



**State exam questions
Mechanical Engineering BSc
Operation and Maintenance specialization**

Repairing Technology

1. Role of machine repairing. Machine lifetime, bathtub curve, wear periods, Role of condition monitoring before repairing. Failure Mode and Effects Analysis (FMEA) and Ishikawa analysis.
2. Field of tribology, types of wear: adhesive, abrasive, surface fatigue, erosive, fretting, cavitation, damages of machine elements.
3. Friction and wear: static friction, rolling friction, fluid friction, lubricated friction. Laws of dry friction, Coulomb's Law of Friction, coefficient of friction. Effect of Sliding Velocity on coefficient of friction. Stribeck's diagram.
4. Lubrication, Reducing friction, Stribeck's diagram. Hydrodynamic lubrication, Elastohydrodynamic lubrication, Boundary lubrication. Performance, Operational tolerance, longevity. Grease and soaps. Internal-combustion engine oils, additives, SAE viscosity grade system for engine oils.
5. Corrosion and protection. Type of corrosion, Stress corrosion cracking. Galvanic corrosion. Pitting corrosion. Crevice corrosion, Stress corrosion cracking (SCC). Protection from corrosion, Applied coatings, Shrink wraps. Anodization. Galvanizing, Biofilm coatings. Cathodic protection. Corrosion in nonmetals. Corrosion of polymers and glasses.
6. Non-destructive testing methods: ultrasonic testing, acoustic emission, eddy-current testing, industrial computed tomography (CT) scanning, dye penetrant inspection, hardness test, scanning electron microscope (SEM), atomic force microscopy (AFM). Basics of vibration diagnostics and thermography analysis for status monitoring before repairing.
7. Parts cleaning methods, Manual washing, Ultrasonic cleaning, type of contaminations. Cleaning equipment and procedure, part washer. Solvent degreasing, vapor degreasing, abrasive blasting. CO₂ cleaning.
8. Hot-dip galvanization, composition of the baths, plating, chrome plating, zinc plating, nickel plating. Paints and protective coatings, paint ingredients.



9. Soldering and brazing technologies: desoldering and resoldering. Welding and cutting in Repairing Technologies. Adhesives, pressure-sensitive adhesives, contact adhesives, hot adhesives, multi-part adhesives. Metal adhesives.
10. Repair and of maintenance of complex mechanical equipment. diagnosis of used bearings. Reconditioning techniques. Cold mountings. Temperature mountings. Induction heater and dismounting. Safety regulations.