

**SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES,  
CHITTOOR -517127  
(AUTONOMOUS)  
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING**

**B.TECH II-II SEM (E.E.E)**

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**SUB CODE: 16EEE222**

**ELECTRICAL MACHINES – II**

**OBJECTIVES:**

- To demonstrate knowledge on construction and working of transformers, auto transformers and induction machines.
- To impart knowledge on testing of transformers and induction machines.
- To analyze the behavior of transformers and induction machines for various operating conditions.
- To educate suitable techniques for the starting and speed control of induction motors.

**UNIT-I Single Phase Transformers – Construction & Performance**

Single phase transformers – DOT Convention, types - Constructional details - minimization of hysteresis and Eddy current losses - EMF equation - operation on no load and on load - phasor diagrams - Equivalent circuit - losses and efficiency-regulation. All day efficiency - Effect of variations of frequency & supply voltage on iron losses.

**UNIT-II Testing of Single Phase Transformer and Poly phase Transformers**

OC and SC tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios - Auto transformers - Equivalent circuit - comparison with two winding transformers- Poly phase transformers – Poly phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ□ and open Δ, Third harmonics in phase voltages - three winding transformers - tertiary windings - Determination of  $Z_p$ ,  $Z_s$  and  $Z_t$  transients in switching - off load and on load tap changing; Scott connection.

**UNIT-III Poly phase Induction Motors**

Poly phase induction motors - Construction details of cage and wound rotor machines - production of a rotating magnetic field - principle of operation - rotor EMF and rotor frequency - rotor reactance, rotor current and power factor at standstill and during operation.

**UNIT-IV Characteristics of Induction Motors**

Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation-deduction from torque equation - expressions for maximum torque and starting torque – torque slip characteristic - double cage and deep bar rotors - equivalent circuit - phasor diagram - crawling and cogging

**UNIT-V Speed Control Methods of Induction Motors**

Methods of starting and starting current and torque calculations, Speed control-change of frequency; change of poles and methods of consequent poles; cascade connection. Injection of an EMF into rotor circuit (qualitative treatment only)

## **COURSE OUTCOMES:**

On successful completion of the course, student will be able to

1. Acquire knowledge on
  - construction and working of transformers, auto transformers and induction machines.
  - testing of transformers and induction machines.
  - speed control of induction motors.
  - parallel operation of transformers.
2. analyze the behavior of transformers and induction machines for various operating conditions.
3. design suitable accessories/techniques for the starting and speed control of induction motors.

## **TEXT BOOKS**

1. P.S. Bimbhra, 'Electrical Machinery', Khanna Publishers, 2003.
2. D.P. Kothari and I.J. Nagrath, 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 2002.

## **REFERENCE BOOKS**

1. A.E. Fitzgerald, Charles Kingsley, Stephen.D.Umans, 'Electric Machinery', Tata McGraw Hill publishing Company Ltd, 2003.
2. J.B. Gupta, 'Theory and Performance of Electrical Machines', S.K.Kataria and Sons, 2002.
3. Electrical Machines by M G SAY
4. Electrical Machines and transformers by KOSAO

### **University Nominee**

Dr.G.V.Marutheswar  
Professor, EEE Dept.  
S.V.U CE Tirupathi

### **Subject Expert**

Dr.T.Gowri Manohar  
Professor, EEE Dept.  
S.V.U.C.E,Tirupathi

### **Subject Expert**

Dr. V.Rajnikanth  
Professor,Dept. of EEE,  
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### **Industry Expert**

Mr. K.Somashekar M.Tech  
SE in Electrical department  
SAPA Alluminium company,  
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### **Alumni Student**

Mr.K. Hemachandra Reddy  
Assistant Professor,Dept. of  
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### **Dept. BOS Chairman**

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