

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 121405

Roll No.

B. TECH.

Theory Examination (Semester-IV) 2015-16

ELECTROMECHANICAL ENERGY CONVERSION-I

Time : 3 Hours

Max. Marks : 100

Section-A

1. Attempt all parts. All parts carry equal marks. Write answer on each part in short. (2×10=20)
- (a) What are the basic role of “Dummy Coils” in D.C. machines ?
 - (b) Explain the introduction of “electro-mechanical energy conversion principles.”
 - (c) Explain the interpole and compesating winding of D.C. Machines.
 - (d) Explain the commutation process in D.C. machines.
 - (e) Enlist any five applications of D.C. Machines.
 - (f) Enlist any five applications of 3 phase transformers.
 - (g) What are the basic difference between auto-transformers and 2-wdg transformers ?

- (h) Define “Phasor group of 3 phase transformers.”
- (i) Define open circuit and short circuit test of 1 phase transformers.
- (j) Explain the all day efficiency of transformers.

Section-B

2. **Attempt any 5 questions from this section.** (10×5=50)

- (a) Discuss the armature reaction of D.C. machines. What are the advantages and disadvantages of armature reaction in D.C. machines ? Explain in detail.
- (b) Write a short notes on the following :
 - (i) Open delta connection of 3 phase transformers.
 - (ii) Excitation phenomenon in 3 phase transformers.
- (c) Discuss the harmonics in 3 phase transformers. What are the merits and demerits of harmonics in 3 phase transformers.
- (d) Discuss the constructional details and working principle of three winding transformers. What are the limitations and significances of these transformers.
- (e) Write a short notes on the parallel operations of 3 phase transformers.
- (f) Discuss the Ward Leonard method for speed control D.C. machines working as motoring mode.

- (g) What do you mean by efficiency and voltage regulation of 1 phase transformers ? Also mention the applications and limitations of 1 phase transformers.
- (h) Write a short notes on the following :
- (i) 3 phase to 2 phase connection of transforms.
 - (ii) 3 phase to 6 phase connection of transforms.

Section-C

Attempt any 2 questions from this section. (15×2=30)

3. Consider the equivalent circuit diagram of D.C. machine as shown in Fig-1.

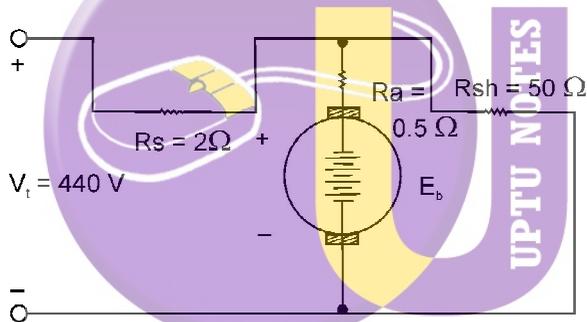


Fig. 1

Given data : - Brush drop = 2V / per brush

Interpole winding drop = 0.5V

Compensating winding drop = 0.25V

- (i) What should be the speed of D.C. machine working as motoring mode ?
- (ii) What should be the speed of D.C. machine working as generating mode ?

4. Consider the equivalent circuit diagram of 1 phase transformer as shown in Fig 2.

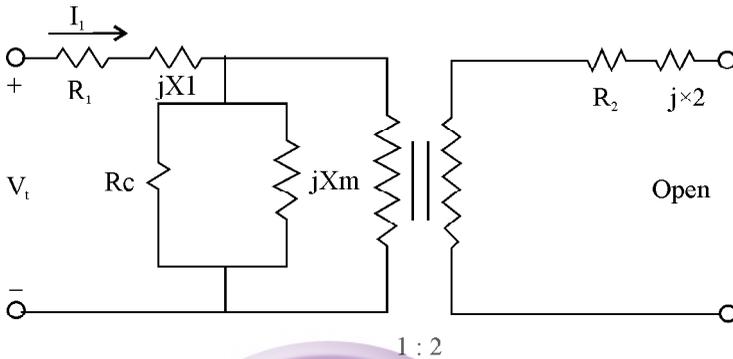


Fig. 2

Given data :

$R_1 = 0.50 \Omega$
$R_2 = 0.25 \Omega$
$X_1 = 0.65 \Omega$
$X_2 = 0.55 \Omega$
$X_m = 44 \Omega$
$R_c = 440 \Omega$
$V_t = \frac{440}{\sqrt{2}} \sin(314t - 45^\circ)$ Volts

- (i) Determine the (' I_1 ') primary current
 (ii) Determine the (' $\cos\theta_1$ ') primary power factor.
5. (a) Discuss the following test for D.C. machines :
- (i) Hopkinson's and Swin burn's test
 (ii) D. C. resistance test.
- (b) Discuss the following test on 1 phase transformers :
- (i) Sumpner's test (ii) Polarity test