الجامعة الاردنية
كلية الهندسة
قسم الهندسة الصناعية

Student name:
Number:
Section no:

Question3 (7marks):

The following table presents the mean and Standard deviation for a physical workload experiment done by of twelve subjects (six males and 6 females).

Calculate:

1. BMI for males and females

2. HRmax for males and females

3. HRI for males and females
(HRI=IHRwork –HRmaxl/HRrest-HRmaxd*100%)

Table 1

characteristic	Males(n=6)		Females(n=6)	
	Mean	SD	Mean	SD
Age	28		26	
Body high(cm)	170.9	7.1	161.2	5.6
Body weight(kg)	77.4	6.4	69.2	4.5
HRrest (beats/min)	80	7.6	85	3.2
HR work(beats/min)	151	6.1	158	11.3

4. Discuss the relationship between HR-work and Borg scale

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7. 140 beats per minutes is defined as.
   a. Medium work
   b. Medium to heavy work
   c. Heavy work
   d. extremely heavy work

8. One of the following statements is correct.
   a. The relationship between the heart rate and the oxygen consumption is linearly and reliable only in the range between light and heavy work.
   b. The heart-rate has a high interaction with the metabolic system.
   c. The breathing rate might increase up to 45 times in a minute during heavy exercising.
   d. Bothe A and B are correct.
   e. All the statements are correct.

Qustion2 (10 marks):

Fill in the blank space with the best answer:

1. _____a term that provides a relative estimate of the level of physical stress associated with a particular manual lifting task.
2. Static muscle work requires more than _____longer than the original contraction-duration for complete recovery from fatigue.
3. _____Connecting mid-point between ankles and midpoint between hand grasps at origin or destination of lift.
4. Moderate duration or 2 hours work pattern is categorized if the ratio of work-time (WT) to recovery-time (RT) is _____.
5. The coefficient of variance (CV) for the body dimensions data is _____.
6. Design for the shortest person considered as design for _____.
7. For longer contraction duration one should apply _____ of muscle strength.
8. _____is a technical requirement for using NAIOSH revised lifting equation.
9. _____ is a line perpendicular to the hips and intersecting mid-point between ankles in neutral body posture.
10. The learning curve phenomenon is _____

_____.

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Question 1 (8marks):

Chose the best answer for each of the following:

1. One of the following statements is true about muscle activity:
   a. The tension produced by the muscle and transmitted through tendons is the muscle exertion.
   b. The force is the observable result of a muscle movement or exertion.
   c. Muscle activity is described based on their exertion and length.
   d. All the above are true statements.
   e. None of the above is true.

2. A cardboard box has two cut outs as carry handles, but the cardboard is thin and creates pressure concentration on the hands; according to the NIOSH lifting equation application guidelines this case is judged as having:
   a. poor coupling
   b. fair coupling
   c. excellent coupling
   d. good coupling

3. The following is a true fact about grip strength except:
   a. Bending your wrest will result in reducing the potential grip strength
   b. The muscles controlling the grip strength is located in the arm.
   c. It can be measured using a hand dynamometer
   d. It is used for estimating whole body strength

4. Dynamic (functional) anthropometric measurements:
   a. Must be taken from a seated individual
   b. Must be collected on a moving individual
   c. Are only defined for 5th and 95th percentile individuals
   d. Allow the sizes of several body dimensions to be simultaneously considered.

When designing for strength, one should consider the strength of :
a. 5th percentile
b. 50th percentile
c. 95th percentile & 5th percentile
d. 95th percentile

6. The revised (1991) National Institute for Occupational Safety and Health (NIOSH) Lifting Equation does not apply if the following occurs
   a. lifting/lowering stable objects
   b. lifting/lowering in an unrestricted workplace
   c. lifting/lowering while carrying, pushing, or pulling
   d. lifting/lowering in an environment where the temperature is 79º F (26º C) and the relative humidity is 50%(optimal environment)

Qustion4 (7 marks)

Student name:
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A hole-plate (shown in Figure 1) is used in an experiment. In this test, the student will move his hand to a precise stationary position recording the best time to finish the experiment. Each time the stylus touches an edge, it will register on the counter as an error or contact. The variable recorded in this test is the time **T** for each trial and the error **E** which is the total number of contacts (errors) for the nine holes. The value of T and E for the student is recorded in Table2.

Analyze and answer each of the following requirements

A) What is the name of this experiment?

