GUJARAT TECHNOLOGICAL UNIVERSITY M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013

Subject code: 714602Date: 04-06-2013Subject Name: Work System Design and Human Factors EngineeringTime: 10.30 am - 01.00 pmTotal Marks: 70

Instructions:

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) Explain how Method Study and Work Measurement help improve productivity 07 of any system.
 - (b) Knowledge of Human Factors Engineering is essential in designing effective 07 work system for any industry. 6 Justify the statement with suitable example.
- Q.2 (a) List the basic application of following.

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- (i) Operation Process Chart
 (ii) Flow Diagram
 (iii) Flow Process Chart
 (iv) Two Handed Process Chart
 (v) Travel Chart
 (vi) String Diagram
 (vii) Man-Machine Chart
- (b) Why allowances are given in arriving at standard time of any activity? Briefly 07 explain different types of allowances with suitable examples.

OR

- (b) Classify different work measurement techniques with respect to their specific 07 application, merits and demerits.
- Q.3 (a) A work sampling study was conducted on a machine to ascertain the proportion 07 of idle time of the same. The preliminary study revealed that the machine was found idle for 30% of the time. This study was carried out with 95% confidence level and +/- 5% accuracy. Find out following.
 - (i) Actual size of the sample required for this study.
 - (ii) Revised sample size at the middle of the study where the proportion of machine idleness was found as 25%.
 - (iii) Accuracy of the study after making 4500 observations wherein the machine was found working during 2500 observations.
 - (b) What is the significance of Rating in work measurement? Briefly explain 07 following terms with respect to rating.
 - (i) Qualified Worker (ii) Tight Rating (iii) Loose Rating (iv) Standard Rating

OR

Q.3 (a) Construct a man-machine chart (*with conventional notations taking appropriate* 07 *scale on your answer book only*) for machining process which takes 6 minutes for machining with auto feed and 3 minutes each for loading and unloading the job. Calculate total cycle time and % utilization of the operator.

Construct another man-machine chart for the condition wherein the operator is asked to work on two machines simultaneously for the same job with following conditions. Calculate the increase in % utilization of the operator in this case.

- (i) It takes 1 min. for the operator to walk between two machines.
- (ii) The start point of the cycle is when loading the job on machine 1
- (iii) The end point of cycle is when operator comes back to machine 1 after unloading job from machine 2.
- (b) Differentiate between Cumulative and Fly Back methods of time study.
- Q.4 (a) Explain how measurements of heart-rate and oxygen consumption are used to 07 ascertain work content of a job.
 - (b) Describe the basic objectives of Ergonomics with suitable examples. 07

OR

- Q.4 (a) What is Anthropometry? Explain the importance of Anthropometric Data in 07 effective product design with suitable examples.
 - (b) What are the measures to reduce Heat Stress in hot and humid industrial 07 environments?
- Q.5 (a) Classify different types of displays with respect to following. 07
 - (i) Specific application
 - (ii) Merits
 - (iii) Demerits
 - (b) Explain the negative impacts of noise at workplace and the remedial actions for 07 the same.

OR

- Q.5 (a) Explain the significance of illumination and vibrations in effective workplace 07 layout.
 - (b) Explain the importance of appropriate standing and seating postures in effective 07 workplace design.

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