Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER I (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2714602 **Date:18/05/2016**

Subject Name: Work System Design and Human Factors Engineering

Time:02:30 pm to 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Define Method study and briefly explain its implementation steps. **07**

(b) What is the importance of Ergonomics in product design as well as work system design? – Explain with suitable examples. **07**

Q.2 **(a)** Define productivity and explain factors affecting the same. **07**

(b) Differentiate between: **07**

(i) Standard Time and Basic Time

(ii) Qualified Worker and Average Worker

OR

(b) Differentiate between cumulative timing and fly-back timing methods of time study by stop watch. **07**

Q.3 **(a)** Why allowances are provided in work measurement to arrive at standard time? Explain different allowances. **07**

(b) A work measurement study was carried out to ascertain standard time of a job. The operation was divided in to four different elements and five readings (through stopwatch) were taken for each element along with its performance rating. The observed time in seconds and observed rating are as illustrated in the tables. **07**

Observed time (Sec.)					
Element	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
1	110	105	100	110	105
2	100	105	100	100	105
3	95	95	90	100	95
4	100	100	105	105	105

Observed Rating					
Element	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
1	105	100	95	100	100
2	100	90	95	100	95
3	100	100	105	110	105
4	100	100	90	90	90

The relaxation allowance for elements 1and 2 is 3% and for elements 3 and 4 is 4% respectively. The relaxation allowances are to be considered elements wiz for calculation of basic time. Calculate standard time of the job considering 5% contingency allowance on overall cycle time. If the factory operates one shift of 8 hours per day with 1 hour break, how many pieces can be produced at standard time per day?

OR

Q.3	**(a)**	A work sampling study was conducted on a Press machine to ascertain the proportion of idle time of the same. The preliminary study revealed that the Press was found working for 85% of the time. This study was carried out with 95% confidence level and +/- 5% accuracy. Find out following. i. Actual size of the sample required for this study. ii. Accuracy of the study, at some point of time after making 3000 observations wherein the Press was found not working during 1000 observations. iii. Revised sample size at some point of the study where the Press was found working during 4000 times out of total 6000 observations.	**07**
	(b)	What is PTS? How is it different from Time Study technique? What are the advantages and limitations of PTS?	**07**
Q.4	**(a)**	What are the measures to counter ill effects of heat at work?	**07**
	(b)	What is the importance of study of biomechanics in work system design? – Explain with suitable examples.	**07**
		OR	
Q.4	**(a)**	What is work physiology? How the same is used in work measurement?	**07**
	(b)	What is Anthropometric data? How the same are useful in any product or work place design?	**07**
Q.5	**(a)**	Discuss various important environmental aspects for efficient work place design.	**07**
	(b)	Explain the important parameters to be satisfied during designing displays for any product and /or system.	**07**
		OR	
Q.5	**(a)**	Explain how the illumination and noise at workplace will affect the performance of operators. .	**07**
	(b)	Workplace design should be such that to avoid poor body posture. – Justify the statement with suitable examples.	**07**

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