Uka Tarsadia University (Diwaliba Polytechnic)
Diploma in Mechanical Engineering
Assignment (Industrial Engineering -020020602)

Unit-1 Introduction to Industrial Engineering

1. Define: (a) Industrial Engineering, (b) Productivity, (c) Production, (d) Production System, (e) Work study
2. What are the objectives of industrial engineering?
3. State the role of industrial engineering in industry.
4. Write down the methodology of industrial engineering.
5. Explain methods of increasing productivity.
6. Enlist and explain factors influencing productivity.
7. How productivity and prosperity are related with each other? OR Explain relation between productivity and prosperity.
8. Enlist various technique used in industrial engineering.
9. There are 200 workers in a plant and they produce 10 items in unit time. Find the productivity of the plant considering one shift (8 hours) per day.
10. Write down the procedure of work study.
11. Explain the purpose of work study. OR Why work study is required in an industry?
12. Explain importance of human factors in application of work study technique for following relations: (a) Work study and management, (b) Work study and supervisors, (c) Work study and workers.

Unit- 2 Technique of work study

1. Define: (a) Method Study (b) work measurement (c) standard time (d) Rating (e) work sampling (f) Allowance (g) Basic time (h) plant layout
2. Which chart is useful to know how much man works in relation with machine?
3. In which chart only operation and inspection two activities are plotted?
4. Which chart is useful in micro motion study?
5. Which technique of work measurement follows the principle of normal distribution of statistics?
6. What are the types of flow process chart?
7. What are the techniques of work measurement?
8. Write the formula for number of observations to be done for work sampling if confidence level is 95%.
9. Which type of plant layout is required for the production of varieties of products in small quantity?
10. Which type of plant layout is required for production of standard product but on very large scale?
11. Name the material handling equipment which transfer material only horizontally.
12. In which material handling equipment, goods can be only lifted or lowered?
13. A worker completes a work element in 0.16 min. if the rating given to him is 125 then calculate the basic time.
14. What is the objectives of method study?
15. State the objectives of outline process chart.
16. Why micromotion study is required?
17. Write down the uses of flow diagram.
18. State the objectives of man – machine chart.
19. Differentiate between cumulative timing and fly back timing.
20. Explain the importance of work measurement.
21. Enlist various charts and diagram used in method study.
22. Which symbols are used in two hand process chart? Also write use of that symbols.
23. What are the objectives of work measurement?
24. In what types of situations time study is required?
25. Why work sampling is needed? Or write applications of work sampling.
26. Explain relaxation allowance with its major components.
27. Find out the standard time, using following data.

    Average time of machine element – 6 min.
    Average time of manual element – 4 min.
    Performance rating – 110 %
    Allowances – 10 %

28. Calculate standard time from following data for one cycle:
    Loading time – 2 min.
    Machining time – 6 min.
    Unloading time – 1 min.
    Inspection time – 1 min.
    Overall allowances – 10 %
    Overall rating of cycle – 110 %
29. In preliminary work sampling study 100 observations were made, out of which 30 times the machine was seen idle. Estimate number of observations required for an accuracy of ± 5% and 95 confidence level.
30. In a work sampling study for 25 % of time machine was found idle. Estimate number of observations required for an accuracy of 5 % and 95 % confidence level.
31. It has been decided to conduct work sampling study of a machine with 5% accuracy and 95 % accuracy level. During 100 observations of trial study, machine was seen idle for 80 times. Find the number of observations required to obtain the desired result mentioned above.
32. Calculate rating when 52 playing cards are distributed to 4 players in 0.42 minutes 0.50 minutes and 0.58 minutes.
33. Explain the basic procedure for work measurement.
34. Draw and write a short description on standard symbols used in process charts.
35. Write short note on flow diagram & string diagram.
36. What is time study allowances? Enlist its types and explain each one in brief.
37. What is Therblings? Draw the symbol of Therblings and write description for each one.
38. Write short note on ‘flow process chart’.
39. Write short note on ‘operation process chart’. OR Explain outline process chart with suitable example.
40. What is the usefulness of man and machine chart? How these charts are prepared?
41. Explain in brief ‘SIMO chart’.
42. Classify the activities recorded in process chart.
43. Explain one of the work measurement method named as “Pre-determined Motion Time System” [PMTS] along with example.
44. State various steps to carry out method study and explain each one briefly.
45. Write advantages and disadvantages of work sampling.
46. Write a short note on product layout with neat sketch.
47. Write a short note on process layout with neat sketch.
48. Classify material handling equipment and give their applications.

