



Name :
Roll No. :
Invigilator's Signature :

CS/B.TECH(APM)/SEM-6/APM-601/2012

2012

PRODUCT ENGINEERING AND PLANT LAYOUT

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

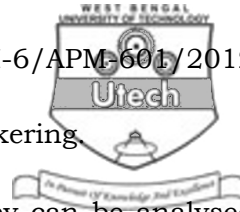
GROUP - A

(Objective Type Questions)

1. Answer the following : 10 × 1 = 10
- i) Time allowance considered for power cut is an example of
- a) contingency allowance b) interference allowance
c) process allowance d) fatigue allowance.
- ii) 'Westinghouse Method' is related with
- a) average working efficiency of that worker
b) performance rating % of the worker
c) standard allowed minute of a job
d) productivity calculation.



- iii) Which of the following control charts are useful to illustrate amount of rework and rejection ?
- a) Two handed process chart
 - b) Multiple activity chart
 - c) Operation process chart
 - d) Flow process chart.
- iv) Mention one example each for 'Make Through Process' and 'Progressive Bundling Process' of Apparel Manufacturing.
- v) 'Selection of the best possible alternatives' is a step included in
- a) work sampling
 - b) time study
 - c) method study
 - d) motion study.
- vi) Which of the following factors have most significant influence on the ideal number of observation cycles for Time Study ?
- a) Average cycle time of the job
 - b) Type of raw material
 - c) Location of the machine
 - d) Efficiency % of the job.



- vii) Mention any two causes of Seam Puckering.
- viii) Utilization of material handling trolley can be analysed through
- a) multiple activity chart
 - b) two handed process chart
 - c) operational process chart
 - d) travel chart.
- ix) Mention one example each for process layout and product layout.
- x) Checking the lay alignment should be done
- a) after cutting
 - b) before cutting
 - c) before sewing
 - d) after sewing.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following 3 × 5 = 15

2. Write short notes on : 2½ + 2½
- i) different levels of productivity calculation
 - ii) check list for cutting department.



3. Write a flow chart to describe different steps involved in Method study.
4. Draw a neat block diagram to show the constitution of standard time by showing different elements of standard time.
5. What do you mean by performance rate % ? Explain the method of determining performance rate % by Westinghouse system. Give a suitable example.
6. Draw a block diagram to describe the schematic method of plant layout plan.

GROUP - C

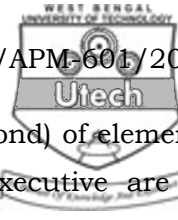
(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) The path of material flow of four items *A, B, C* and *D* are as observed below in a manufacturing industry :

| Item | Department |
|----------|---|
| <i>A</i> | $P \rightarrow Q \rightarrow S \rightarrow U \rightarrow V$ |
| <i>B</i> | $R \rightarrow P \rightarrow V \rightarrow U \rightarrow S$ |
| <i>C</i> | $Q \rightarrow U \rightarrow V$ |
| <i>D</i> | $P \rightarrow Q \rightarrow R \rightarrow S \rightarrow T \rightarrow V$ |

Draw a suitable travel chart.



- b) The stop watch readings of time (in second) of elements of a job recorded by a time study executive are as under :

| Element | Cycle-1 | Cycle-2 | Cycle-3 | Cycle-4 |
|---------|---------|---------|---------|---------|
| A | 2 | 1.5 | 1.5 | 2 |
| B | 10 | 10 | 9 | 11 |
| C | 6 | 5 | 6 | 5.5 |

Calculate the required number of cycles to be recorded at $\pm 5\%$ of accuracy and a 95% confidence level.

7 + 8

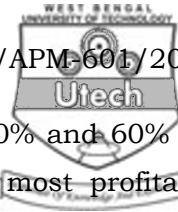
8. a) An assembly operation in Sewing Department consists of five elements with following observed time and the performance ratings :

| Element | Observed Time in Minutes | Performance Rating % |
|---------|--------------------------|----------------------|
| A | 1.2 | 80 |
| B | 0.5 | 85 |
| C | 1.12 | 80 |
| D | 0.5 | 95 |
| E | 0.10 | 90 |

Assume element B and D are machine job and rest are manual jobs. Assuming rest and personal allowance as 15%, contingency allowance as 3% and process allowance as 5% of the basic time. Calculate Standard Allowed time.



- b) Briefly mention the causes of any 4 commonly occurred sewing defects. 7 + 8
9. a) Mention in brief the basic characteristics of different manufacturing process generally adopted in apparel industry. Use suitable block diagrams.
- b) Illustrate a sample matrix to be used for examination and analysis in case of method study.
- c) Define: 'Interference Allowance', 'Personal Allowance', 'Process Allowance'. 7 + 5 + 3
10. a) What do you mean by Fly back timing method and Cumulative timing method ?
- b) Prepare a sample format for recording of Time study details in a Sewing department.
- c) Mention the factors which influence the number of observation cycles to be fixed in a time study.
- d) Explain how time study can help in line balancing and production planning. 4 + 4 + 4 + 3
11. a) The alternatives derived after examination and analysis stage of method study are A, B and C. Initial investment is Rs. 50,000, Rs. 80,000 and Rs. 20,000 for A, B and C respectively. The ROI % are 30, 40 and 30 for A, B and C respectively. Similarly, process cycle times are 10 minutes, 5 minutes and 12 minutes & manual



involvement % are estimated as 40%, 20% and 60% for A, B and C respectively. Evaluate the most profitable alternative. Assume the weightages given for initial investment, ROI, Cycle time and human involvement are 40, 30, 20 and 10 respectively.

- b) What are the factors to be considered for selection of a job for Method study ? 9 + 6

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