

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

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

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**SUB CODE: 16EEE212**

**ELECTRICAL MACHINES-I**

**OBJECTIVES:**

- To demonstrate knowledge on construction, operation and characteristics of DC machines
- To analyze the operation of DC machine for various operating conditions.
- To design armature windings for DC machines.
- To evaluate the performance of DC machines

**UNIT I: D.C. GENERATORS-CONSTRUCTION & OPERATION**

D.C. Generators - Principles of operation – Action of commutator - Constructional feature – armature lap and wave windings – simplex and multiplex windings – use of laminated armature – E.M.F Equation - problems - Armature reaction – cross magnetizing & demagnetizing AT/pole - compensating winding – commutation – methods of improving commutation.

**UNIT II: TYPES OF D.C GENERATORS**

Methods of excitation of generators – O.C.C Characteristics of D.C Shunt Generator - Critical field resistance & critical speed – causes for failure to self excite and remedial measures - Load characteristics of shunt, series and compound generators – parallel operation of D.C series generators –use of equalizer bar & cross connection of field windings – load sharing.

**UNIT III: D.C MOTORS**

D.C Motors – principle of operation – back E.M.F – torque equation – characteristics & application of shunt , series and compound motors – Armature reaction & commutation .

**UNIT IV: SPEED CONTROL OF DC MOTOR**

Speed control of D.C motors: Armature voltage & field flux control methods. Ward-Leonard system - Principle of three point & four point starters – Design of resistance elements for starters - protective devices.

**UNIT V: TESTING OF D.C MACHINES**

Testing of D.C machines : losses – constants & variable losses – calculation of efficiency – condition for maximum efficiency .Methods of testing-direct, indirect & regenerative testing –brake test –Swinburne’s test – Hopkinson’s test – field’s test – retardation test – separation of stray losses in a D.C Motors test.

## **COURSE OUTCOMES:**

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

1. Acquire knowledge on
  - construction, operation and characteristics of DC machines.
  - armature reaction and commutation.
  - armature windings for DC machines.
  - starting and speed control of DC motors
  
  - testing of DC machines.
  - starters for DC motors
2. Analyze the operation of DC machine for various operating conditions.
3. Design armature windings for DC machines and starters for DC motors.
4. Evaluate the performance of DC machines.

## **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. DC Machines by Clayton and Hangcock CBS Publ.

### **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  
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### **Dept. BOS Chairman**

Prof. Ramesh Halakurki  
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