Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/APM(NEW)/SEM-6/APM-602/2013

2013
PRODUCTION PLANNING & CONTROL IN APPAREL INDUSTRY

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 all the questions : $10 \times 1 = 10$

   A) Choose the correct alternatives for the following :

      i) 'SAM for pocket attaching operation for style no. 0013/AP is 2 minutes' — this statement indicates

         a) Minimum time required to attach one pocket for style no. 0013/AP = 2 minutes

         b) Maximum time required to attach one pocket for style no. 0013/AP = 2 minutes

         c) Average observed time for attaching one pocket for style no. 0013/AP = 2 minutes

         d) Allotted time estimated for attaching one pocket for style no. 0013/AP = 2 minutes.

ii) 'Performance rating of a worker = 90%' — this statement indicates

a) Observed time > Basic time

b) Basic time > Observed time

c) Observed time = Basic time

d) None of these.

iii) Which of the following control charts is useful to prepare the plan for plant Layout ?

a) Two handed process chart

b) Multiple activity chart

c) Operation process chart

d) Travel chart.

iv) Which of the following statements is *False* ?

a) Job on the critical path cannot have any 'Slack'

b) In case of the last job in the sequence the Earliest Finish = Latest Finish.

c) Slack of a job cannot be higher than the duration of that job

d) The estimated duration of a job is usually the 'Most likely time of completion' of that job.

v) 'Job card' is associated with
   a) production calculation
   b) method study
   c) production planning
   d) production scheduling.

vi) Which of the following parameters is not required for calculating man power requirement for a process in sewing department ?
   a) SAM
   b) Performance rating %
   c) Absenteeism %
   d) Personal allowances %.

vii) Which of the following parameters are not essential in case of spread planning ?
   a) Marker ratio
   b) Colour ratio
   c) Total order quantity
   d) Fabric consumption details.

viii) In an Apparel factory with computerized sewing machine and effective ERP system, which of the following productivity calculation systems is the most suitable one ?
   a) Operator productivity
   b) Labour productivity
   c) Machine productivity
   d) None of these.

B) Write brief answers.

ix) Write the full forms of PMTS and PERT.

x) Mention the parameters required to calculate the productivity of a Sewing depatment.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. a) Draw a block diagram to show the different levels of Apparel Productivity Calculation.

   b) Explain the significance of 'Average' in case of the 'Westinghouse Technique' of calculating the performance rating % for sewing operators. 3 + 2

3. a) Explain why slack time of a job on critical path must be zero in case of PERT & CPM ?

   b) Explain the principle of allocation of sewing operators for different style numbers in order. 2 + 3

4. a) 'Earliest start of the first job must be equal to the latest start of that job'. Justify this statement in context of PERT & CPM.

   b) Explain how 'Multiple Activity' chart can help in reducing the interference allowance. 2 + 3

5. The sewing machine operators in an Apparel factory are expected to work for 450 minutes in a shift of 8 hours. The Remaining time is meant for rest and personal needs etc.

   a) Determine the standard time for Sleeve Attaching operation, whose normal time (basic time) is 2 minutes.

   b) Calculate number of sleeves to be attached per shift.

   c) If the operator engaged on the above job attaches 180 pieces of sleeves in a shift, what is his efficiency in that shift ? 2 + 2 + 1

6. The following represent the procedure of Garment Washing as observed on 9th April, 13 in M/s Prateek Fashions.

   i) Bunch of Garments (40 pcs) are taken from the intermediate storage Rack and carried up to the washing machine (5 mtrs away from the Rack) : Time taken 2 minutes

   ii) Filling of water to the washing machine : 2 minutes

   iii) Adding Detergents : 0·5 minutes + Delay of 1·5 minutes for unavailability of the required detergent in proper place.

iv) Mixing detergents : 1 minute

v) Checking & Loading of Garments to the Washing machine : 5 minutes

vi) Tumble Washing Cycle : 30 minutes

vii) Unloading of Garments : 4 minutes + delay of 1·5 minutes due to unavailability of trolley in proper place.

viii) Carrying the germents up to the hydroextractor (2·5 mtrs away from the washing machine) : 0·2 minute.

Draw a flow process chart for the above mentioned activities.

