

Enrollment No.....



Faculty of Engineering
End Sem Examination May-2024
ME3EL20 Lean Manufacturing

Programme: B.Tech.

Branch/Specialisation: ME

Duration: 3 Hrs.**Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1 i. Which of the following is a key principle of lean manufacturing? **1**
 (a) Just-in-Time (JIT) production (b) Mass production
 (c) High inventory levels (d) Long production runs
- ii. What is the primary benefit of implementing Total Productive Maintenance (TPM) practices in manufacturing operations? **1**
 (a) Increased equipment downtime
 (b) Decreased equipment reliability
 (c) Improved equipment effectiveness and productivity
 (d) Reduced employee involvement in maintenance activities
- iii. What is the primary objective of secondary lean tools in lean manufacturing? **1**
 (a) Maximizing production output
 (b) Minimizing machine downtime
 (c) Improving specific areas of the manufacturing process
 (d) Reducing employee involvement in maintenance activities
- iv. Who is credited with developing the Single Minute Exchange of Die (SMED) methodology? **1**
 (a) Taiichi Ohno (b) Shigeo Shingo
 (c) Henry Ford (d) W. Edwards Deming
- v. What is the role of the black belt in six sigma projects? **1**
 (a) Perform data analysis and statistical tests
 (b) Lead project teams and facilitate improvement efforts
 (c) Train employees on six sigma methodologies
 (d) Assist in documenting project results
- vi. How are quality circles typically organized within an organization? **1**
 (a) By job function (b) By seniority
 (c) By department (d) By external consultants

[2]

- vii. Which of the following best describes Reliability Centered Maintenance (RCM)? **1**
- (a) A reactive maintenance approaches
 - (b) A proactive maintenance approaches
 - (c) A maintenance approach that relies solely on condition monitoring
 - (d) A maintenance approach that focuses on maximizing equipment life
- viii. What is the function of Autonomous Maintenance in Total Productive Maintenance (TPM)? **1**
- (a) Performing routine maintenance tasks without relying on specialized maintenance personnel
 - (b) Reacting to equipment failures as they occur
 - (c) Conducting regular equipment inspections
 - (d) Identifying and addressing root causes of equipment failures
- ix. What is the purpose of using factorial designs in Design of Experiments (DOE)? **1**
- (a) To analyze the impact of one variable at a time
 - (b) To perform experiments in a random order
 - (c) To determine the optimal level of a single factor
 - (d) To study the interaction between variables
- x. What is the primary purpose of the roof of the House of Quality (HOQ) in Quality Function Deployment (QFD)? **1**
- (a) To provide structural support
 - (b) To assess market competition
 - (c) To prioritize customer requirements
 - (d) To visualize the relationships between engineering characteristics
- Q.2 i. What is lean manufacturing? **2**
- ii. How does 5-S contribute to improving safety in the workplace? **3**
- iii. What is Total Productive Maintenance (TPM)? How does TPM involve all employees in the maintenance process? **5**
- OR iv. What is the purpose of creating a process map? How does value stream mapping differ from process mapping? **5**
- Q.3 i. What is the purpose of creating a Pareto chart? **2**
- ii. Describe the concept of Single Minute Exchange of Die (SMED) and its significance in manufacturing processes. Explain the difference between internal and external setup activities in the context of SMED. **8**

[3]

- OR iii. Discuss the key principles and objectives of Design for Manufacturing and Assembly (DFMA). Explain the difference between Design for Manufacturing (DFM) and Design for Assembly (DFA). **8**
- Q.4 i. How does Total Quality Management (TQM) apply to the service sector, including IT? **3**
- ii. Describe the process of implementing Quality Function Deployment (QFD) in a product development context, including its various phases and steps. What are its main components? **7**
- OR iii. Define quality circles. Provide examples of successful benchmarking initiatives in various industries, highlighting the benefits achieved and lessons learned. **7**
- Q.5 i. What is Total Productive Maintenance (TPM)? What are its primary objectives? **4**
- ii. Explain the fundamental principles underlying Reliability Centered Maintenance (RCM). Discuss how RCM focuses on understanding failure modes, consequences, and maintenance strategies to optimize asset performance. **6**
- OR iii. Provide case studies or examples of organizations that have successfully implemented breakdown maintenance strategies. Discuss their experiences, challenges faced, and lessons learned. Highlight key best practices and recommendations for optimizing breakdown maintenance effectiveness in diverse industrial settings. **6**
- Q.6 Attempt any two:
- i. Analyze the role of experimental design in the Taguchi approach. Discuss the use of orthogonal arrays and signal-to-noise ratios to efficiently explore the effects of multiple factors on product quality. **5**
- ii. Define Failure Mode and Effect Analysis (FMEA). Discuss the role of cross-functional teams in FMEA. **5**
- iii. Discuss the unique challenges and opportunities associated with managing quality in service sectors such as healthcare, hospitality, banking, and retail. **5**

Marking Scheme**Lean Manufacturing (T) - ME3EL20 (T)**

Q.1	i)	a	1
	ii)	c	1
	iii)	c	1
	iv)	b	1
	v)	b	1
	vi)	c	1
	vii)	b	1
	viii)	a	1
	ix)	d	1
	x)	d	1
Q.2	i.	2	2
	ii.	3	3
	iii.	2+3	5
	OR iv.	2+3	5
Q.3	i.	2	2
	ii.	4+4	8
	OR iii.	4+4	8
Q.4	i.	3	3
	ii.	5+2	7
	OR iii.	2+5	7
Q.5	i.	2+2	4
	ii.	2+4	6
	OR iii.	2+4	6
Q.6			
	i.	2+3	5
	ii.	3+2	5
	iii.	2.5+2.5	5
