RV College of Engineering®
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Date : 4-11-25	**CIE – 1**	**Max. Marks : 10 + 50**
Semester : III	**UG**	**Duration : 30 + 90 Min**
Course Title: Work Systems Design		**Course Code : IM233AI**

SCHEME & SOLUTIONS

Sl. No	Solutions with Scheme	M
	Part – A	
1.	**Production**: Total output generated. **Productivity**: Output per unit input (e.g., labor, time).	2
2.	A pyramid showing: Task → Subtask → Work Elements → Basic Motions. Visual hierarchy of task decomposition.	2
3.	**Methods Design**: Creating new work methods. **Methods Engineering**: Broader scope including analysis, design, and implementation.	2
4.	Manual work systems, Worker-machine systems, Automated systems.	2
5.	Standard Hour & Worker Efficiency	2
	Part – B	
1.	Define Basic Work Content (2M), Define Excess Work Content (2M), List causes: poor design, inefficient layout, lack of training, delays (6M) **Examples:** Basic: Time to assemble a product using optimal method, Excess: Time lost due to tool searching or poor ergonomics.	10
2.	**Month 1:** • Output = 1000 units • Labor input = 20 × 8 × 25 = 4000 hrs • Productivity = 1000 / 4000 = 0.25 units/hr **Month 2:** • Output = 1400 units • Labor input = 20 × 8 × 20 = 3200 hrs • Productivity = 1400 / 3200 = 0.4375 units/hr **Productivity Index = (0.4375 / 0.25) × 100 = 175%** **Scheme:** • Define productivity measures (2M) • Calculate both months (4M) • Compute index and interpret (4M)	10
3.	**Given:** • Normal time = 6.5 min • Irregular element = 3 min every 16 cycles • PFD = 12% • 4 units per cycle • Shift = 8 hrs = 480 min **Calculations:** • Irregular time per cycle = 3 / 16 = 0.1875 min • Total time per cycle = 6.5 + 0.1875 = 6.6875 min • Standard time = 6.6875 × (1 + 0.12) = 7.49 min • Standard time per unit = 7.49 / 4 = 1.8725 min • Units per shift = 480 / 1.8725 ≈ 256 units • Time worked = 480 × (1 – 0.14) = 412.8 min • Time lost = 480 – 412.8 = 67.2 min **Scheme:** • Standard time per unit (4M) • Shift output (3M)	10

	• Time worked and lost (3M)	
4.	**Scheme:** • Select task (1M) • Record current method (2M) • Examine critically (2M) • Develop improved method (2M) • Define new method (1M) • Install and maintain (2M) The answer has to be on similar lines.	10
5 a.	One worker–one machine, One worker–multiple machines, Multiple workers–one machine, Multiple workers–multiple machines. **Examples for each (5M)**	05
5 b.	PFD = Personal, Fatigue, and Delay (2M),Purpose: Adjust normal time to account for unavoidable delays and human needs (3M)	05