

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]  
(2124)

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**M. Tech 3rd Semester Examination**  
**Methods Engineering and Ergonomics**  
**PEE-E23**

**Time : 3 Hours**

**Max. Marks : 100**

*The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.*

**Note :** Attempt Five questions in all, selecting one question from each sections A, B, C and D. Section E is compulsory. Assume missing data suitably, if any.

**SECTION - A**

1. (a) Enlist the sequence of phases involved in METHOD study? Indicate the difference between method study and work study procedure.
- (b) For what type of Jobs Therbligs are useful ? List various Therbligs along with their definition, symbols and colours. Show interrelationship of therbligs with operation chart symbols. (8+12=20)
2. (a) What is SIMO Chart? Construct SIMO chart with suitable example, say an assembly operation
- (b) Define work sampling. What are the sources of error in work sampling.? State limitations of work sampling. (10+10=20)

**SECTION - B**

3. (a) State the objectives of ergonomics and discuss the design of controls for a typical man-machine system.

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- (b) State the importance of human anthropometry and its importance in workplace layout. (10+10=20)
4. (a) Explain the concept of interface design in man machine system. What is the relationship between controls and displays? Explain.
- (b) Explain the importance of work seat height and seat geometry in a work envelope with neat sketch.
- (c) Explain filming techniques and micro motion analysis in detail. (8+6+6=20)

### SECTION - C

5. (a) State difference between physical work load and mental workload. What are the methods for measurement of physical work load and mental work load?
- (b) State effect of human motor activity on muscular work. Explain difference between static and dynamic muscular work. (10+10=20)
6. (a) Discuss Importance of body heat balance and effective temperature scale on work . Provide some mathematical models to discuss their importance.
- (b) Explain the importance of i) Job evaluation ii) Merit rating iii) Job enrichment. (10+10=20)

### SECTION - D

7. (a) Write notes on:
- (i) Temporary and permanent threshold shift w.r.t noise.
- (ii) Speed interference and hearing loss.
- (b) Discuss terminology used in describing vibration, types of vibrations and response of body to high frequency vibrations and their effect on health of worker. (10+10=20)

8. (a) Define the terminology used in describing "NOISE" . What are various physiological effects of noise?
- (b) Explain with neat sketches
- (i) Noise reduction methods
- (ii) Zones of discomfort (10+10=20)

### SECTION - E

9. (i) Define work load.
- (ii) State the methods of reducing vibration.
- (iii) What are different methods of wage payments?
- (iv) Mention the relationship between method study and work measurement.
- (v) What are recording techniques used in method measurement?
- (vi) Define standard time.
- (vii) What are different methods for performance rating?
- (viii) On what factors selection of controls in an automobile depends? Compare features of hand versus foot controls.
- (ix) What are recommended illumination levels for following types of work : (i) Fine assembly work (ii) Ordinary bench work.
- (x) State advantages of work sampling procedure. (10×2=20)