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

(An Autonomous Institution affiliated to VTU, Belgaum)

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

Semester End Examination; Dec. - 2015

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 suitable missing data if any.

UNIT - I

- 1 a. What is productivity? Explain productivity of the following resources, 10
- i) Land ii) Machines
- iii) Material iv) Men
- b. What is work study? Explain how the total time of a Job is made up. 4
- c. Explain the basic procedure followed in work study. 6
- 2 a. List the objectives of incentive schemes and explain the Halsey 50-50 plan. 8
- b. Calculate the wage earned by a worker on Halsey 50-50 plan,
- Standard output= 25 pieces per hour
- Base rate of pay = ` 2 per hour 8
- Workers actual output = 40 pieces per hour
- Period of worker = 8 hours.
- c. Calculate the wage earned by a worker using Rowan plan, given standard output = 25 pieces 4
- per hour, Base rate of pay = ` 5 on 8-hour a day basis. Worker does 40 pieces.

UNIT - II

- 3 a. List and explain the factors to be considered while selecting a Job for method study. 7
- b. Draw a material type process chart for making a 10 cm long 3 cm diameter mild steel bar with a 0.5 cm central hole with suitable assumptions. 7
- c. Write a note on the following : 6
- i) String diagram ii) Multiple activity chart
- 4 a. Explain the principles of motion economy related to the arrangement of the workspace. 6
- b. Draw two handed process chart for the assembly of bolt, nut and washer with suitable work space layout. 8
- c. Write a note on chronocycle graph. 6

UNIT - III

- 5 a. Explain the procedure followed in conducting work sampling study. 6

- b. A work sampling study was conducted for 100 hours in the machine shop in order to estimate the standard time. The total number of observations recorded were 2500. No working activity could be noticed for 400 observations. The ratio between manual and machine elements was 2:1. Average rating factor was estimated at 1.15 and the total numbers of articles produced during the study period were 6000. 9
- Rest and personal allowances may be taken as 12% of the normal time. Find the standard time.
- c. State the uses of work measurement. 5
- 6 a. List and explain various types of elements identified in stop watch time study. 8
- b. An operator was observed for 18 cycles to perform a job as below:
- 0.72 minutes for 4 cycles
 - 0.70 minutes for 5 cycles
 - 0.74 minutes for 5 cycles 6
 - 0.73 minutes for 4 cycles.
- His average performance index was 92 percent. Allowance of 20% was given. Calculate the standard time for the job. At 6 hours per shift what would be the production per shift.
- c. List various classifications of motions. According to M.T.M. Explain any two of them. 6

UNIT - IV

- 7 a. What is Ergonomics? Explain the areas of study under Ergonomics. 10
- b. With a block diagram explain man-machine system. 10
- 8 a. List the characteristics of man-machine system. 6
- b. Explain the work-capabilities of an industrial worker. 6
- c. Discuss in brief development of stress in human body and their consequences. 8

UNIT - V

- 9 a. List the types of displays. Explain any three of them. 10
- b. Discuss the influence of the following on human efficiency:
- i) Climate ii) Noise 10
 - iii) Vibration iv) Light
- 10 a. List the relation between controls and displays. 5
- b. List the design considerations in work place design. 10
- c. List the considerations for improving working conditions. 5

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