Unit-3 Job Evaluation, Enrichment, Wages, Incentives and Acceptance Sampling

1. Define: Real Wage and Fair Wage.
2. Enlist different method of job evaluation.
3. Write the advantages of acceptance sampling.
4. What is 'Producer – risk' and 'Consumer – risk' with reference to acceptance sampling?
5. Give the importance of random sampling.
6. Define: Incentive.
7. Differentiate minimum wage and fair wage.
8. Give the importance of job evaluation.
9. Write the characteristic of good sample.
10. Define job specification.
11. What is real wages and living wages?
12. Write down the steps of job evaluation.
13. Give the importance of random sampling.
14. Write down characteristic of good wages system.
15. What is job specification?
16. Differentiate between compensation and incentives.
17. What is nominal wage and real wage?
18. Write the advantages and disadvantages of acceptance sampling.
19. Give the distinguishing features of job analysis, job description.
20. List out characteristic of good wages system.
21. The specification for double sampling plan are as follows.

N1 = 70	a1 = 3	r1=7
N2= 70	a2 = 8	r2=9

22. Describe the process of job evaluation.
23. Discuss the double sampling plan with neat sketch.
24. Explain the different types of incentive plans.
25. Write short note on job specification.
26. Explain the process of job evaluation with flow diagram.
27. Explain the single sampling plan with neat sketch.
28. What do you mean by wages? Explain different types of wages.
29. Enlist different method of job evaluation. Explain any one in detail.
30. Write short note on job analysis.
31. Design double sampling plan for accepting or rejecting a lot of 2000 items. It is decided to use 2.5% AQL and Inspection level-3. The details at 2.5% AQL for sample size, acceptance numbers and rejection number obtained are:

N1 = 32	a1 = 1	r1 = 4
N2= 32	a2= 4	r2= 5

32. Explain the ranking method of job evaluation.
33. What is wages? Write down characteristic of good wages system.
34. Write short note on job description.
35. The specification for double sampling plan are as follows. Draw a block diagram to explain the sampling plan

N1 = 150	a1 = 5	r1 = 8
N2 = 150	a2 = 9	r2 = 10
N = 2400		

36. Explain nominal wages and real wages.
37. Explain the single sampling plan with neat sketch.
38. IV) Write down objectives of job evaluation.
39. The specification for double sampling plan are as follows. Draw a block diagram to explain the sampling plan.

N1 = 50	a1 = 3	r1 = 7
N2 = 50	a2 = 8	r2 = 9
N=1000		

40. Explain classification of method of job evaluation.
41. Narrate very briefly the distinguishing features of job analysis, job description and job specification.
42. Discuss the process of job evaluation with flow diagram.

Unit-4 Introduction to quality assurance (Q.A) and Reliability

1. Define: (a) Mean, (b) Median, (c) Mode, (d) Range, (e) Standard deviation
2. Draw a neat sketch of normal distribution curve and state percentage area covered under various specification limit.
3. Explain quality, quality control, quality assurance and statistical quality control.
4. Differentiate between quality control and inspection.
5. Define quality and statistical quality control.
6. What is reliability? Explain its significance in industrial engineering.
7. List the factors affecting reliability.
8. Upper and lower specification limits of shaft diameter are 30.20 mm and 30.00 mm. respectively. Mean dia. Is 30.50 mm and standard deviation is 0.05 mm. Find out how many parts out of 400 will be accepted.

   Z-value Area
   3 0.4987
   -1 0.3413

9. Draw histogram, frequency bar chart, frequency polygon and frequency distribution curve from following data: 75, 80, 63, 65, 70, 12, 18, 22, 24, 29, 31, 33, 34, 35, 38, 40, 52, 55, 57, 60, 41, 45, 47, 49.
10. Hardness of 500 products is shown in table given below. Calculate the mean and standard deviation for these products.

