15UEE504   **ELECTRICAL MACHINE DESIGN**   **L T P C 3 2 0 4**

UNIT I INTRODUCTION   9+6

Major considerations in Electrical Machine Design - Electrical Engineering Materials – Space factor – Choice of Specific Electrical and Magnetic loadings – Thermal considerations - Heat flow – Temperature rise - Rating of machines – Standard specifications.

UNIT II DC MACHINES   9+6

Output Equations – Main Dimensions -Magnetic circuit calculations – Carter's Coefficient - Net length of Iron –Real & Apparent flux densities – Unbalanced Magnetic Pull- Selection of number of poles – Design of Armature – Design of Field winding - Design of commutator and brushes – performance prediction using design values.

UNIT III TRANSFORMERS   9+6

Output Equations – Main Dimensions - KVA output for single and three phase transformers – Window space factor - Overall dimensions – Operating characteristics – Regulation – No load current – Temperature rise in Transformers – Design of Tank - Methods of cooling of Transformers.

UNIT IV INDUCTION MOTORS   9+6

Output equation of Induction motor – Main dimensions –Length of air gap- Rules for selecting rotor slots of squirrel cage machines – Design of rotor bars & slots – Design of end rings – Design of wound rotor -– Magnetic leakage calculations – Leakage reactance of polyphase machines-Magnetizing current - Short circuit current –Operating characteristics.

UNIT V SYNCHRONOUS MACHINES   9+6

Output equations – choice of loadings – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Armature parameters – Estimation of air gap length – Design of rotor –Design of damper winding – Determination of full load field mmf – Design of field winding – Design of turbo alternators – Rotor design.

                                        TOTAL: 45(L)+30 (T) =75 PERIODS

COURSE OUTCOMES:

After the successful completion of this course, the student will be able to

- Discuss the factors influencing the designing of electrical machines
- Determine the main dimensions and various parameters of DC machines
- Determine the dimensions and design suitable cooling schemes for transformers
- Compute the main dimensions and various parameters of Induction machine
- Design the dimensions of synchronous machines based on given parameters

TEXT BOOKS:

1. Sawhney A.K, "A Course in Electrical Machine Design ", Dhanpat Rai& Sons, Sixth edition 2010.

2. Sen S.K., " Principles of Electrical Machine Designs with Computer Programmers ", Oxford and IBH Publishing Co. Pvt. Ltd, 2006.

REFERENCE BOOKS:

1. Shanmugasundaram A., Gangadharan and Palani R, "Electrical Machine Design Data Book ", New Age International Pvt. Ltd., 2007.

2. Upadhyay K.G., " Design of Electrical Machines", New Age International Pvt. Ltd., 2008

3. Agarwal R.K., "Principles of Electrical Machine Design ", S.K.Kayaria& Sons , 2007

4. Eclayton A. and NNHancock, , "The performance and Design of Direct current Machines ", CBS & Distributors Pvt.Ltd, 2004.