Printed Pages: 02 **Subject Code: NEE 301**

Paper Id: **120313** **Roll No:** | | | | | | | | | | |

B TECH

(III-SEM) THEORY EXAMINATION, 2018-19

ELECTRO-MECHANICAL ENERGY CONVERSION-I

Time: 3 Hours ***Total Marks:100***

Notes: *Assume any Missing Data.*

SECTION – A

1. Attempt all parts. Each parts carry equal marks. **(10×2= 20)**

a) Define Back EMF for a DC motor?
b) How the direction of rotation of the DC shunt motor can be changed?
c) Give two applications of DC shunt motor and compound generator.
d) What are the various causes for a DC shunt generator not building up voltage?
e) Define reactance voltage during commutation.
f) Discuss the necessity of starter for DC motors.
g) Define energy and co-energy.
h) Why the transformer ratings in KVA?
i) Draw the pharo diagram of an ideal transformer when loaded.
j) Explain singly excited system.

SECTION – B

2. Note: Attempt any three questions from this section: **(10x3=30)**

a) Explain energy in magnetic system, field energy and mechanical force.
b) Explain Efficiency, Merits, demerits and applications of an auto-transformer.
c) Describe Parallel operation of single phase and three phase transformers.
d) Explain the effects of armature reaction on the operation of a DC machine. How the effects of armature reaction can be minimized.
e) A 15 KW, 250V, 1200rpm, shunt motor has 4 poles, 4 parallel armature paths and 900 armature conductors. Assume R_a = 0.2 Ω. At rated speed and rated output the armature current is 75 A and I_f = 1.5 A. Calculate (i) The flux/pole and (ii) The torque developed.

SECTION – C

3. Attempt any one parts of the following: **(10x1 = 10)**

a) Derive the EMF equation and torque equation of DC machine.
b) Discuss Ward Leonard method for speed control D.C. machine working as motoring mode.

4. Attempt any one parts of the following: **(10x1 = 10)**

a) Discuss the harmonic in 3 phase transformer. What are the merits and demerits of harmonic in 3 phase transformer?
b) Define starting of DC motors and braking of DC motors.

5. Attempt any one parts of the following: (10x1 = 10)

a) A 4-pole dc shunt generator with wave connected armature has field and armature resistance of 90 Ω and 0.15 Ω respectively. It supplies power to 25 lamps rated at 100V, 60W each, calculate the armature current and EMF generated. Neglect brush drop.

b) Why a starter is required for starting a DC motor. Describe a 3-point starter, having no-volt and overload protections for a dc shunt motor. What modification is made in 4-point starter?

6. Attempt any one parts of the following: (10x1 = 10)

a) How to determine the efficiency of shunt machines using Hopkinson's test? Explain in detail.

b) Explain methods of speed control of DC shunt motors.

7. Attempt any one parts of the following: (10x1 = 10)

a) Explain the commutation action in DC machines. Also describe the ways for achieving good commutation.

b) What do you mean by efficiency and voltage regulation of 1 phase transformer? Also mention the applications and limitations of 1 phase transformer.