



**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 - 2019**

**Work Study and Ergonomics**

*Time: 3 hrs*

*Max. Marks: 100*

**Note:** Answer *FIVE* full questions, selecting *ONE* full question from each unit.

**UNIT - I**

- 1 a. Mention the major resources of an enterprise. Explain how their productivity is calculated? 10
- b. With the help of the bar chart, explain how manufacturing time is made-up? 10
- 2 a. Explain the procedure involved in work study. 6
- b. Explain Rowan plan, Halsey plan and explain which plan is more beneficial? 6
- c. Explain the management technique to reduce ineffective time with a bar chart. 8

**UNIT - II**

- 3 a. Differentiate between outline process chart and flow process chart. 4
- b. Mention the recording tools in method study. 6
- c. Briefly explain the Micro-Motion study. 10
- 4 a. Method study man records the movement of the messenger in an office on a simple study sheet which is given below. Draw a travel chart and critically examine it.

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

12

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

- b. Describe the principle of motion economy with respect to the use of human body. 8

**UNIT - III**

- 5 a. A work sampling analyst observed on activity randomly 200 times. The activity was seen to be 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 observation for 68.27% confidence level and 99.9% confidence level for same accuracy range. 10
- b. List the different kinds of systems of rating and explain any two. 10
- 6 a. An activity was observed for 10 trials. The following times were observed: 0.35, 0.36, 0.34, 0.38, 0.37, 0.35, 0.34, 0.35, 0.36, and 0.35 mints. The average rating for the operation was 110%. Find the standard time for the activity, if the fatigue allowance given was 5%, relaxation of 7% and a policy allowance of 2% of the basic time. 10
- b. Explain the different methods of recording time study. 10

**UNIT - IV**

- 7 a. With a simple ergonomics model, explain briefly the system approach to it. 12
- b. Enumerate the human characteristics to accomplish the successful application of ergonomics and explain briefly. 8
- 8 a. Explain with a block diagram, the Man-Machine system. 6
- b. List the main area of study covered under ergonomics? Explain them. 8
- c. Compare the design and use of present day and traditional tools / machines characteristics. 6

**UNIT - V**

- 9 a. Explain any two types of displays with a simple sketch. 12
- b. List the general guidelines for industrial lightings. 8
- 10 a. Explain the different criteria for control design. 8
- b. 'Design of controls is largely dependent on its application and user capability', explain taking a design of keyboard example. 6
- c. Explain the influence of noise and vibration on human performance. 6

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