

MAINTENANCE ENGINEERING
(MECH 3261)

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

*Candidates are required to answer Group A and
any 5 (five) from Group B to E, taking at least one from each group.*

*Candidates are required to give answer in their own words as far as
practicable.*

Group - A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) Quality Assurance : TQM = Maintenance : _____ .
(a) LFC (b) TPM (c) BDM (d) OEE.
- (ii) Best method of lubrication of high speed anti friction bearing is
(a) grease packing (b) forced oil
(c) oil mist (d) cold air.
- (iii) OEE stands for
(a) overall equipment effectiveness (b) overtime employees' effect
(c) overseas equipment entry (d) overall equipment efficiency.
- (iv) Working life of a worn spur gear pair can be extended by
(a) reducing centre distance (b) reversing sides of the gears
(c) increasing centre distance (d) reducing outside diameters.
- (v) Babbitt is used as a plain bearing material because of its
(a) conformability (b) corrosion resistance
(c) yield Strength (d) temperature strength.
- (vi) Life cycle costing of a product depends on
(a) initial Investment (b) maintenance cost
(c) yearly operation cost (d) all of these.
- (vii) MTBF stands for
(a) machining time between failures
(b) mean time before failures
(c) mean time between failures
(d) maximum time before failures.

- (viii) If the valve in the delivery line of a centrifugal pump is stopped while the pump is operating, what will happen?
 (a) delivery pipe will burst (b) pump will stop
 (c) suction pipe will burst (d) pump will continue to run.
- (ix) Wheel of an automobile is fixed with axle hub with specified torque by a tool called
 (a) pipe wrench (b) torque wrench
 (c) feeler gauge (d) tachometer.
- (x) By SAE 30, we specify the following property of a lubricant
 (a) density (b) viscosity
 (c) ignition point (d) flash point.

Group - B

2. (a) Define the following terms (i) MTTF (ii) MTBF (iii) MDT (iv) Failure rate.
 (b) The MTBF of a piece of equipment is 1000 hr. What is the probability of survival of the equipment for (i) 200 hr (ii) 500 hr and (iii) 1000 hr of operation.

$$6 + 6 = 12$$

3. (a) Define Overall Equipment Effectiveness.
 (b) An equipment is scheduled to run for an 8 hr. shift with 30 minutes scheduled break and on a particular shift it was not in operation for 50 mins due to unscheduled maintenance. The standard rate of production is 40 unit/hr. But that particular shift produced 240 units. 20 units were found defective out of 240 units produced. Calculate (i) availability (ii) performance (iii) quality and (iv) OEE.

$$3 + 9 = 12$$

Group - C

4. (a) (i) What are the factors based on which maintenance function is positioned in an organization?
 (ii) What are the functions of maintenance department in an organization?
 (b) (i) What is life cycle cost of an equipment and what are the components of life cycle cost?
 (ii) Draw a typical "Bath tub curve" and explain its various features.

$$(2 + 2) + (3 + 5) = 12$$

5. (a) (i) What are the components of planned maintenance job costing?
 (ii) Briefly describe each component.
 (b) (i) What is maintenance audit?
 (ii) Describe maintenance audit procedure in a typical manufacturing concern.

$$(2 + 4) + (2 + 4) = 12$$

Group - D

6. (a) Explain different types of surface coating processes and give examples where these processes are used.
 (b) Match the following:

Feeler Gauge	Plumbing Job
Spirit Level	Linear distance measurement
Pipe Wrench	Fixing wheel on axle hub of a car.
Dial Indicator	Lifting of machine
Chain Pulley Block	Valve clearance in Engine
Torque wrench	Levelling of a machine on foundation

$$6 + 6 = 12$$

7. (a) What are the properties of an ideal lubricant?
 (b) (i) What are the functions of seals and packings?
 (ii) Describe the radial shaft seals and O rings used to prevent leakage of oil.

$$6 + (2 + 4) = 12$$

Group - E

8. (a) (i) What are the major causes of reduced delivery for a centrifugal pump?
 (ii) On the basis of which properties the material of plain bearings is chosen?
 (b) How a worn-out lead screw with trapezoidal thread can be repaired?
9. (a) (i) What is hot clamping method of repairing a crack?
 (ii) What are the causes of unusual wear of gear teeth?
 (b) How can you repair a worn shaft?

$$(4 + 4) + 4 = 12$$