

**B.E. PRODUCTION ENGINEERING
THIRD YEAR
FIRST SEMESTER EXAM 2025**

ERGONOMICS & WORK DESIGN

Time :3 Hrs.

Full Marks -100

Use separate Answer-scripts for each part.

Part – I (60 marks)

Answer any 3 Questions

1. a) Describe the Biomechanical Model for lifting. 5
 b) Discuss in details about the guidelines for hand-tool design. 10
 c) What are the primary causes of RMIs? 5

2. a) Explain with examples of usage areas:
 ARP, HARP, HRP. 6
 b) 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
 c) $D = \sum (C_i/T_i)$
 What does the abovementioned formula denote? What is the maxm. permissible value of D? 2+1
 d) To reduce heat stress, suggest six measures which can be taken. 3
 e) Write short notes on:
 ATP, Metabolism. 4

3. a) What is contrast ratio & modulation contrast? Which one is more relevant to the human eye? 2+1
 b) What is the value & significance of Bennett's bend? 2
 c) Sketch human figure(s) & show the following: 5
 Functional forward reach, Stature, Shoulder (Acromian) height, Buttock-knee depth, Inter-pupillary distance.
 d) Describe the control movements stereotypes. 6
 e) Write short notes on:
 Acclimation, Acclimatization. 1+3

[Turn over

4. a) For manual lifting, what is the so-called "Correct lifting technique"? What are its limitations? 1+2
- b) What is the expression of RWL as suggested by NIOSH? Discuss in details. What is NIOSH? 5+1
- c) What are the hearing protectors, commonly used in industries? Does cotton give much protection as a hearing protector? 2+1
- d) For reducing CTDs, indicate the guidelines in designing hand tools. 6
- e) In the formula

$$l_p = 20 \cdot \log (p/p_0)$$
explain each term. 2
5. a) What are the basic grips? Sub-categorize. Give examples. 6
- b) What is the generic source of the name, "Ergonomics"? Who has first used this word? What does "Ergonomics" deal with? 1+1+3
- c) Differentiate betn. illuminance & luminance. What are their units? 4
- d) Write the thermal balance eqn. of the human body. Explain each term. 5

B. E. PRODUCTION ENGG. EXAMINATION- 2025

(3RD YEAR 1ST 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) 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

- 7.(a) What are the different equipment and forms used in time study? Explain their purposes.
(b) Define the method study. Describe the purpose of method study
(c) What are the use of work sampling?

7+8+5=20

- 8.(a) Define work measurement. What are the purposes 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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