BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER : VI**
BRANCH: PROD & IND ENGG. **SESSION : SP/2025**

SUBJECT: PE345 WORK SYSTEM DESIGN

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Work system design is a scientific management technique for improving efficiency and effectiveness at all levels. Discuss it briefly and also explain how this technique is useful in a cost-reduction program.	[5]	01	02
Q.1(b)	What do you mean by different process chart? Explain the procedure of drawing a few main process charts with the help of suitable examples. Show the method study charts in tabular form with their application, advantages, and limitations.	[5]	01	01
Q.2(a)	An operator was kept under observation for 10 days. He was found working on 400 occasions and abstaining, including idle 100 times. He produced 200 jobs during these days. The observation per day was for 5 hours only, and the total number of observations was 500. Assuming 120 as the performance rating for the operator and 20% as an allowance, calculate the standard time.	[5]	02	02
Q.2(b)	Why are we interested in the number of cycles time of the same activity? Discuss a statistical method to find out the number of cycles to be timed for the same activity. Why confidence level is necessary? Explain.	[5]	02	02
Q.3(a)	A management sets the target of completing 72 jobs for each worker. The workers are promised to pay incentives according to Halsey's 50 – 50 plan. The hourly wage rate is Rs. 1.00. A worker, however, could complete the whole task in 6 hours only. Calculate the total earnings and hourly wage rate of a worker.	[5]	03	03
Q.3(b)	With the help of a suitable example, explain the following methods of job evaluation: (I) Simple ranking method (II) Grade description method (III) Factor comparison method (IV) Point method.	[5]	03	02
Q.4(a)	What do you mean by man-machine system? What are the various types of functions performed by man or machine components of a man-machine system? What are the assumptions made in the design of man-machine systems?	[5]	04	02
Q.4(b)	Suggest a layout for the controls of an electric tricycle for use by a person having only one hand (no legs) or for use by a person having both legs but no hands.	[5]	04	05
Q.5(a)	Discuss the role of anthropometry in workspace design. How do the principles of applied anthropometry contribute to the ergonomic design of workspaces? Explain the significance of postural analysis in preventing musculoskeletal disorders in sitting and standing positions.	[5]	05	03
Q.5(b)	Explain the biomechanics of manual handling tasks. Describe the anatomy involved in lifting and carrying tasks and discuss the factors that influence physical work capacity. How can physiological cost measurement help in designing efficient and safe manual handling tasks?	[5]	05	03

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