

Name :

Roll No. :

Invigilator's Signature :

**CS/M.Tech(IEM)/SEM-1/IEM-102/2011-12
2011**

MANUFACTURING SYSTEMS ENGINEERING

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.*

Answer any *five* questions.

5 × 14 = 70

1. a) In a 40 hours work-week the operator produces 400 units of a product. The allowed time per unit is 8.4 minutes. Considering hourly wage as Rs. 90/-, find the earnings under 'Rowan' and 'Haslsey-weir' incentive systems. 8
- b) Describe any 'performance index, based incentive scheme taking into consideration of multiple products and different quantities of production for each product where 'Standard Time' per unit of each product is available. 6



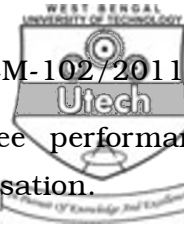
2. a) Using 'Helgeson and Birmie' method allocate the operation optimally in six work stations considering the following data :

Operation	Following Operation(s)
01	02, 10, 13, 14, 15
02	10, 13, 14, 15
03	09, 10, 13, 14, 15
04	05, 11, 12, 13, 14, 15
05	11, 12, 13, 14, 15
06	07, 11, 12, 14, 15
07	11, 12, 14, 15
08	11, 12, 14, 15
09	10, 13, 14, 15
10	13, 14, 15
11	12, 14, 15
12	14, 15
13	14, 15
14	15
15	—

The processing times for the operations are :

29, 61, 36, 46, 50, 30, 56, 65, 30, 33, 33, 30, 135, 30, and 95 respectively. 9

- b) There are three work centres 'A' 'B' and 'C' along a conveyorised production line. 'A' comprises of 3 machines, each can process a job in 30 minutes ; 'B' comprises of 4 machines, each can process a job in 60 minutes and 'C' comprises of 2 machines, each can process a job in 25 minutes. Find the capacity of the production line per shift of 8 hours. Also determine the utilisation of the above three centres. 5

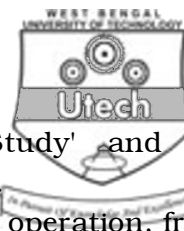


3. a) Elucidate the importance of the three performance metrics QCD for a manufacturing organisation. 4
- b) Discuss on PMTS in the context of work measurement. 3

- c) Determine the 'Standard Time', from the following data of a given task broken into five elements. Observed time is presented (in minutes) for three observation cycles and the performance rating is shown in parantheses alongwith each such observations. Allowances for personal and relaxation is 18% and for elements (ii) and (iii) a contingency allowance of 3% needs to be considered :

		Observed Time and Performance Rating		
	Work Elements	Cycle-1	Cycle-2	Cycle-3
i)	Pick up component from pallet trolley and set in work fixture	0·20(70)	0·21(70)	0·19(75)
ii)	Pick-up Assy kit from Bin	0·25(80)	0·28(75)	0·31(70)
iii)	Carry out sub-Assy	0·42(80)	0·46(75)	0·45(75)
iv)	Carry out complete Assy	0·35(75)	0·36(75)	0·38(70)
v)	Unload Assembly on conveyor	0·05(90)	0·06(85)	0·07(80)

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4. a) Illustrate the steps in 'Methods Study' and its importance in productivity improvement. 6
- b) Determine 'Standard Time' of machining operation, from the following data, in an engineering manufacturing unit. The observations have been carried out on three production operators. Total production during the course of study has been 3000 units. Allowances for 'machining job' to be provided as
- personal & rest as 18%
 - contingency and interference as 5%.

		Production Operator		
		I	II	III
i)	Duration of observation (in hours)	48	46	48
ii)	Total number of observations	85	80	85
iii)	Number of observation showing machining operation	32	29	34
iv)	Overall Performance Rating	70%	75%	70%

5. a) Present a detailed comparison of 'Product Layout' and 'Process Layout'. 8
- b) Illustrate on 'Load-Distance' analysis in process layout. 6
6. a) State the factors affecting location decisions and show how a location is selected using ranking method. 4 + 4
- b) Describe the 'Analytical Tools' used in plant layout. 6
7. a) Elucidate the OPITZ system in Group Technology. 7
- b) Describe the 'Value Analysis' procedure. 7
8. Write short notes on any *two* of the following : 2 × 7
- Assignment Model in Location/Layout
 - Cellular Layout and Group Technology
 - Ergonomic Workplace Layout
 - Productivity Analysis.

