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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Fifth Semester, B.E. - Industrial and Production Engineering

Semester End Examination; Dec - 2017/Jan - 2018

Work Study and Ergonomics

Time: 3 hrs

Max. Marks: 100

*Note: i) Answer FIVE full questions, selecting ONE full question from each unit.
ii) Assume suitably missing data if any.*

UNIT - I

- 1 a. How does Marlow’s hierarchy of needs theory help in understanding the worker by a work study man? Explain. 8
- b. Discuss with the help of Bar-chart, the various factors that contribute to the total time of operation for a given job. 8
- c. Explain the Emerson’s efficiency plan in brief. 4
- 2 a. Explain the basic procedure of work study. 7
- b. Discuss the relationship between method study and work measurement. 6
- c. Write a note on human factors in the application of the work study. 7

UNIT - II

- 3 a. List the principles of motion economy with respect to “arrangement of workplace”. 7
- b. Explain the factors to be considered while selecting the work for method study. 7
- c. What do you mean by Micro motion study? Elaborate. 6
- 4 a. What are questioning techniques? Explain how questioning techniques helps in critical examination of work in method study? 10
- b. A method study man records a movement of a messenger in an office on a sample study sheet, which is given below:

From	1	5	3	8	4	7	1	2	8	1	8	5	7	4	1	8	3	7	4	3	7	1	4	2	6	2	4
To	5	3	8	4	7	1	2	8	1	8	5	7	4	1	8	3	7	1	1	5	8	7	5	6	2	4	6

10

Construct the travel chart and critically examine it and summarize.

UNIT - III

- 5 a. Explain the different methods of reading the stop watch for recording time in a time study. 10
- b. A work sampling analyst observed an activity randomly 200 times. The activity was seen taking place 160 times for 99% confidence level with an accuracy range of $\pm 5\%$. Find the number of observation to be made. Also, determine the number of observations for 68.27% and 99.9% confidence levels respectively for the same accuracy range. 10

- 6 a. List and explain the various types of elements to be distinguished while conducting time study on a job. 10
- b. Consider the example which is stated as follows:
 Observed time: 0.75 minute; Rating factor = 110%; Personal allowance = 3%;
 Relaxation allowance = 10%; Delay allowance = 2%; 5
 Calculate the standard time.
- c. Define predetermined time standards and enumerate the advantages of it. 5

UNIT - IV

- 7 a. Explain the characteristics of a man-machine system with a neat sketch. 8
- b. List the areas of study covered under ergonomics. Explain. 7
- c. Explain briefly the work capabilities of an industrial worker. 5
- 8 a. Explain the general principles involved in carrying out the physical activities. 7
- b. Discuss on the development of stresses in the human body and its consequences. 8
- c. List the various factors for improving the performance. 5

UNIT - V

- 9 a. Distinguish between quantitative and qualitative displays. 6
- b. Discuss the four different types of controls and their design criteria. 8
- c. Explain the reasons for fatigue in industrial work. 6
- 10 a. Discuss the influence of the following on the human efficiency : 12
 i) Noise ii) Light iii) Vibration.
- b. Explain the factors considered in selection of controls. 8

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