Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree (S,FE) Examination January 2022 (2015 Scheme)

Course Code: EE205

Course Name: DC MACHINES AND TRANSFORMERS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1	Explain the role of dummy coils in the dc machine?	(5)
2	Derive the e.m.f equation of a DC generator.	(5)
3	What is the significance of back e.m.f in a DC motor?	(5)
4	What is meant by an ideal transformer? Draw the phasor diagram of an ideal transformer on no load.	(5)
5	What are the losses in a transformer? How it can be reduced?	(5)
6	Define all day efficiency of a transformer. What is done to improve the all-day efficiency of a distribution transformer?	(5)
7	Compare between a bank of 3 single phase transformers and a single unit of three-phase core type transformer.	(5)
8	Enumerate the purpose which detect the use of tertiary winding in a three-winding transformer.	(5)

PART B

Answer any two full questions, each carries10 marks.

9		Explain the constructional features of dc machine with a neat diagram and explain the working of each part.	(10)
10		A short-shunt dc compound generator supplies a current of 100A at 220V. The resistance of the shunt field is 50Ω, of the series winding 0.025Ω and of the armature 0.05Ω. Iron and friction losses amount to 1kW. Find (i) e.m.f generated (ii) copper loss, (iii) the b.h.p of the prime mover (iv) commercial efficiency.	(10)
11	a)	Explain the voltage build up in a DC shunt generator. What are the conditions for voltage build up in a DC shunt generator?	(5)

b) Derive the electro dynamic equation of rotating electrical machine and explain the principle of energy conversion? (5)

PART C

Answer any two full questions, each carries 10 marks.

12 a) With a neat diagram explain the speed control of a DC shunt motor. (5)

b) An ideal 25 kVA transformer has 500 turns on the primary winding and 40 turns in the secondary winding. The primary is connected to 3000V, 50Hz supply. Calculate (i) primary and secondary current on full load (ii) secondary e.m.f (iii) the maximum core flux. (5)

13 a) Draw the phasor diagram of a single phase transformer supplying inductive load (5)

b) Explain briefly the different cooling methods employed in transformer (5)

14 A 100 kW, 460V shunt generator was run as a motor on no load at its rated voltage and speed. The total current taken was 9.8A including a shunt current of 2.7A. The resistance of the armature circuit at normal working temperature was 0.11Ω. Calculate the efficiency of the generator at (i) full load (ii) half load. (10)

PART D

Answer any two full questions, each carries 10 marks.

15 Explain the operation of an autotransformer. How saving of copper is achieved in an autotransformer as compared to an ordinary two winding transformer? (10)

16 With a neat circuit diagram, explain how a two-phase supply can be obtained from a three-phase supply. (10)

17 a) A 10 kVA, 200/400V, 50Hz single phase transformer gave the following result. (5)

O.C test: 200V, 1.3A, 120W …….on L.V side

S.C test: 22V, 30A, 200W …….on H.V side

Calculate (i) the magnetising current and the component corresponding to core loss at normal frequency (ii) the magnetising branch impedances.

b) In 1998, there was a 100kVA transformer serving power to a locality. Due to sudden industrial revolution, there was a need to parallel another 100kVA transformer. Suggest various conditions to be satisfied to successfully parallel the two three-phase transformers. (5)

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