

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025***Sixth Semester**Artificial Intelligence and Data Science***OIE351 - Introduction to Industrial Engineering***(Common to Computer Science and Engineering & Information Technology)**Regulations - 2021**Duration : 3 Hrs**Maximum : 100 Marks***PART - A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	Differentiate between industrial engineering and production management.	L2	1	2
2.	Why is measuring productivity essential for industries?	L1	1	2
3.	List the factors affecting plant location.	L1	2	2
4.	Justify the selection of a specific plant layout for an automobile industry.	L2	2	2
5.	Define method study.	L1	3	2
6.	List the main applications of ergonomics in the work place.	L2	3	2
7.	Compare control charts for variables and control charts for attributes.	L2	4	2
8.	Mention the applications of statistical quality control in industries.	L1	4	2
9.	State the role of progress control in manufacturing.	L1	5	2
10.	How is Economic Batch Quantity (EBQ) calculated?	L2	5	2

PART - B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a i Explain the history and development of industrial engineering with key milestones.	L2	1	8
	ii Discuss how Industrial engineering principles can be used to optimize a service-based industry.	L2	1	8
	Or			
	b i Develop a new strategy using industrial engineering techniques to improve operational efficiency in an automobile plant.	L2	1	8
	ii Examine the impact of industrial engineering on modern manufacturing systems.	L2	1	8
12.	a i List and explain the principles of plant layout. How do these principles help in achieving cost-effectiveness and operational efficiency?	L3	2	8
	ii What is line balancing in a manufacturing setup, and why is it important? Describe the key methods used for line balancing.	L3	2	8

Or

- b i Draw the simple layout of a metal powder manufacturing unit and explain. L3 2 8
- ii Discuss the storage space requirements in a plant layout. How does the availability of storage space impact the flow of materials and the overall efficiency of a manufacturing plant? L3 2 8
13. a i Define work study. State its objectives. Differentiate between method study and work measurement. L2 3 10
- ii A work sampling study was conducted for 100 hrs. in the machine shop in order to estimate the standard time. The total number of observations recorded was 3000. No working activity could be noticed for 500 observations. The ratio between manual and machine elements was 3:1. Average rating factor was estimated at 1.15 and the total numbers of articles produced during the study period were 6000. Rest and Personal allowances may be taken as 12% of the normal time. L3 3 6
- Or
- b i What are the various types of allowances to be considered in the calculations of standard time. L2 3 10
- ii The worker in an engineering company is expected to work for 420 min in a shift of 8 hrs. The remaining time is allowed for rest and personal needs etc. (i) Determine the standard time per piece of a job whose normal time is 4 min (ii) Calculate the number of pieces produced per day (iii) If the worker produced 100 pieces in his shift what is his efficiency. L3 3 6
14. a i Number of defects found in an inspection of 10 assemblies are 2, 3, 2, 5, 2, 3, 5, 3, 0, 1 respectively. Draw appropriate control chart and conclude. L3 4 6
- ii Explain the terms: control limits, tolerance limits and specification limits. L2 4 10
- Or
- b i Describe an item by item sequential sampling plan by attributes. Derive the acceptance and rejection lines of such a plan with a given producers risk and consumers risk. L3 4 10
- ii A manufacturer records the diameter (in mm) of a machined part in five samples, each containing four observations:

Sample	Observations (mm)
1	10.2, 10.4, 10.5, 10.3
2	10.1, 10.3, 10.4, 10.2
3	10.3, 10.2, 10.4, 10.3
4	10.2, 10.3, 10.5, 10.1
5	10.3, 10.4, 10.2, 10.1

Calculate UCL and LCL for $\bar{X}$ chart using $A_2 = 0.729$ and for R chart using $D_4 = 2.282$, $D_3 = 0$.

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|-----|---|----|--|----|---|---|
| 15. | a | i | There are two industries manufacturing two types of plugs. The standard time per piece is 1.5 minute; output of the two industries is 300 and 200 respectively per shift of 8 hrs. Then (i)What is the productivity of each per shift of 8 hrs? (ii)What is the production of each per week (6 days) on the basis of double shift? | L3 | 5 | 8 |
| | | ii | Based on the unique nature of the custom orders, do you think XYZ Custom Furniture should consider switching to Batch Production for some product lines? Justify your answer with reasons and examples. | L5 | 5 | 8 |
| | | | Or | | | |
| | b | i | Explain how loading should be done to ensure optimal utilization of machines and avoid delays in the production process. | L3 | 5 | 8 |
| | | ii | Using a Gantt chart, create a scheduling plan for the three jobs, assuming the jobs arrive at the factory in the given sequence. | L5 | 5 | 8 |