

33041 ELECTRICAL MACHINES - II

DETAILED SYLLABUS

UNIT I ALTERNATOR PRINCIPLES AND CONSTRUCTION

Basic principle of alternators – Types of alternators – Stationary armature rotating field – advantages of rotating field – Construction details of alternator – Salient pole rotor – Cylindrical type rotor – Types of A.C. armature windings – Types of slots – Full pitch and short pitched windings – Phase spread angle and effect of distribution factor – pitch factor – relation between frequency, speed and number of poles – EMF equation – Problems – methods of obtaining sine wave – Critical speed of rotor – Ventilation of turbo alternators – advantages of hydrogen cooling and its precaution – excitation and exciters.

UNIT II ALTERNATOR PERFORMANCE AND TESTING

Load characteristics of alternators – reason for change in terminal voltage – Qualitative treatment of armature reaction for various power factor loads – effective resistance – leakage reactance – synchronous reactance, synchronous impedance – Voltage regulation – Determination of voltage regulation by synchronous impedance method (simple problems)- MMF method – potier method. Necessity and conditions for parallel operation of alternators – synchronizing by dark lamp method, bright lamp method, dark - bright lamp method and synchroscope method – synchronizing current, synchronizing power and synchronizing torque – load sharing of alternators – infinite bus bar .

UNIT III THREE PHASE INDUCTION MOTOR

Rotating magnetic field – Principle of operation of three phase induction motors – slip and slip frequency – comparison between cage and slip ring induction motors – development of phasor diagram – expression for torque in synchronous watts – slip-torque characteristics – stable and unstable region – no load test and blocked rotor test – development of approximate equivalent circuit – problems on the above topics – simplified circle diagram – determination of maximum torque, slip (problems not required) – starting torque and starting current expression

For Notes, Syllabus, Question Papers and Many more
– relationship between starting torque and full load torque – speed control of induction motors.

Starters of induction motors – direct on line starter and its merits for cage motors – star delta starter- auto transformer starter -rotor resistance starter – cogging –crawling in induction motor– double cage induction motor-induction generator.

UNIT IV A)SINGLE PHASE INDUCTION MOTOR

single phase induction motors – not self starting – methods of making itself starting – construction, working principle –phasor diagram-slip torque characteristics- split phase motor - capacitor motor - shaded pole motor - repulsion motor - universal motor – operation of three phase motor with single phase supply.

B) SYNCHRONOUS MOTOR

Principle of operation –not self starting – methods of starting–effects of excitation on armature current and power factor– ‘V’ curve and inverted ‘V’ curve of synchronous motor – the phenomenon of hunting and prevention of hunting by damper winding – comparison between synchronous motor and three phase induction motor -applications - problems on power factor improvement.

UNIT V A)SPECIAL AC MACHINES

Permanent magnet Synchronous motors – Construction and performance – Advantages – Applications –Synchros – Constructional features – Control Transmitter – Control receiver Applications of synchros– A.C. Servo motors – Two phase A.C. Servo motor – Linear induction motor.

B)SPECIAL DC MACHINES

Permanent Magnet D.C. Motor – Construction–Working principle – Speed control – Advantages – Applications – Servo motors – D.C. Servomotors – Stepper motors – Variable reluctance stepper motor – Permanent magnet stepper motor.