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Question Paper Code	13194
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B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Seventh Semester

Mechanical Engineering

20PROE908 - MAINTENANCE ENGINEERING

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

- | | Marks | K-Level | CO |
|--|-------|---------|-----|
| 1. What is the primary objective of maintenance planning?
(a) To increase downtime of equipment
(b) To reduce costs by avoiding breakdowns and enhancing equipment reliability
(c) To increase production costs
(d) To decrease the availability of machinery | 1 | K1 | CO1 |
| 2. A key factor influencing equipment availability is
(a) Equipment reliability (b) Maintenance response time
(c) Both A & B (d) None of the above | 1 | K1 | CO1 |
| 3. Maintenance economics primarily focuses on:
(a) Reducing production costs only
(b) Balancing the cost of maintenance with the benefits of increased equipment availability
(c) Eliminating maintenance costs
(d) Improving production rates regardless of maintenance needs | 1 | K1 | CO1 |
| 4. In a maintenance organization, planned maintenance activities include all of the following except
(a) Scheduled inspections (b) Random breakdown repairs
(c) Preventive maintenance (d) Predictive maintenance | 1 | K1 | CO1 |
| 5. What is the primary goal of preventive maintenance in a maintenance policy?
(a) To repair equipment only when it fails
(b) To perform regular checks and servicing to avoid unexpected equipment failure
(c) To reduce the cost of spare parts
(d) To maximize equipment downtime for repairs | 1 | K1 | CO2 |
| 6. Which principle of lubrication is critical to prevent excessive wear and tear on moving parts?
(a) Using the thickest possible lubricant regardless of the machine
(b) Ensuring regular lubrication intervals and using the right type of lubricant
(c) Lubricating only when noise is noticed
(d) Avoiding lubrication to keep parts dry | 1 | K1 | CO2 |
| 7. What is the purpose of a maintenance schedule in a preventive maintenance policy?
(a) To ensure maintenance tasks are performed only after breakdowns
(b) To outline a systematic plan for regular checks and servicing
(c) To minimize the frequency of maintenance tasks
(d) To schedule repairs only during emergencies | 1 | K1 | CO2 |
| 8. Which of the following best describes the "repair cycle" in maintenance?
(a) The steps involved in procuring spare parts
(b) A process that outlines periodic inspection, repairs, and restoration of equipment
(c) A method for reducing repair costs by postponing repairs
(d) A routine maintenance task for lubrication only | 1 | K1 | CO2 |

9. What is the difference between on-load testing and off-load testing in condition monitoring? 1 K1 CO3
 (a) On-load testing is performed with equipment running under typical operating conditions, while off-load testing is done when equipment is shut down.
 (b) On-load testing is only for electrical equipment, while off-load testing is for mechanical systems
 (c) On-load testing requires specialized tools, while off-load testing does not
 (d) Off-load testing is done under load, and on-load testing is done without load
10. What is the primary purpose of condition monitoring (CM) in maintenance? 1 K1 CO3
 (a) To perform repairs only after a breakdown occurs
 (b) To detect potential equipment issues early to prevent unexpected failures
 (c) To reduce maintenance costs by eliminating inspections
 (d) To reduce equipment performance for cost savings
11. In condition monitoring, wear-debris analysis is primarily used to 1 K1 CO3
 (a) Measure temperature variations in machinery
 (b) Detect abnormal vibration patterns
 (c) Analyze particles in lubricants to identify wear in mechanical components
 (d) Measure electrical conductivity in components
12. Which of the following is a primary cost benefit of using condition monitoring in maintenance? 1 K1 CO3
 (a) Higher overall repair costs
 (b) Increased unexpected downtime due to breakdowns
 (c) Reduced long-term maintenance and repair costs due to early fault detection
 (d) Reduced need for specialized monitoring equipment
13. Which method is often used to repair worn-out gears in a machine? 1 K1 CO4
 (a) Re-lubricating the gear teeth
 (b) Welding or building up the worn areas and re-machining the teeth
 (c) Polishing the gears with sandpaper
 (d) Painting the gears to reduce wear
14. Which repair method is commonly used to fix cracks in a machine bed? 1 K1 CO4
 (a) Surface polishing
 (b) Welding or brazing the cracked areas
 (c) Applying a layer of grease
 (d) Ignoring the crack if it is minor
15. Which of the following is a likely failure development in gears under constant load? 1 K1 CO4
 (a) Gradual wear of gear teeth, leading to pitting and cracks
 (b) Continuous improvement of gear performance
 (c) Expansion of gear teeth due to wear
 (d) No visible wear over time
16. When bearings experience repeated failure, what is one possible cause to investigate? 1 K1 CO4
 (a) Excessive lubrication
 (b) Misalignment or contamination within the bearing housing
 (c) Regular operation under design load
 (d) Oversized bearing clearance
17. Equipment records are essential in maintenance because they 1 K1 CO5
 (a) Track equipment purchase costs only
 (b) Provide a history of repairs, maintenance schedules, and part replacements
 (c) Ensure the equipment is always operational without maintenance
 (d) Are used exclusively for inventory purposes
18. What is one advantage of using computers in maintenance management for material handling equipment? 1 K1 CO5
 (a) Elimination of the need for maintenance staff
 (b) Automation of all repairs without human intervention
 (c) Enhanced ability to track, schedule, and document maintenance activities in real-time
 (d) Increased maintenance costs due to software expenses

