

Electrical Machines

S.E. Sem. III [MARINE]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	–	–
Oral Exam	–	–
Term Work	–	25

SYLLABUS

1. Direct current Machines (Generators and Motors)

Principle of working of generator, construction, winding, e.m.f. equation, losses, power stages, armature reaction, commutation, methods to improve commutation, brush shift, compensating winding, interpoles, D.C. generator, their characteristic, methods of excitation, parallel operation, equalizer busbar, performance equations etc. D.C. Motor principle, Types, their characteristics, speed–torque equations, starters, speed control, testing of D.C. Machines, applications, power stages, braking of D.C. Motor.

2. Transformers

Principle of action, e.m.f. equation, phasor diagrams under no load and load conditions, leakage reactance, equivalent circuits, voltage regulation, losses and efficiency, open circuit and short circuit tests, parallel operations, three phase transformer–core and shell type current and potential transformer, auto–transformers (single phase and 3–phases).

3. Three Phase Induction Motor

Principle of operation, slip speed, rotor to stator relationship, rotor frequency, rotor e.m.f. and current, equivalent circuit relationship between rotor copper loss and the rotor slip, torque/slip characteristics, power stages starting torque and maximum running torque, reversing, speed control of induction motor, starting of induction motor, method of starting D.O.L., Star / Delta, Auto single phase induction motor–principle and operational characteristics, constructional details. Failure and repairs of electrical machines.

4. Alternators and Synchronous Motor

General arrangement of alternators, construction of salient pole and cylindrical rotor types, types of stator windings, e.m.f. equation of an alternator, distribution and pitch factor, waveform of generated. e.m.f. phasor diagrams, load characteristics and regulation, parallel operation of alternators, KW and KVA sharing. Synchronous motor principle, method of starting, torque / angle characteristics and hunting, motor on, load with constant excitation, effect of change in excitation, V curve, comparison between induction motor and Synchronous motor in Methods of starting, merits and limits of synchronous motor over others.

5. D.C. and A.C. Transmission and Distribution

Two wire and three wire D.C. System, use of balancer, A.C. Transmission single phase and three phase, three wire and four wire distribution, comparison of D.C. and A.C. transmission, effect of voltage drop, copper utilization under different systems, single and double fed distributors, fuses, D.C. air circuit breaker, A.C. air and oil circuit breakers.

6. Safe Working Practices

Safe working practices to be followed while using and during Maintenance and Repairs of electrical and electronic equipments. Statutory requirements in respect of installation, working and use of electrical equipments.

References :

1. A text book of Electrical Technology (*B.L. Theraja and A.K. Theraja*)
2. Marine Electrical Practice (*G.O. Waston*)
3. Higher Electrical Engineering (*J. Shepherd, A.H. Morton, L.F. Spence*)
4. Practical Marine Electrical Knowledge (*D.T. Hall*)
5. Electrical Machines (*Bimbra*)
6. Power systems (*Soni Gupta and Bhatnagar*)
7. Electrical Machines (*Shankar Sen*) – Khanna Publications
8. Power Systems (*Uppal*)

