

B. Production E. Exam., 2018

(3-rd Yr., 2-nd Sem.)

Ergonomics & Work Design

Time:3 Hrs.

Full Marks -100

Use separate Answer-scripts for each part.

Part – I (60 marks)

Answer any 3 Q.s

1. a) What are the preferred work postures for the following tasks? (Give 2 choices for each)
 - i) Extended horizontal reaching
 - ii) Lifting more than 5 kg. 2X2
- b) What is the expression of RWL as suggested by NIOSH? Discuss in details. What is NIOSH? 5+1
- c) What are the primary causes of RMIs? 5
- b) Describe the Biomechanical Model for lifting. 5
2. a) For reducing CTDs, indicate the guidelines in designing hand tools. 6
- b) What are the basic grips? Sub-categorize. Give examples. 5
- c) To reduce heat stress, suggest six measures which can be taken. 3
- d) Describe the control movements stereotypes. 6
3. a) Discuss in details about the guidelines for hand-tool design. 10
- b) Explain with examples of usage areas:
HARP, ARP, HRP. 6
- c) Write short notes on:
Acclimation, Acclimatization. 1+3
4. a) Write short notes on:
ATP, Metabolism. 4
- b) Write the thermal balance eqn. of the human body. Explain each term. 5
- c) Sketch human figure & show the following:
Shoulder (Acromian) height, Buttock-knee depth, Functional forward reach, Stature, Inter-pupillary distance. 5
- d) Differentiate betn. illuminance & luminance. What are their units? 3
- e) What are the hearing protectors, commonly used in industries? Does cotton give much protection as a hearing protector? 2+1

[Turn over

5. a) What is the value & significance of Bennett's bend? 2
- b) $D = \sum (C_i/T_i)$
 What does the abovementioned formula denote? What is the maxm. permissible value of D? 2+1
- c) For manual lifting, what is the so-called "Correct lifting technique"? What are its limitations? 1+2
- d) In the formula
 $I_p = 20 \cdot \log (p/p_0)$ explain each term. 2
- e) What is contrast ratio & modulation contrast? Which one is more relevant to the human eye? 2+1
- f) What is the generic source of the name, "Ergonomics"? Who has first used this word? What does "Ergonomics" deal with? 1+1+3
- g) What is the expression & recommended value of Lifting Index (LI)? 2

B.E. PRODUCTION ENGINEERING THIRD YEAR SECOND SEMESTER EXAM
2018
ERGONOMICS AND WORK DESIGN
Part II

(Answer any two questions)

6. (a) Discuss the role of motion study and time study in increasing productivity. (12)
- (b) Write short notes on the followings:
- (i) Flow diagram and (ii) Travel chart. (4×2)
7. (a) Explain the different allowances in time study. How is standard time determined? (6+4)
- (b) What is the purpose of work measurement. (4)
- (c) What are the different equipments and forms used in time study? Explain their purposes. (3+3)
8. (a) State the Indian Factory Act for work on or near machinery in motion. (6)
- (b) Describe Taylor' plan and Halsey plan for wage-incentive calculation. (6)
- (c) It is estimated that an operator in an assembly line has 20% of idle time. The expected accuracy in work sampling is $\pm 4\%$. For a 95% confidence level, how many observations are needed? (4)
- (d) What are the prerequisites of a good incentive plan? (4)