

## **35231 - BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING**

### DETAILED SYLLABUS

#### **UNIT I. AC FUNDAMENTALS, BATTERIES AND UPS**

**1.1 AC Fundamentals:** Difference between AC and DC - Advantages of AC over DC  
Waveform of sinusoidal A.C. Cycle – Generation of single phase A.C. by elementary alternator - Definition of cycle, frequency, time period, amplitude, peak value, average value and rms value – Define peak factor and form factor - Concept of phase , phase difference and phase angle – Single phase and 3 phase (Definition) - Meaning of lagging and leading sine wave - Advantages of three phase over single phase

**1.2 Batteries:** Classification of cells - Construction of Lead acid cell – Methods of charging – Care and Maintenance of Lead acid battery – Indications of a fully charge battery – Maintenance free batteries.

**1.3 UPS :** Need for UPS - Online and Offline UPS – Definition – Block Diagram – **Explanation** of each block – Merits and demerits of on line and off line UPS – Need of heat sink- Specification and ratings –Maintenance of UPS including batteries

#### **UNIT II.TRANSFORMER AND SPECIAL MOTORS**

**2.1 Single Phase transformer:** Working Principle and Construction of transformer – Brief description of each part – Function and materials used - emf equation of transformer (No derivation) – Voltage and current ratio of a transformer – Efficiency - Losses in a transformer - Auto transformer - Comparison with two winding transformer – Applications – Step up and Step down transformer ( Definition only)

**2.2 Special Motors:** Stepper Motor: Definition - Working principle - Types and applications – Servo motors: Definition - Working principle - Types and applications – Factors to be considered for selecting a motor for a particular application.

**2.3 Electrical Safety:** Electric shock-need for earthing-types of earthing, fusesneed- types of fuses

#### **UNIT III.SEMICONDUCTOR DEVICES**

**3.1 Diodes:** PN Junction diode – Barrier Voltage, Depletion Region – Forward biased and Reverse biased Junction – Working principle - forward /Reverse characteristics of P-N Junction diode - Applications of diode – Zener Diode: Construction -Characteristics ( Forward and Reverse) – Avalanche and Zener break down - Applications of Zener diode. Light Emitting Diodesoperation, construction and characteristics. LDR – Principle of operation and Characteristics .Photo Diode – Principle of operation(concept only)

**3.2 Rectifiers:** Definition – Need of Rectification – Circuit diagram, Operation, i/p and o/p Waveforms of Half wave - Full wave- Bridge rectifiers (without filters) - Uses of filters in rectifier circuit – Ripple factor, Efficiency and PIV ( No derivation) – Comparison



**3.3 Bipolar Junction Transistor:** Definition - Principle of NPN and PNP transistor – Symbol - Transistor terminals - Operating principle (NPN transistor only) - Configurations of transistor – Comparison between CB, CE and CC - Input and Output characteristics of CE configuration – Transistor application as switch.

#### **UNIT IV. BOOLEAN ALGEBRA ,LOGIC GATES COMBINATIONAL SYSTEM**

**4.1 Number representation:** Decimal, Binary, Octal and Hexa decimal number systems- Conversion of number from one number system to another (without decimal point) – BCD CODE – ASCII Codes - Parity bit – Use of a parity bit – Odd parity and Even parity

**4.2 Logic gates:** Positive and Negative logic System - Definition, Truth table, Symbol and Logical equations of AND – OR - NOT – EXOR – EXNOR (Only 2-inputs) gates – Universal gates - NAND - NOR – Symbol and truth table.

**4.3 Boolean Algebra :** Basic laws of Boolean algebra – Demorgan’s Theorem and proofs – Duality theorem - Simplification of logical equations using Boolean laws - De-Morgan’s theorem – Two and three variable Karnaugh map

**4.4 Arithmetic Circuits:** Half Adder and full adder- Truth table, Circuit diagram – Half subtractor and Full subtractor - Truth table, Circuit diagram.

**4.5 Combinational logic circuits:** Parity generator and checker - Multiplexer – De multiplexer – Encoder - Decoder (Definition and Basic Circuits only) – Comparator Circuit for two bit words.

#### **UNIT V .SEQUENTIAL LOGIC SYSTEM**

**5.1 Flip flops:** Basic principle of operation - S-R, D flip-flop – Operation and truth table - Race Condition – JK flip flop – T flip flop – Toggling – Edge Triggered Flip-flop – Level Triggered flip flop - Need for a Master-slave flip flop - J-K Master Slave flip flop.

**5.2 Counters:** Need- Types of counters- 4 bit Asynchronous counter-Mod N counter-Decade Counter- 4 bit Synchronous counter-Distinguish between Synchronous and Asynchronous counter-Application of counters

**5.3 Registers:** Shift register - Block diagram representation and waveform of serial –in Serial out, Serial – in Parallel – out, Parallel in -parallel out Applications of Shift Registers.

#### **TEXT BOOKS**

1 Electrical Technology Vol I and II. B.L.Theraja S.Chand& Co , New Delhi Mutiple Colour Revised First Edition,2012

2 Modern Digital Electronics R.P. Jain TataMc- GrawHill, New Delhi Third Reprint 2010

3 Principles of Digital electronics K.Meena PHI learning Private Ltd 2009



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