



**UNIVERSITI KUALA LUMPUR**  
**Malaysia France Institute**

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**FINAL EXAMINATION**  
**SEPTEMBER 2014 SESSION**

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<b>SUBJECT CODE</b>	<b>: FIB38004</b>
<b>SUBJECT TITLE</b>	<b>: WORK STUDY AND INDUSTRIAL ERGONOMICS</b>
<b>LEVEL</b>	<b>: BACHELOR</b>
<b>TIME / DURATION</b>	<b>: 8.00 PM – 10.30 PM</b> <b>( 2.5 HOURS )</b>
<b>DATE</b>	<b>: 30 DECEMBER 2014</b>

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**INSTRUCTIONS TO CANDIDATES**

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1. Please read the instructions given in the question paper **CAREFULLY**.
  2. This question paper is printed on both sides of the paper.
  3. Please write your answers on the answer booklet provided.
  4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
  5. This question paper consists of **TWO (2) sections**. Section A and B. Answer all questions in Section A. For Section B, answer three (3) questions only.
  6. Answer all questions in English.
  7. Percentage Points of the  $t$  Distribution table is appended on Appendix A.
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**THERE ARE 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.**

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**SECTION A (Total: 40 marks)**

**INSTRUCTION: Answer ALL questions. Please use the answer booklet provided.**

**Question 1**

Describe four (4) general requirement guidelines for designing workplace

(4 marks)

**Question 2**

Describe all steps the employee posture assessment using rapid upper limb assessment (RULA) or rapid entire body assessment (REBA)

(9 marks)

**Question 3**

Describe four (4) approach should consider adjustability workstation

(10 marks)

**Question 4**

Briefly describe **three (3)** the principle of component arrangement.

(9 marks)

**Question 5**

Describe **two (2)** tools for method analysis an ergonomics problem in organization.

(8 marks)

**SECTION B (Total: 60 marks)****INSTRUCTION: Answer THREE (3) questions only.****Please use the answer booklet provided.****Question 6**

Construct a Process Flow Chart based on the data given below.

(20 marks)

NewArk Electronic Sdn. Bhd. is an electronic company. The main manufacturing activity is assembling the electronic component onto printed circuit board (PCB). This company produces the electronic board for television and computer. Based on observations, the process of assembly one of its television electronic board is as below. The production line is fully automatic which consist of a solder paste machine, three automatic pick and place machine and one automatic inspection machine integrated with sorting system. Between these machines, there are conveyors connected to transfer the PCB automatically. The value in the bracket show the operation duration (minute) and distance (meter).

- The PCB (in batches) is transported from inventory to production line (60 min, 500 m). This transportation is done manually by the worker using trolley since the path from the inventory to the production line is too narrow. The PCB then manually loaded into magazine and the production begin when the start button is pressed by an operator (2.0 min). The PCB magazine is attached to the print machine.
- The first process is to print the solder paste onto each PCB (0.2 min). After print process complete, the PCB then loaded onto a conveyor which is placed at the rear of this machine. The PCB then transferred into first pick and place machine (0.2 min). The pick and place operation take place (1.0 min) and when the process complete, the PCB is automatically loaded onto another conveyor to be transferred to the second pick and place (0.2 min).
- The cycle time for second pick and place machine is about (1.5 min) and once completed, the PCB is transferred to the third pick and place by another conveyor (0.2 min).
- The third pick & place cycle time is about (1.0 min) and then transferred the completed PCB to inspection machine (0.2 min). The inspection machine which is integrated with the sorting system take about (1.0 min) for inspection. If the PCB components placement is correct, then the sorting system will load the PCB onto oven conveyor and if not, the PCB then will be load to recycle bin conveyor. The

sorting process takes about (0.5 min). The transfer time for oven and recycle bin is (0.2 min).

- The electronic component for pick and place machines are supplied using the component holder. The operator will manually load the components into the component holder (15 min) at another area called component loader station. The component is supplied into this station manually by an operator who transfers it from the inventory (60 min, 500 m). After all components needed are loaded into the component holder, it then transferred into each pick and place machine (3 min) and loaded into machine (1.0 min).

### Question 7

As a result of a time study exercise the following information is available table 1 below.

Table 1 : Time Study of Sew Activity

	Elements	Observed Rating (BSI. 100 rating used)	Observed Time(min)
1	Obtain and sort bundle	90	0.11
2	Position breast pocket	75	0.16
3	Sew to attach pocket	105	1.02
4	Cut threads and reposition	100	0.05
5	Pickup and position pocket	80	0.15
6	Sew to attach flap	110	0.88
7	Cut threads and aside garment.	95	0.09
8	Close bundle and write ticket	85	0.17

#### Additional Information

- An 8% allowance is to be applied to all sewing elements to compensate for machine attention.
- A 14% relaxation allowance is to be applied to all work.
- The average bundle size is 10 garments

a) Calculate the standard time for one garment.

(10 marks)

b) How many garments would you expect to be produced in a 465 minute working day?

(10 marks)

**Question 8**

- a) State and explain two (2) advantages and two (2) disadvantages of using Predetermined Time System in obtaining time standard.

(8 marks)

- b) Determine the standard time (in seconds) for the task in Table 2. The allowance to be given is 12%.