19. When a crane in a warehouse shows signs of wear, a common repair approach is: 1 K1 CO5
 (a) Ignoring minor signs and continuing usage
 (b) Lubricating the moving parts and replacing worn cables or hooks
 (c) Reducing the weight it lifts to extend its life
 (d) Painting it to prevent wear
20. Which of the following repairs is commonly performed on forklifts to ensure operational safety? 1 K1 CO5
 (a) Replacing worn-out tires (b) Adding extra weight for stability
 (c) Repainting the forklift (d) Removing the brakes to reduce maintenance needs

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21. Define maintenance. 2 K1 CO1
22. Define Reliability. 2 K1 CO1
23. What is meant by maintenance schedule? 2 K1 CO2
24. What are the merits of condition based maintenance? 2 K1 CO2
25. List any four equipment used for temperature monitoring. 2 K1 CO3
26. What are the limitations of breakdown maintenance? 2 K1 CO3
27. Define fault tree diagram. 2 K1 CO4
28. Mention the common two factors contributing to gear tooth breakage. 2 K1 CO4
29. List the various phases present in a good maintenance management system. 2 K1 CO5
30. Define work order systems. 2 K1 CO5

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31. a) What do you understand by maintenance categories? Explain common types. 10 K2 CO1
OR
 b) i) Explain the maintenance procedure for overhead crane and hydraulic lift and conveyer. 5 K2 CO1
 ii) Explain how preventive maintenance engineering and condition monitoring are related. 5 K2 CO1
32. a) Explain how you will implement TPM in automotive industry. 10 K2 CO2
OR
 b) Explain the different types of automatic lubrication system with suitable example. 10 K2 CO2
33. a) What are the different types of tests involved in condition monitoring? Explain in detail. 10 K2 CO3
OR
 b) Illustrate the process involved in condition monitoring. 10 K2 CO3
34. a) Describe the procedural steps in the failure analysis with suitable examples. 10 K2 CO4
OR
 b) Enumerate the drawbacks of fault tree analysis with suitable examples. 10 K2 CO4
35. a) Explain repair methods of Material Handling Equipment. 10 K2 CO5
OR
 b) Explain the repair methods of Slideways, Spindle, Lead screws and bearing in a CNC Machine. 10 K2 CO5

36. a) i) Write about overall successful coordination and management of various maintenance activities in an industry. 5 K2 CO1
ii) Demonstrate features of any four CMMS software available. 5 K2 CO5
- OR**
- b) i) Write short notes on long term plan. 5 K2 CO1
ii) Write short notes on use of computer in maintenance. 5 K2 CO5