16777

BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(ME)-2021
Course Name – Sustainable Manufacturing
Course Code - PEC-ME801C
(Semester VIII)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Choose from the following is a key pillar of sustainability.
a) Economic growth b) Social equity
c) Environmental protection d) All of the mentioned

(ii) Select from the following is an example of green manufacturing.
a) Using solar energy for production b) Increasing emissions for higher productivity
c) Disposing of hazardous waste in landfills d) Using more non-renewable resources

(iii) Identify which operation focuses on reducing defects in manufacturing.
a) Six Sigma b) Casting
c) Welding d) Assembly

(iv) State the primary goal of Lean Manufacturing.
a) To increase waste in production b) To maximize defects in products
c) To slow down the manufacturing process d) To reduce waste and improve efficiency

(v) Select the primary focus of the system approach.
a) Optimization of individual components b) Optimization of the entire system
c) Reduction of workforce d) Increase in production costs

(vi) Select the key advantage of renewable energy sources over fossil fuels.
a) Higher carbon emissions b) Infinite availability
c) Higher operational costs d) Limited accessibility

(vii) Identify an example of Industrial Symbiosis.
a) Independent energy production b) Waste from one factory used as raw material in another
c) Increasing emissions for high productivity d) Landfilling industrial waste

(viii) Choose the best strategy to reduce carbon footprint in industrial operations.
a) Using energy-intensive processes b) Increasing supply chain emissions
c) Implementing energy-efficient technologies d) Avoiding renewable energy integration

(ix) Identify the most common toxic substance released from industrial processes.

a) Carbon dioxide b) Heavy metals
c) Water vapor d) Nitrogen

(x) Select the best method to reduce toxic substance exposure in manufacturing industries.

a) Eliminating ventilation systems b) Implementing proper waste treatment
c) Increasing use of hazardous chemicals d) Ignoring industrial safety regulations

(xi) Justify the role of Life Cycle Assessment (LC in sustainable manufacturing.

a) It optimizes the entire product life cycle b) It reduces production time only
c) It focuses on single-use materials d) It supports excessive energy consumption

(xii) Select the most effective method to reduce carbon footprint in manufacturing.

a) Using energy-efficient technologies b) Increasing fossil fuel consumption
c) Disposing of more industrial waste d) Using non-recyclable materials

(xiii) Select the best alternative to conventional cutting fluids.

a) Edible oil-based fluids b) Petroleum-based lubricants
c) Chlorinated oils d) Solvent-based coolants

(xiv) Identify the main benefit of dry machining.

a) Eliminates the need for liquid coolants b) Requires excessive lubrication
c) Increases environmental pollution d) Decreases tool life

(xv) Select the primary advantage of minimum quantity lubrication (MQL).

a) Reduces fluid waste while maintaining lubrication b) Increases energy consumption
c) Requires more coolant than traditional methods d) Leads to high operational costs

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Classify different lean techniques used in sustainable manufacturing. (3)
3. Write about eco-friendly alternatives which can be used as synthetic cutting fluids. (3)
4. List the use of cryogenic machining for eco-efficiency. (3)
5. Develop a roadmap for implementing green technologies in manufacturing. (3)
6. Differentiate between short-term and long-term social aspects of sustainable manufacturing. (3)

OR

Analyze the benefits of industry symbiosis for reducing carbon footprint. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Differentiate between waste-based and value-based approaches in manufacturing. (5)
8. Assess the impact of lean techniques on sustainable manufacturing. (5)
9. Implement lean validation requirements to improve sustainability. (5)
10. Assess the relationship between sustainable manufacturing and corporate social responsibility (CSR). (5)
11. Discuss the significance of green supply chain management in modern manufacturing. (5)
12. Develop a methodology to quantify environmental impacts using Life Cycle Analysis tools. (5)

OR

Analyze how experimental design contributes to sustainability in manufacturing. (5)

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