Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Online End Semester Examination, May 2021

Programme: B. Tech-ADE **Semester : VI**
Course Name: TQM+ Industrial Engineering **Max. Marks : 100**
Course Code: MECH 3018P **Max. Time : 03 Hours.**

SECTION A (30 Marks)

1. **All questions are compulsory in this section.**
2. **Total 06 questions are there in this section and each question is of 5 Marks.**
3. **Short answer type questions.**
4. **Assume any missing data if required.**

Q1	Desribes the EOQ & ABC analysis.	**5**	**CO1**
Q2	Illustrate the difference between Product, Process & combination Layouts.	**5**	**CO2**
Q3	Describe cyclograph and Chrono cyclograph in Method study.	**5**	**CO3**
Q4	Describe the four major differences between QC & QA.	**5**	**CO4**
Q5	State the primary objectives of six sigma.	**5**	**CO5**
Q6	Mention the requirement of ISO 14001.	**5**	**CO5**

SECTION B (50 Marks)

1. **All questions are compulsory in this section.**
2. **Total 05 questions are there in this section and each question is of 10 Marks.**
3. **Write brief notes.**
4. **Assume any missing data if required.**

Q7	A company makes bicycles. It produces 450 bicycles a month. It buys the tires for bicycles from a supplier at a cost of Rs.20 per tire. The company's inventory carrying cost is estimated to be 15% of cost and the ordering is Rs.50 per order. a) Calculate the EOQ b) What is the number of orders per year? c) Compute the average annual ordering cost. d) Compute the average inventory. e) What is the average annual carrying cost?	**10**	**CO1**
Q8	Compare & contrast among product, process & combination layouts. Support your answer with relevant example from Industry.	**10**	**CO2**

<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Q9</td><td>
<table>
<tr><th>Task</th><th>Performance time(Min.)</th><th>Task Must follow</th></tr>
<tr><td>A</td><td>10</td><td>-</td></tr>
<tr><td>B</td><td>11</td><td>A</td></tr>
<tr><td>C</td><td>5</td><td>B</td></tr>
<tr><td>D</td><td>4</td><td>B</td></tr>
<tr><td>E</td><td>12</td><td>A</td></tr>
<tr><td>F</td><td>3</td><td>C,D</td></tr>
<tr><td>G</td><td>7</td><td>E</td></tr>
<tr><td>H</td><td>11</td><td>F</td></tr>
<tr><td>I</td><td>3</td><td>G,H</td></tr>
</table>
a) Draw precedence diagram
b) Determine cycle time. Target = 40 units
c) Theoretical minimum no. of work stations
d) Assign tasks to workstations using longest task time
e) Efficiency and balance delay of line.
</td><td>10</td><td>CO2</td></tr>
<tr><td>Q10</td><td>Describe in brief about a) Therblig & b) Two handed process chart for Nut & bolt Assembly.</td><td>10</td><td>CO3</td></tr>
<tr><td>Q11</td><td>Define Benchmarking & explain various types of bench marking studies undertaken for quality improvement.</td><td>10</td><td>CO5</td></tr>
<tr><td colspan="4">SECTION C (20 Marks)
1. Please solve one question out of two.
2. Write long answers.
3. Use Standard Normal distribution table & cumulative Poisson probability Table. Assume any missing data if required.</td></tr>
<tr><td>Q12</td><td>The diameter of cotter pins produced by an automatic machine is a characteristic of interest. Based on historical data, the process average diameter is 15 mm with a process standard deviation of 0.8 mm. If samples of size 4 are randomly selected from the process:
a. Find the 1σ and 2 σ control limits.
b. Find the 3 σ control limits for the average diameter.
c. What is the probability of a false alarm?</td><td>20</td><td>CO4</td></tr>
</table>

	d. If the processes mean shifts to 14.5 mm, what is the probability of not detecting this shift on the first sample plotted after the shift? e. What is the probability of failing to detect the shift by the second sample plotted after the shift? **OR** The Noise King Muffler Shop, a high-volume installer of replacement exhaust muffler systems, just received a shipment of 1,000 mufflers. The sampling plan for inspecting these mufflers calls for a sample size n = 60 and an acceptance number c = 1. The contract with the muffler manufacturer calls for an AQL of 1 defective muffler per 100 and an LTPD of 6 defective mufflers per 100. Calculate the OC curve for this plan, and determine the producer's risk and the consumer's risk for the plan.		