Hardness	Frequency(f)
250-254	20
255-259	135
260-264	175
265-269	155
270-274	15

11. The weight of cans of Tomatoes is shown in table given below. Calculate the mean and standard deviation for the given data.

Weight	23.0	22.5	22.0	21.5	21.0	20.5	20.0	19.5	19.0	18.5
frequency	14	31	34	33	41	26	24	12	7	2

Unit-5 Controls Charts for Variables, Attributes and Statistical Tolerencing

1. Write down the examples of attribute type of data.
2. What is control chart?
3. Write down the use of C-chart.
4. When C-chart is used?
5. Give the example of variable type of data.
6. What is shift in control charts?
7. Give the example of attribute type of data.
8. What is trend in control charts?
9. When P-chart is used?
10. What is erratic fluctuation in control charts?
11. Enlist objectives of control chart.
12. Give difference between X bar-R chart and P-chart.
13. Define: variable chart.
14. What is cyclic variation in control charts?
15. Give difference between defect and defective.
16. Define: control chart.
17. Enlist types of quality with example.
18. What is stratification in control charts?
19. The measured dimension of 5 wooden blocks in meter are given in table.

1	2	3	4	5
4.95	4.92	5.07	5.01	5.01
5.00	5.05	5.03	5.02	4.98
4.93	5.03	5.01	4.99	5.03
4.98	5.01	4.95	4.94	4.91
4.99	4.95	4.96	4.96	4.89

Find the control limits for X bar and R chart. Take value of A2 = 0.577, D4 = 2.114, D3 = 0

20. Explain the method of drawing X bar - R chart.
21. Following table shows the number of defect of the sample taken from the products manufactured in an industry. Find control limits.

No. of product(n)	100	100	100	100	100	100	100	100	100	100
Defective	8	10	6	11	3	5	0	4	9	7

product(d)										

22. Explain the method of drawing P-chart.
23. In each subgroup of 150 (n) number of products, defective products in 5 subgroups are shown in table below. Find control limits of fraction defective chart (p-chart).

subgroup	1	2	3	4	5
Defective No.(d)	8	4	4	6	5

24. Explain attribute type data.
25. Describe the method of drawing variable quality chart (X bar – R chart).
26. 5 random sample were taken for the slip ring diameter in cm. The diameters are measured as under.

1	2	3	4	5
5.02	5.01	4.99	5.03	4.95
5.01	5.03	5.00	4.91	5.03
4.94	5.07	4.93	5.01	5.05
4.99	4.95	4.92	4.98	5.01
4.96	4.96	4.99	4.89	4.92

Find the control limits for X bar chart. Take value of A2 = 0.577, D4 = 2.114, D3 = 0

Unit-6 Ergonomics and Emerging Trends In Industrial Engineering

1. Which are the objectives of ergonomics?
2. Define the term six sigma.
3. Why reengineering is called creative activity?
4. Define the term ergonomics.
5. What is T.Q.C.?
6. Write down basic steps of Reengineering.
7. Define the term anthropometry.
8. What is T.Q.C.?
9. Give uses of I.S.O standard.
10. Give the importance of I.S.O standards in industry.
11. What are the application of Ergonomics?
12. Write down objectives of Kaizen.
13. What do you mean by zero defect?
14. Write down objectives of Kaizen.
15. Define the term re- engineering.
16. Explain the Importance of "TQM" concept.
17. What are the effects of illumination and noise on workplace and worker?
18. Write short note on kaizen technique.
19. Explain the importance of anthropometric data in product design.
20. Write a short note on I.S.O. standard.
21. Explain normal working area and maximum working area.
22. What are the effects of temperature and humidity on workplace and worker?
23. Discuss zero defect concept.
24. Explain the principle of six sigma with its presumption.
25. Write down the objective and application of Ergonomics.
26. Explain zero defect approach.
27. Write short note on re-engineering.
28. Write a short note on just in time.
29. Give comparison between TQM and Reengineering.
30. Explain the different stages of total quality control.
31. Write objectives of T.Q.M. concept.
32. Explain six sigma model or D.M.A.I.C. model.
33. Write down the objectives of T.Q.C.
34. Explain the concept of just in time.
35. Give comparison between TQM and Reengineering.