Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER-1 (NEW) EXAMINATION – WINTER 2016

Subject Code: 2714602 **Date:05/01/2017**

Subject Name: Work Systems Design and Human Factors Engineering

Time: 2:30 pm to 5:00 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)**	What is the difference between "Productivity" and "Profitability"? Explain the factors affecting productivity.	**07**
	(b)	What is Human Factors Engineering? How this is useful in effective Work System Design?	**07**
Q.2	**(a)**	What is the basic objective of Method Study? Briefly explain 8-steps approach of Method Study.	**07**
	(b)	Explain how Principles of Motion Economy will be useful in designing an effective and efficient workplace?	**07**
		OR	
	(b)	What is Performance rating? Why is it done in Time Study?	**07**
Q.3	**(a)**	What is PTS? Explain the advantages and limitations of PTS with respect to conventional Time Study.	**07**
	(b)	What is Work Sampling?	**02**
		A work sampling study was conducted on a machine to ascertain the proportion of idle time of the same. The preliminary study revealed that the machine was found working for 70% 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 after making 6000 observations wherein the machine was found not working during 2000 observations.	**05**
		OR	
Q.3	**(a)**	Why Allowances are added to arrive at Standard Time of a job? Explain various allowances in brief with example.	**07**

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

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

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

The relaxation allowances to be considered elements wiz are also given in table.

Element	1	2	3	4	5
Relaxation Allowance	3%	3%	3%	5%	4%

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 60 minutes as lunch break, how many pieces can be produced at standard time per day?

Q.4 **(a)** What is the importance of Anthropometry in product/work system design? **07**

(b) In designing a revolving executive chair which Anthropometric dimensions are critical and why? **07**

OR

Q.4 **(a)** Explain the concept of Physiological Work Measurement. **07**

(b) Explain various health illnesses due to heat stress at work. **07**

Q.5 **(a)** Why a work place designed promoting poor body postures will result into lower productivity at work? Explain with suitable examples. **07**

(b) Briefly explain the criteria to be satisfied for design of good displays and controls in a man-machine system. **07**

OR

Q.5 **(a)** Well-designed illumination system is important for industrial productivity and quality. – Justify the statement giving suitable examples. **07**

(b) Explain various health illnesses due to noise and vibrations at work place. **07**

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