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Question Paper Code: U9777

B.E. / B.Tech. DEGREE EXAMINATION, APRIL / MAY 2025

Open Elective

Mechanical Engineering

21UME977 - GREEN SUPPLY CHAIN MANAGEMENT

(Regulations 2021)

(Common to all Engineering Branches)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Which regulation focuses on restricting the use of hazardous materials in electronics? CO1- U
(a) WEEE (b) REACH (c) EuP (d) RoHS
2. What is a key environmental concern addressed by green electronics regulations? CO1-U
(a) Reducing production costs (b) Ensuring energy security
(c) Limiting the use of toxic materials (d) Increasing product durability
3. In green electronics, which of the following is an example of a green material? CO1- U
(a) Lead-free solder paste (b) Halogen-free substrates
(c) Non-recyclable thermosetting polymers (d) Conductive adhesives
4. Which process is typically the first step in integrated circuit (IC) manufacturing? CO1- U
(a) Etching (b) Wafer fabrication
(c) Testing and quality control (d) Photolithography
5. What does the term 'substrate interconnects' refer to in electronics assembly? CO1- U
(a) External wiring connections (b) Internal pathways for electrical signals
(c) Circuit board adhesives (d) Recycling components

6. What is the primary process in assembling electronic components? CO1- U
 (a) Soldering (b) Coating
 (c) Improving production speed (d) Enhancing device performance
7. What is the first stage of the green product development process? CO1- U
 (a) Materials (b) Packaging
 (c) Design planning (d) Concept development
8. What is the first stage of the green product development process? CO1- U
 (a) Materials (b) Packaging (c) Recycling (d) Resource recovery
9. What is the main objective of eco-design in CRT recycling? CO1- U
 (a) Minimize waste (b) Enhance energy efficiency
 (c) Reduce cost (d) Improve resolution
10. What is a significant challenge in the recycling of CRTs? CO1- U
 (a) Hazardous materials (b) High durability
 (c) Poor design (d) Limited market demand

PART – B (5 x 2= 10 Marks)

11. Illustrate any two hazardous substances restricted under RoHS. CO1- U
12. Distinguish between thermosetting and thermoplastic polymers in terms of recyclability. CO1 - U
13. Summarize the environmental benefits of a well-managed e-waste recycling system. CO1- U
14. Distinguish between traditional design and green design approaches. CO1- U
15. Identify the challenges in establishing a green supply chain. CO1 - U

PART – C (5 x 16= 80 Marks)

16. (a) Compare the environmental regulations for electronics in China, the EU, and other countries, highlighting their effectiveness in addressing environmental challenges. CO4 -Ana (16)
- Or
- (b) Examine the REACH regulation's role in restricting hazardous chemicals, its effectiveness in protecting health and the environment, and its advantages and disadvantages for companies. CO4 -Ana (16)

17. (a) Examine the application of conductive adhesives in electronics assembly, explaining their working mechanism, advantages, and disadvantages, accompanied by appropriate diagrams. CO2- App (16)
- Or
- (b) Design a workflow for manufacturing electronics with halogen-free substrates and components, illustrating the process with a clear diagram, and analyze its advantages and limitations. CO3 -App (16)
18. (a) Compare the effectiveness of thermal and mechanical recycling methods for printed circuit boards (PCBs) and assess their environmental impact. CO3 -App (16)
- Or
- (b) Discuss the role of product labeling systems in green electronics and evaluate how they aid in the recycling and disposal process. CO3- App (16)
19. (a) Design an eco-friendly household electronic device using the product development process for green design. Justify material choices, manufacturing techniques, and their environmental impact. CO6 -Eva (16)
- Or
- (b) Design a circular economy model for the sustainable production and disposal of electronic products, emphasizing material recovery and waste reduction. CO6 -Eva (16)
20. (a) Apply the Life Cycle Assessment (LCA) approach to eco-design in Cathode Ray Tube (CRT) recycling, illustrate the CRT recycling process with a detailed diagram, benefits and drawbacks in sustainable waste management. CO2 -App (16)
- Or
- (b) Solve the issue of electronic waste by applying green supply chain practices. Use a case study of a city or company that successfully implemented such practices. CO2 -App (16)