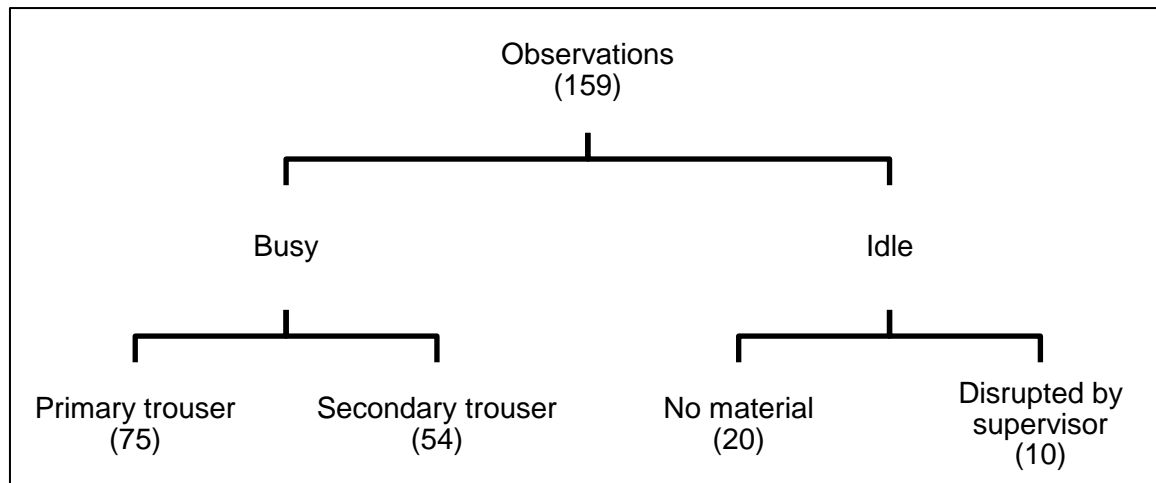
(12 marks)

**Table 2: Part X process sequences**

Activities	Left hand	TMU	Right hand	Activities
Reach 30 cm to bin for part	R30C	14.1		
Grasp part	G4B	9.1		
Move part 26 cm to fixture	M26C	13.7		
Position part in fixture	P2SE	16.2		
		10.5	R22B	Reach 22 cm to part in fixture
		2.0	G1A	Grasp part
		11.2	M22B	Move part 22 cm to disposal chute
		2.0	RL1	Release part

**Question 9**

A worker is assigned to sew two (2) types of trousers, primary and secondary school. Observations were made for 5 work shifts. Total time per shift (exclusive of rest periods) is 6.5 hours. Total outputs at the end of the study are 107 primary school trousers and 98 secondary school trousers. Figure 1 shows the preliminary data collected and Table 3 shows the observations on rating. The total amount of allowances the worker is entitled to is 15%.



**Figure 1: Preliminary data collected, in bracket is the frequency value**

**Table 3: Rating observation**

Rating (%)	90	95	100	105	110	115
Frequency	9	28	48	20	15	9

- a) At 95% confidence level, calculate the error with the available data if both trousers are to be considered.

(10 marks)

- b) Based on your answer for Question 9 (a), assume that the error is acceptable. Calculate the standard time for both trousers.

(10 marks)

# Appendix A

## Percentage Points of the *t* Distribution

<i>n</i>	Probability <i>P</i>												
	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	0.05	0.02	0.01	0.001
1	0.158	0.325	0.510	0.727	1.000	1.376	1.963	3.078	6.314	12.706	31.821	63.657	636.619
2	0.142	0.289	0.445	0.617	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	31.598
3	0.137	0.277	0.424	0.584	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	12.941
4	0.134	0.271	0.414	0.569	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	8.610
5	0.132	0.267	0.408	0.559	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	6.859
6	0.131	0.265	0.404	0.553	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.959
7	0.130	0.263	0.402	0.549	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	5.405
8	0.130	0.262	0.399	0.546	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	5.041
9	0.129	0.261	0.398	0.543	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.781
10	0.129	0.260	0.397	0.542	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.587
11	0.129	0.260	0.396	0.540	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.437
12	0.128	0.259	0.395	0.539	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	4.318
13	0.128	0.259	0.394	0.538	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	4.221
14	0.128	0.258	0.393	0.537	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	4.140
15	0.128	0.258	0.393	0.536	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	4.073
16	0.128	0.258	0.392	0.535	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	4.015
17	0.128	0.257	0.392	0.534	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.965
18	0.127	0.257	0.392	0.534	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.922
19	0.127	0.257	0.391	0.533	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.883
20	0.127	0.257	0.391	0.533	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.850
21	0.127	0.257	0.391	0.532	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.819
22	0.127	0.256	0.390	0.532	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.792
23	0.127	0.256	0.390	0.532	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.767
24	0.127	0.256	0.390	0.531	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.745
25	0.127	0.256	0.390	0.531	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.725
26	0.127	0.256	0.390	0.531	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.707
27	0.127	0.256	0.389	0.531	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.690
28	0.127	0.256	0.389	0.530	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.674
29	0.127	0.256	0.389	0.530	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.659
30	0.127	0.256	0.389	0.530	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.646
40	0.126	0.255	0.388	0.529	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.551
60	0.126	0.254	0.387	0.527	0.679	0.848	1.046	1.296	1.671	2.000	2.390	2.660	3.460
120	0.126	0.254	0.386	0.526	0.677	0.845	1.041	1.289	1.658	1.980	2.358	2.617	3.373
∞	0.126	0.253	0.385	0.524	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.291

Source: Reprinted from Table III of R. A. Fisher and F. Yates, *Statistical Tables for Biological, Agricultural, and Medical Research* (Edinburgh: Oliver & Boyd, Ltd.), by permission of the authors and publishers.

Note: Probabilities refer to the sum of the two tail areas; for a single tail, divide the probability by 2.

END OF QUESTION