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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: VII**

Branch: Institutional Elective **Duration: 3 hrs.**

Course Code: 22ME7OESSE **Max Marks: 100**

Course: Sustainable Engineering

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

				CO	*PO*	Marks
			UNIT - I			
1	a)	List and briefly explain the 17 Sustainable Goals as per the 70th UN general assembly held on 25th September 2015 under the official agenda "transforming our word: 2030 towards sustainable development"		*CO1*	*PO1 PO7*	**10**
	b)	Explain the concepts of Factor 4 and Factor 10 goals for sustainable development		*CO2*	*PO1 PO7*	**10**
		OR				
2	a)	Explain the green and low carbon economy		*CO1*	*PO1 PO7*	**10**
	b)	Explain the concept of circular economy with example		*CO1*	*PO1 PO7*	**10**
		UNIT - II				
3	a)	Explain environmental impact model IPAT equation developed by Ehrlich and Holdren in 1971 for sustainable development		*CO3*	*PO7 PO9 PO10*	**10**
	b)	Explain the basic elements of an Environmental Management System (EMS) with PDCA cycle		*CO3*	*PO7 PO9 PO10*	**10**
		OR				
4	a)	List and explain the Nine Principles of life cycle analysis tools - Sandestin Sustainable Engineering Principles		*CO3*	*PO9*	**10**
	b)	Explain the cleaner production implementation strategies procedural tool.		*CO3*	*PO10*	**10**
		UNIT - III				
5	a)	Identify an appropriate functional unit for each of the products listed below. Think of the basic need the product provides —it is this that determines use —and list what you would choose, thinking of all from an environmental standpoint for any 5 (Five) products 1) Washing machines 2) Refrigerators 3) Home heating systems 4) Air conditioners 5) Lighting 6) Home coffeemaker 7) Public transport 8) Handheld hair dryers		*CO3*	*PO7 PO9 PO10*	**10**

		b)	Problem Statement: System A is a multi-output process, which produces 10 kg of product A and 5 kg of product B per minute. 1 kg of product A is worth 20 USD, 1 kg of B is worth 5 USD. The process emits 120 kg CO_2 per hour. Product B can also be produced using another process, which produces 0.05 kg CO_2 per kg of product B. Calculate the CO_2 emissions for two different allocation procedures for product A. Determining the CO_2 emissions of the system A from products A and B emissions allocated based on the MASS.	*CO4*	*PO7 PO9 PO10*	**10**
			OR			
	6	a)	What are the methodologies are used to determine the outcomes of LCA	*CO4*	*PO7*	**10**
		b)	What is externalized and internalized cost in an environmental context with an example?	*CO3*	*PO7*	**10**
			UNIT - IV			
	7	a)	What are the six GHG emissions it accounts for and what are their sources?	*CO2*	*PO1 PO7*	**10**
		b)	What is the life cycle tree for a plastic water bottle? Includes the label and cap; excludes the water.	*CO3*	*PO7 PO9 PO10*	**10**
			OR			
	8	a)	Explain the case study of sustainable procurement criteria with benefits and challenges considered for office furniture procurements	*CO4*	*PO10*	**10**
		b)	Explain the different methods such as Environmental, Social and economic metrics are used to measure sustainability	*CO3*	*PO7*	**10**
			UNIT - V			
	9	a)	Explain the Sustainable Process Design – Case Study – Chemical Process Design for Vinyl Chloride Monomer (VCM)	*CO1*	*PO1 PO7*	**10**
		b)	Calculate carbon sequestration in plants involves estimating the amount of carbon dioxide (CO_2) that is absorbed and stored by plants through the process of photosynthesis. Case Study: Calculating Carbon Sequestration in a Forested Area in a 10-acre forest. Suppose the total tree biomass in the 10-acre forest is 200 metric tons (200,000 kg).	*CO3*	*PO7 PO9 PO10*	**10**
			OR			
	10	a)	Explain the case study of sustainable procurement criteria with benefits and challenges considered for office furniture procurements	*CO2*	*PO1 PO7*	**10**
		b)	What is conventional engineering design process and what are the 4 Cs of design	*CO1*	*PO1 PO7*	**05**
		c)	Explain the 7-strategy wheel for design for sustainability	*CO2*	*PO1 PO7*	**05**

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