

Course code	Course Name	L-T-P-Credits	Year of Introduction
BM363	PRINCIPLES OF ERGONOMIC DESIGN	3-0-0-3	2016

Prerequisite: Nil

Course Objectives

- To Introduce the Concept of Human Factors in Engineering & Design.
- To understand human body Physiological Factors in Work.
- To Introduce different Factors of Manual Material Handling (MMH)
- To understand thoroughly the concepts of Compatibility in Designing Displays and controls.
- To apply Anthropometric principles in Designing Workspace and Seat.
- To enquire basic causes of Errors & Accidents.

Syllabus

Introduction to Human factors Engineering, Visual Capabilities of Human Beings, Human factor aspects of hard copy text, computer screen text, graphics, symbols, codes. Qualitative & Quantitative visual displays, Principles of auditory displays. Efficiency, Energy Consumption & Work rest cycles.

Human Factors aspects of manual material handling (MMH). Compatibility Principles & Types, Rotary controls and rotor displays movement of displays, Control orders and control responses, Tracking, Anthropometric design principles, Work space envelope, Principles of seat design, Errors & Accidents

Expected Outcome

At the end of the course students will be able to

- i. Appreciate the relevance of Human Factors in Engineering Design.
- ii. Examine anthropometric factors in Workspace design and propose best Engineering design.
- iii. Suggest practices to avoid errors & accidents in workspace.

Reference Books:

1. Mark S. Sanders & Ernest J. McCormic, Human Factors in Engineering and Design, McGraw Hill international Edition, 1993.
2. Terence S. Andre, Aaron W. Schopper, Human Factors Engineering in System Design, British Columbia Teacher, 1997.
3. Wesley E. Woodson, Human Factors Design Handbook, McGraw-Hill Professional; 2nd edition, 1992.

Course Plan

Module	Contents	Hours	Sem. Exam Marks
I	Introduction to Human factors Engineering.	1	15%
	Relevance of Ergonomics.	3	
	Process of seeing, Visual capabilities, Factors affecting Visual acuity and Contrast sensitivity. Human factor aspects of hard copy text and computer screen text.	3	

II	Factors in selecting graphic representations, symbols. Qualitative visual displays, Quantitative visual displays.	4	15%
	Process of hearing.	1	
	Principles of auditory displays.	2	
FIRST INTERNAL EXAM			
III	Muscle physiology, Muscle metabolism.	2	15%
	Measure of physiological in-efficiency and energy consumption, Work rest cycles.	3	
	Aspects of manual material handling (MMH). Bio-mechanical recommended limits of MMH.	3	
IV	Spatial compatibility, Physical arrangement of displays and controls, Movement capability, Rotary controls and rotor displays movement of displays, Orientation of the operator and movement relationships.	5	15%
	Control orders and control responses, Human limitations in tracking task.	2	
SECOND INTERNAL EXAM			
V	Anthropometry, Anthropometric design principles	2	20%
	Work space envelope, Factors in design of workspace surfaces, Principles of seat design, Principles of control panel organization.	5	
VI	Classification of human errors, Dealing with human errors	3	20%
	Theories of accident causation, Reducing accidents by altering behavior. Risk, Warning & Liability	3	
END SEMESTER EXAM			

QUESTION PAPER PATTERN:

Maximum Marks: 100

Exam Duration: 3 Hours

There shall be three parts for the question paper.

Part A includes Modules 1 & 2 and shall have three questions of fifteen marks out of which two are to be answered. There can be subdivisions, limited to a maximum of 4, in each question.

Part B includes Modules 3 & 4 and shall have three questions of fifteen marks out of which two are to be answered. There can be subdivisions, limited to a maximum of 4, in each question.

Part C includes Modules 5 & 6 and shall have three questions of twenty marks out of which two are to be answered. There can be subdivisions, limited to a maximum of 4, in each question.

Note: Each part shall have questions uniformly covering both the modules in it.