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 : $10 \times 1 = 10$

   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 $3 \times 5 = 15$

2. Write short notes on : $2\frac{1}{2} + 2\frac{1}{2}$

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
A	$P \rightarrow Q \rightarrow S \rightarrow U \rightarrow V$
B	$R \rightarrow P \rightarrow V \rightarrow U \rightarrow S$
C	$Q \rightarrow U \rightarrow V$
D	$P \rightarrow Q \rightarrow R \rightarrow S \rightarrow T \rightarrow V$

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 +/– 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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