Derive EMF equation of single-phase transformer. 5M
- 19 The following readings were obtained from OC and SC tests on 8 KVA, 400/120V and 50 Hz transformer. 10M
 OC Test (Lv side): 120V, 4A and 75W
 SC Test (Hv side): 9.5V, 20A and 110W
 (i) Obtain equivalent Circuit of the transformer
 (ii) Voltage regulation and efficiency at 0.8 power factor lagging load and
 (iii) Efficiency at Half full load and 0.8 power factor load.
- OR
- 20 (a) What is auto transformer. Compare its merits and de merits over single phase transformer. 5M
 (b) Discuss the parallel operation of transformers with unequal voltages. 5M