

B.TECH/ME/6TH SEM/MECH 3261/2019
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**

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|---|----------------------------------|
| (i) Maintenance job at times are outsourced due to | |
| (a) lack of expertise in house | (b) cheaper |
| (c) reducing spares inventory | (d) all of the above. |
| (ii) Higher OEE of an equipment signifies | |
| (a) higher productivity | (b) higher availability |
| (c) higher quality | (d) all of these. |
| (iii) Autonomous maintenance | |
| (a) reduce performance loss | (b) improves OEE |
| (c) increases machine availability | (d) all of these. |
| (iv) Lubrication of IC engine cylinder is done by | |
| (a) ring oiler | (b) chain oiler |
| (c) oil mist system | (d) splash lubrication. |
| (v) Identification of Vital Few and Trivial Many is the outcome of | |
| (a) Six sigma | (b) Taguchi method |
| (c) PDCA | (d) Pareto analysis. |
| (vi) Scratch hardness test is done to check the quality of | |
| (a) a painted surface | (b) a lubricant |
| (c) rivetted joint | (d) clad surface. |
| (vii) The important property of lubricant relevant to cold countries is | |
| (a) lubricity | (b) viscosity |
| (c) calorific value | (d) cloud point and pour point. |
| (viii) Early failure period of an equipment is also known as | |
| (a) useful life period | (b) infant mortality period |
| (c) wear failure period | (d) catastrophic failure period. |

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| (ix) Valve clearance of an IC Engine is checked by | |
| (a) feeler gauge | (b) spirit level |
| (c) torque wrench | (d) micrometer. |
| (x) An overhead tank by a railway station reads “Last cleaning April, 2017, next cleaning, October, 2017”. This is an example of | |
| (a) breakdown maintenance | (b) predictive maintenance |
| (c) planned maintenance | (d) corrective maintenance. |

Group – B

2. (a) (i) Define Reliability and Maintainability. (ii) What are the benefits of having high reliability in a machine or process? (iii) What is inherent availability and operational availability?
- (b) In a sample of 60 nails, 10 of them contain only defective heads, 8 of them contain only defective tail ends, and 5 of them contain both defective heads and tails. Find the probability that a nail, selected, will contain no defect at all.

(2+2+2) + 6 = 12

3. (a) Define TPM? What are the objectives of TPM? What are the components of Overall Equipment Effectiveness? What is Office TPM? How is it implemented? What are its benefits?
- (b) An equipment is scheduled to run for an 8 hr. shift with 30 mins. scheduled break and on a particular shift it was not in operation for 60 mins. due to unscheduled maintenance. The standard rate of production is 40 units/hr. But that particular shift produced 240 units. 30 units were found defective out of 240 units produced. Calculate OEE.

(1+1+1+1+1+1) + 6 = 12

Group – C

4. (a) What is maintenance planning? What are the functions of a maintenance planner? What is maintenance scheduling?
- (b) What is maintenance audit and what is the purpose of it? How are the non-conformances found in audit report are closed for improved effectiveness of maintenance function in the organisation?
5. (a) What is maintenance budget? What are the benefits of having a proper maintenance budget? Discuss various types of maintenance budget that are followed in industries.
- (b) Discuss the merits and demerits of centralised and decentralised maintenance dept. in an organisation. On what factors does the positioning of maintenance dept. depend on?

(1 + 2 + 4) + (3 + 2) = 12

Group – D

6. (a) Explain different types of painting processes that may be applied on a MS sheet metal surfaces. What are the advantages of powder coating over liquid painting?

- (b) Match and pair the following tools and activities

Feeler gauge	measurement of concentricity
Spirit level	plumbing job
Pipe wrench	lifting machine onto a foundation
Torque wrench	engine valve clearance
Dial Gauge	checking the horizontality of a machine
Chain pulley block	fixing wheel onto hub of an axle in bus

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

7. (a) Name different types of manual and automatic lubrication system that are used in industries.

- (b) What are the functions of seals and packings? Describe the radial shaft seals and O rings used to prevent leakage of oil.

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

Group – E

8. (a) What are the major causes of reduced delivery for a centrifugal pump and what are their remedies?

- (b) How a worn-out lead screw with trapezoidal thread can be repaired?

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

9. (a) Briefly describe how gear box are assessed for wear and what are the maintenance actions one must take to restore to near normalcy.

- (b) What are the major steps of installation of a machine.

$$8 + 4 = 12$$