

**B. Tech. Sem –III (Electrical Engg.) 2014 COURSE) (CBCS) :  
WINTER - 2018**

**SUBJECT: ELECTRICAL MACHINES-I**

Day: Monday  
Date: 26/11/2018

**W-2018-2297**

Time: 10.00 AM TO 01.00 PM  
Max. Marks: 60

**N.B:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat diagram **WHEREVER** necessary.
- 4) Assume suitable data **WHEREVER** necessary.

- 
- Q.1** a) Derive expression of induced EMF in single phase transformer. **(05)**
- b) A transformer is rated at 100kVA, At full load its copper loss is 1200W and its iron loss is 960W. **(05)**

**Calculate:**

- i) Efficiency at full load, unity power factor.
- ii) Efficiency at half load, 0.8 power factor.
- iii) The load kVA at which maximum efficiency will occur.

**OR**

- a) Write short note on an Autotransformer. **(05)**
- b) Open circuit and short circuit tests on a 5kVA, 220/400V, 50 Hz single phase transformer gave following results. **(05)**  
O.C test: 220V, 2A, 100W (LV side)  
S.C. test: 40V, 11.4A, 200W (HV side)  
Find efficiency of transformer for power factor 0.9 lagging.

- Q.2** a) Differentiate between 3 phase transformer and 3 units of single phase transformer working. **(05)**
- b) Explain Delta-Delta connection in detail with the diagram. **(05)**

**OR**

- a) Which schemes of connections are commonly used for 3 phase to six phase transformation. Draw neat sketch of any one. **(05)**
- b) State the necessary conditions for satisfactory parallel operation of two transformers. State briefly why all transformers can not be operated in parallel. **(05)**
- Q.3** a) Derive the expression for EMF induced in a coil rotating in a magnetic field. **(05)**
- b) State the electromagnetic phenomena useful for the electromagnetic energy conversion in rotating electric machines. **(05)**

**OR**

- a) Explain concept of energy conservation. **(05)**
- b) Show that the field energy in linear magnetic system is **(05)**

$$W_f = \frac{1}{2} Li^2 = \frac{1}{2} \psi i = \frac{1}{2L} \psi^2 .$$

**P.T.O.**

- Q.4** a) Give characteristics of series and shunt DC motor and their applications. (05)  
b) Explain meaning of commutation and causes of bad commutation and remedies. (05)

**OR**

- a) Give significance of Back EMF and also explain working principle of DC motor. (05)  
b) A 6 pole, 500V wave connected shunt motor has 1200 armature conductors and useful flux/pole of 20mwb. The armature and field resistances are  $0.5\Omega$  and  $250\Omega$  respectively. What will be the speed and torque developed by motor when it draws 20A from mains. (05)

- Q.5** a) Explain torque-slip characteristics of  $1\phi$  Induction motor. (05)  
b) Write a Short note on Repulsion motor. (05)

**OR**

- a) Explain any one type of self starting of 1-phase Induction motor. (05)  
b) Describe the construction and explain any one application of DC servomotor in detail. (05)

- Q.6** a) Short note on CT and PT. (05)  
b) Explain construction and working details of BLDC motor. (05)

**OR**

- a) Explain stepper motor with neat sketch. (05)  
b) Short note on PCB motors. (05)

\* \* \* \* \*