EE6352 ELECTRICAL ENGINEERING AND INSTRUMENTATION

DETAILED SYLLBUS

OBJECTIVES:

- To introduce three phase supply and power measurement.
- To understand concepts in electrical generators, motors and transformers.
- To introduce power generation, transmission and distribution concepts.
- To learn basic measurement concepts.
- To learn the concepts of electronic measurements.
- To learn about importance of digital instruments in measurements

UNIT I DC MACHINES

Three phase circuits, a review. Construction of DC machines – Theory of operation of DC generators – Characteristics of DC generators- Operating principle of DC motors – Types of DC motors and their characteristics – Speed control of DC motors- Applications.

UNIT II TRANSFORMER

Introduction – Single phase transformer construction and principle of operation – EMF equation of transformer-Transformer no–load phasor diagram –– Transformer on–load phasor diagram –– Equivalent circuit of transformer – Regulation of transformer –Transformer losses and efficiency-All day efficiency –auto transformers.

UNIT III INDUCTION MACHINES AND SYNCHRONOUS MACHINES

Principle of operation of three-phase induction motors – Construction –Types – Equivalent circuit – Construction of single-phase induction motors – Types of single-phase induction motors – Double revolving field theory – starting methods - Principles of alternator – Construction details – Types – Equation of induced EMF – Voltage regulation. Methods of starting of synchronous motors – Torque equation – V curves – Synchronous motors.

UNIT IV BASICS OF MEASUREMENT AND INSTRUMENTATION

Static and Dynamic Characteristics of Measurement – Errors in Measurement - Classification of Transducers – Variable resistive – Strain guage, thermistor RTD – transducer - Variable Capacitive Transducer – Capacitor Microphone - Piezo Electric Transducer – Variable Inductive transducer – LVDT, RVDT

UNIT V ANALOG AND DIGITAL INSTRUMENTS

DVM, DMM – Storage Oscilloscope. Comparison of Analog and Digital Modes of operation, Application of measurement system, Errors. Measurement of R, L and C, Wheatstone, Kelvin, Maxwell, Anderson, Schering and Wien bridges Measurement of Inductance, Capacitance, Effective resistance at high frequency, Q-Meter.

TEXT BOOKS:

1. I.J Nagarath and Kothari DP, “Electrical Machines”, McGraw-Hill Education (India) Pvt Ltd 4th Edition ,2010

2. A.K.Sawhney, “A Course in Electrical & Electronic Measurements and Instrumentation”, Dhanpat Rai and Co, 2004.

REFERENCES:

1. Del Toro, “Electrical Engineering Fundamentals” Pearson Education, New Delhi, 2007.

2. W. D. Cooper & A. D. Helfrick, “Modern Electronic Instrumentation and Measurement Techniques”, 5th Edition, PHI, 2002.

3. John Bird, “Electrical Circuit Theory and Technology”, Elsevier, First Indian Edition, 2006.

4. Thereja. B. L, “Fundamentals of Electrical Engineering and Electronics”, S Chand & Co Ltd, 2008.

5. H. S. Kalsi, “Electronic Instrumentation”, Tata Mc Graw-Hill Education, 2004.

6. J. B. Gupta, “Measurements and Instrumentation”, S K Kataria & Sons, Delhi, 2003.