

**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) A systematic and independent examination whether all the maintenance activities are carried out as per plan is called
(a) quality audit (b) quality plan
(c) maintenance budget (d) maintenance audit
- (ii) Cracks are developed into the metallic part of an equipment due to the reasons
(a) improper handling of materials
(b) surface corrosion
(c) composition of material
(d) mechanical or thermal stress, fatigue or heavy impact by another mass.
- (iii) Considering “Mean time between failure (MTBF)” as 25 days and “Mean time to repair (MTTR)” as 6 hours of a software, the availability would become
(a) 1% (b) 24% (c) 99% (d) 99.009%.
- (iv) Higher OEE of an equipment signifies
(a) higher productivity (b) higher availability
(c) higher quality (d) all of these.
- (v) Scratch hardness test is done to check the quality of
(a) a painted surface (b) a lubricant
(c) riveted joint (d) clad surface.
- (vi) The best method of lubrication of high speed anti friction bearing is
(a) grease packing (b) forced oil
(c) oil mist (d) cold air
- (vii) The important property of lubricant relevant to cold countries is
(a) hydraulic stability (b) viscosity
(c) calorific value (d) cloud point and pour point.

B.TECH/ME/6TH SEM/MECH 3261(BACKLOG)/2021

- (viii) Babbitt is used as a plain bearing material because of its
(a) conformability (b) corrosion resistance
(c) yield strength (d) temperature resistance.
- (ix) Early failure period of an equipment is also known as
(a) useful life period (b) infant mortality period
(c) catastrophic failure period (d) wear out failure period.
- (x) Valve clearance of an IC Engine is checked by
(a) feeler gauge (b) spirit level
(c) torque wrench (d) micrometer.

Group - B

2. (a) If the inherent availability of 0.90 is necessary and MTBF is 200h, (i) what is the maximum possible MTTR? (ii) If MTBM = 980h and MDT = 20H, FIND OUT Operational Availability.
- (b) Determine the failure rate in % 100h for the following test in case of no replacement:
Test Duration(t) -1000h, Number of units tested (n) =12, Number of failed units(k) = 5

The failure history for the test is given in the table below:

Unit No.	2	3	4	8	9
Time to Failure (h)	620	390	780	860	950

$$6 + 6 = 12$$

3. (a) Briefly discuss the basic and the composite functions of "Maintenance Engineering".
- (b) What are the major causes of failures that occur in an Engineering Equipment or in a system? Explain the probable remedies to overcome those failures.

$$6 + (3 + 3) = 12$$

Group - C

4. (a) What are the components of maintenance cost? How do you estimate the maintenance costs?
- (b) How does maintenance audit help an organization? Describe the process of maintenance audit in an organization.

$$(3 + 3) + (2 + 4) = 12$$

5. (a) What is maintenance budget? What is the purpose of making a maintenance budget?
- (b) What are the advantages and disadvantages of centralised and decentralized maintenance? How do you decide whether a maintenance job should be outsourced or done in-house?

$$(2 + 4) + (3 + 3) = 12$$

Group - D

6. (a) Explain different types of surface coating processes with suitable examples for the application of surface coating processes.
- (b) Illustrate the usages of the following tools :
(i) Torque Wrench (ii) Feeler Gauge (iii) Pipe Wrench (iv) Chain Pulley Block
(v) Dial Gauge (vi) Spirit Level
- 6 + 6 = 12**
7. (a) What are the properties of an ideal lubricant?
- (b) Name different types of manual and automatic lubrication system that are used in industries.
- 6 + 6 = 12**

Group - E

8. (a) What are the major causes of reduced delivery for a centrifugal pump? What are the major steps of installation of a machine?
- (b) Mention the procedures for repairing a worn-out lead screw with trapezoidal thread.
- (3 + 3) + 6 = 12**
9. (a) Discuss the different methods of mounting of rolling element bearings.
- (b) What are the causes of unusual wear of gear teeth?
- 8 + 4 = 12**

Department & Section	Submission Link
ME	https://forms.gle/PD93GqGUfBzWebEH7