National Exams May 2017
98-Ind-A2-Analysis and Design of Work
3 hours duration

Notes:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.

2. This is a Closed Book exam. Candidates may use one of two calculators, the Casio or Sharp approved models.

3. Any five questions constitute a complete paper. Only the first five questions as they appear in your answer book will be marked.

4. All questions are of equal value.

5. Write your answers in point-form whenever possible, but fully. Show all the calculations.

Marking Scheme (marks)

1.	(i) 7,	(ii) 7,	(iii) 6
2.	(i) 7,	(ii) 6,	(iii) 7
3.	(i) 8,	(ii) 6,	(ii) 6
4.	(i) 9,	(ii) 6,	(iii) 5
5.	(i) 8,	(ii) 6,	(iii) 6
6.	(i) 6,	(ii) 7,	(iii) 7
7.	(i) 6,	(ii) 6,	(iii) 7

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1. (i) State the reasons for making motions at the lowest classification of movements whenever possible. What are the body members involved in the classification of movements?
(ii) In the context of methods engineering, explain the concept of operations analysis. What are primary approaches to operations analysis?
(iii) What is the use of operations analysis? Show the basic features of an operation process chart, including the summary form of such a chart.

2. ((i) State the manner by which the principles of motion economy can be employed in the design of tools and equipment.
(ii) Explain the role of methods analyst in providing a good working condition? Do working conditions appreciably affect output?
(iii) What are the main uses of human machine chart? Show the basic features of human machine chart, including summary form of such a chart.

3. (i) (Determine the expected unit cost of output, when the operator is assigned four machines. The following data are known:
Operator rate = $12.00 per hour,
Machine rate = $20.00 per hour,
Average machine downtime per machine per hour = 6 min.
Machine servicing time per unit = 12 min.,
Machine time per unit = 45 min.
(iii) Why are performance rating and allowances considered important in stop-watch time study?
(iii) What approaches may be taken to overcome the problems of performance rating and allowances in industry?

4. (i) For a drill press operations, the following data are known:

Work Elements	Observed time (min.)	Rating %
1. Load drill press	0.25	110
2. Drill hole with automatic power feed	0.15	100
3. Check tolerance of the last piece produced during machine cycle (#2) with go/no-go gauge	0.08	115
4. Unload drill press	0.20	120

The company allows: 5% for personal, 5% for unavoidable delays and 5% for fatigue. Calculate the normal time and the standard time for the operation in min./pc.
(ii) What are the uses of time standards?
(iii) State the steps that are followed in a stopwatch time study.

5. (i) What are the advantages and disadvantages of predetermined motion times compared to step-watch time study?
(ii) How would you explain to a worker in your company who knows nothing about MTM (Methods-Time Measurement), what it is and how it is applied?
(iii) Explain the factors that influence the reach and the move times in the MTM system.

6.   (i) What is the basic purpose of employing work sampling technique?
  (ii) What is the basis of work sampling theory? When does the binomial distribution approach normal distribution?
  (iii) State the advantages and disadvantages of work sampling over stop-watch time study.

7.   (i) What is the purpose of job evaluation? Explain the concept of job analysis in the context of job evaluation.
  (ii) What are the principal benefits of a properly installed job evaluation plan?
  (iii) What are the common methods used for job evaluation? Explain briefly.