

B.E. PRODUCTION ENGINEERING
THIRD YEAR
FIRST SEMESTER EXAM 2024
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 is the generic source of the name, "Ergonomics"? Who has first used this word?
What does "Ergonomics" deal with? 1+1+3
b) What are the hearing protectors, commonly used in industries? Does cotton give
much protection as a hearing protector? 2+1
c) What is the expression & recommended value of Lifting Index (LI)? 2
d) What are the primary causes of RMIs? 5
e) In the formula
 $I_p = 20 \cdot \log(p/p_0)$ explain each term. 2
f) $D = \sum(c_i/T_i)$
What does the abovementioned formula denote? What is the maxm. permissible value
of D? 2+1
2. a) What is the expression of RWL as suggested by NIOSH? Discuss in details. What is
NIOSH? 5+1
b) Write short notes on:
Acclimation, Acclimatization. 1+3
c) Discuss in details about the guidelines for hand-tool design. 10
3. a) Write the thermal balance eqn. of the human body. Explain each term. 5
b) What are the basic grips? Sub-categorize. Give examples. 5
c) Sketch human figure & show the following: 5

Shoulder (Acromian) height, Buttock-knee depth, Functional forward reach, Stature, Inter-pupillary distance.

d) Describe the Biomechanical Model for lifting. 5

4. a) Describe the control movements stereotypes. 6

b) What is the value & significance of Bennett's bend? 2

c) What is contrast ratio & modulation contrast? Which one is more relevant to the human eye? 2+1

d) To reduce heat stress, suggest six measures which can be taken. 3

e) Differentiate betn. illuminance & luminance. What are their units? 3

f) For manual lifting, what is the so-called "Correct lifting technique"? What are its limitations? 1+2

5. a) Write short notes on:

ATP, Metabolism. 4

b) For reducing CTDs, indicate the guidelines in designing hand tools. 6

c) Explain with examples of usage areas:

HARP, ARP, HRP. 6

d) 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

BACHELOR OF PRODUCTION ENGINEERING EXAMINATION, 2024
[3rd Year 1st Semester (5th Semester)]

ERGONOMICS & WORK DESIGN

PART- II (40 Marks)

Use Separate Answer script

Answer **any TWO** questions.

All parts of a question (**a, b, c etc**) should be answered at one place.

- 6.(a) Define the method study. Describe the purpose of method study. With help of a flow chart exhibit the steps of method study.
- (b) What are the different equipment and forms used in time study? Explain their purposes.
- (c) What is the use of work sampling?

10+6+4=20

- 7.(a) Discuss the role of motion study and time study in increasing productivity.
- (b) Write short notes on the followings:
- (i) Flow diagram, (ii) Travel chart

12+(4 x 2) = 20

- 8.(a) Define work measurement. What are the different techniques of work measurement?
- (b) With the help of neat diagram explain String Diagram.
- (c) Discuss briefly the Multiple activity chart.
- (d) Explain 'Total Factor Productivity' technique to measure productivity.

6+5+5+4=20

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