GROUP – C

(Long Answer Type Questions)

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

7. a) Mention different causes of loss in productivity in Sewing Department. What are the techniques generally used to minimize the loss in production time in an Apparel factory.

b) Prepare a Spread planning based upon the following information : Order Number – XZ-120, Style Number – ZEN-200, Total order quantity = 5000 pcs, Size ratio = S:M:L :: 2:2:1, Colour ratio = Ivory : Camel :: 2:3, Max number of Ply = 45. 5 + 10

8. a) The activities undertaken by an operator of a high speed computerized multi-head embroidery machine are as observed under for a particular day.

Threading : 15 minutes

Switch on machine and framing : 10 minutes

Loading of design to the CPU : 6 minutes

Automatic embroidery (1 full repeat) : 45 minutes

M/c stoppage due to thread breakage and knotting : 12 minutes

M/c stoppage due to power failure : 5 minutes

Prepare a multiple activity chart and calculate capacity utilization % of man and machine in the given work cycle.

b) A process consists of five elements with following observed time and the performance ratings :

Element	Observed Time in Minutes	Remarks
A	1·2	Manual job
B	0·5	Manual job
C	4·0	Machine job
D	1·5	Manual job
E	2·0	Machine job

Assuming rest and personal allowance as 15%, contingency allowance as 3% and process allowance as 2% of the basic time, calculate standard allowed time per piece. Assume performance rate % for operator = 80%. 9 + 6

9. a) Briefly mention the objectives of a good plant layout in apparel industry.

b) Draw a neat flow diagram to illustrate the steps involved in the systematic procedure for plant layout.

c) Explain mathematically the basic principle of order follow up and updating the job completion in a Gantt chart. 4 + 5 + 6

10. a) In a shirt manufacturing factory M/s JFC Garments, the data on the output and various inputs are as mentioned below :

Total number of machines per shift	: 90
Total number of operators per shift	: 92
Total number of helpers per shift	: 12
Total number of checkers per shift	: 15
Total number of supervisors per shift	: 2
Duration of work per shift	: 450 minutes
Product Sewn	: Men's full sleeve formal shirt
SAM of the shirt (Sewing)	: 15 minutes
Average output per shift	: 1500 shirts

Calculate the following :

i) Operator productivity (Sewing)

ii) Machine productivity (Sewing)

iii) Productive efficiency of operators (Sewing)

iv) Total labor productivity (sewing)

b) Explain the basic differences between the principles of calculating performance rating % by speed rating method & synthetic rating method. 10 + 5

11. a) In a Ladies T-shirt Manufacturing company Delta Apparels, the details of order number SL 023/13 is as given below :

Data of order confirmation	:	15th May 2013
Style No.	:	Sig/L/003
Colour No.	:	Pantone-IP00023
Total Number of Pcs ordered	:	5000

The details of production planning estimation are as under :

Time Estimation :

Fabric sourcing	:	6 days
Fabric inspection	:	800 m per day
Cutting	:	700 pcs per day
Sewing	:	SAM = 12 minutes, 450 working minutes per day, 80 operators.
Washing & finishing	:	13 days
Ironing	:	7 days
Final inspection	:	5 days
Packing	:	7 days

Assume fabric consumption per pc = 1·5 mtr and an overall fabric wastage % = 8%

Prepare a suitable Gantt chart to make a planning sheet for the order mentioned above. Mention the expected date of order completion according to your Gantt chart.

b) In M/s A. S. Fashions, the following information are collected :

Total working hour per shift = 450 minutes, Avg. Absenteeism : 8 %, Methods effectiveness : 90%, Avg. Factory performance = 95%, Rework = 12%, Rejection = 3 %, Machine delay = 1%, Waiting time = 1%, Misce. delay = 2 %

i) Draw a curve to illustrate detailed break up of the causes of loss in productivity

ii) Determine the productivity percentage. 10 + 5

12.

Activity	Must Precede	Optimistic Time (days)	Pessimistic time (days)	Most likely time (days)
A	none	2	4	3
B	A	1	3	2
C	B	6	8	7
D	C	5	7	6
E	C	4	6	5
F	D	3	5	4
G	E	1	3	2
H	G	3	5	4
I	F+H	1	3	2

a) Draw PERT & CPM diagram.

b) Show the critical path.

c) Calculate the required number of days to complete the process.

d) Calculate the earliest and latest finish of each activity.

e) Slack time for each activity.