Figure 1

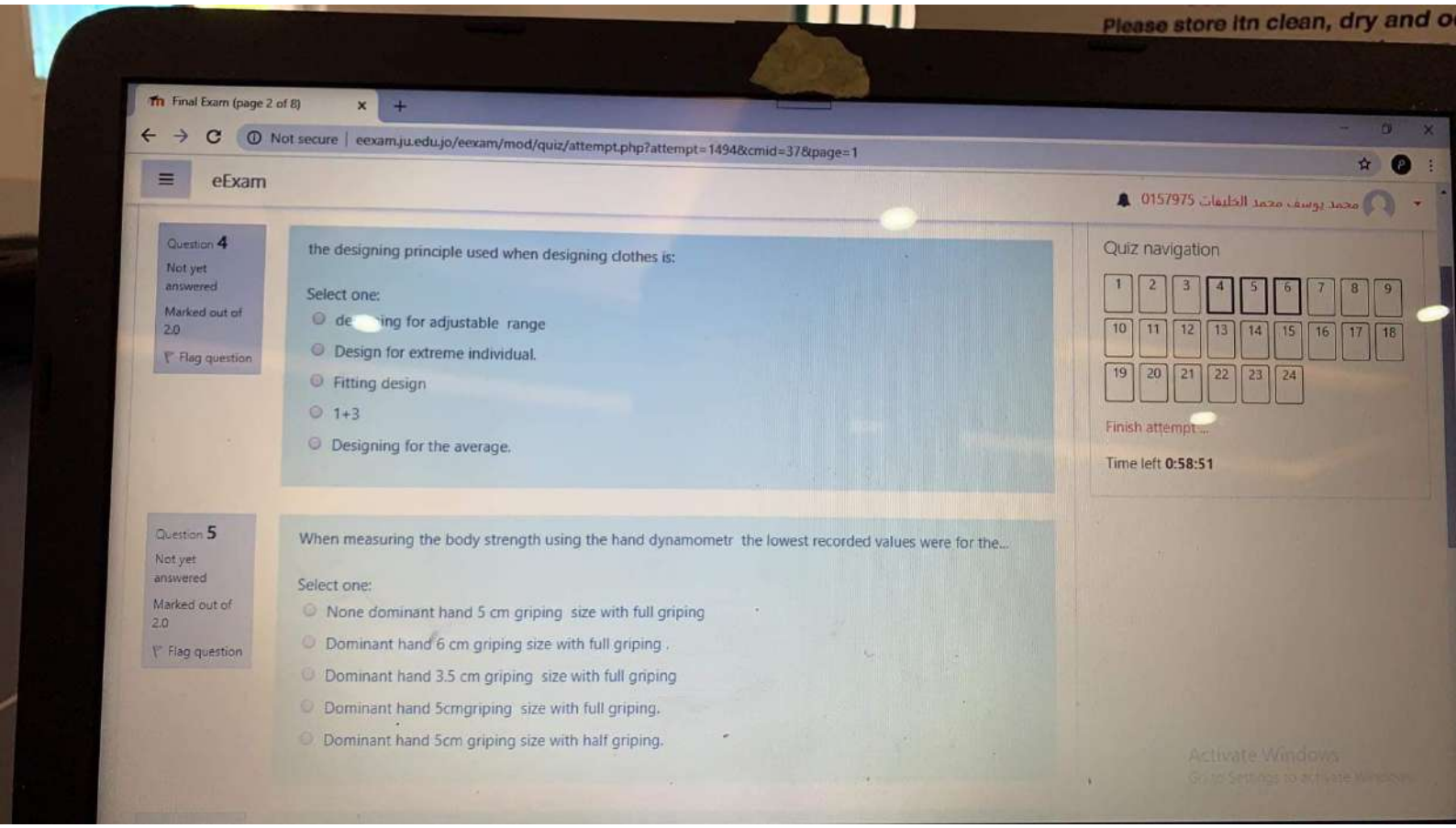
B) Calculate the mean and the standard deviation for the data

Table 2

[illegible]	[illegible]	
1	90	20
2	86	18
3	75	13
4	60	10
5	45	12
6	30	8
[illegible]		
[illegible]		

C) What is the effect of decreasing the hole-diameter on E?

D) Draw a learning curve using the trial No and the times associated for each trial and show the standard time on your curve. (Discuss your graph)


Please store itn clean, dry and o
Final Exam (page 2 of 8)
Not secure | eexam.ju.edu.jo/eexam/mod/quiz/attempt.php?attempt=1494&cmid=37&page=1
eExam
0157975 محمد يوسف محمد الخليفات
Question 4
Not yet answered
Marked out of 2.0
Flag question
the designing principle used when designing clothes is:
Select one:
de ing for adjustable range
Design for extreme individual.
Fitting design
1+3
Designing for the average.
Quiz navigation
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18
19 20 21 22 23 24
Finish attempt ...
Time left 0:58:51
Question 5
Not yet answered
Marked out of 2.0
Flag question
When measuring the body strength using the hand dynamometr the lowest recorded values were for the...
Select one:
None dominant hand 5 cm griping size with full griping
Dominant hand 6 cm griping size with full griping .
Dominant hand 3.5 cm griping size with full griping
Dominant hand 5cmgriping size with full griping.
Dominant hand 5cm griping size with half griping.
Activate Windows

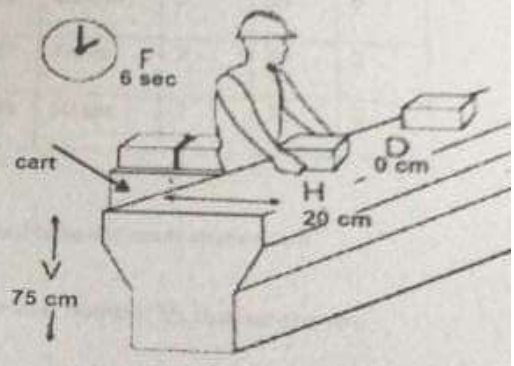
Student name:
Student Number:

Question 3(8 points):

Analyze and assess the risk for the following work task using NIOSH equation: a worker lifts 10 Kg load of loosely piled box from the conveyor to the cart ten times every minute (assume an 8 hours standard shift).

a- Define the Recommended weight limit

b- Calculate the recommended weight limit (RWL) for the task at the **destination**.
c- Calculate the LI and use engineering judgment to write down a redesign suggestion for the task - if required.



Student name:
Student Number:

Question4(12 points):

A laboratory experiment on the eye hand coordination to find the learning rate for a number of students using the mirror tracer, the recorded outputs from the experiment for two of the students is shown in the table:

	Student1		Student2	
	time	error	time	error
Trial1	5min	17	2 min.	4
Trial2	4.20min	12	1 min.	1
Trial3	3.40 min	10	50 sec.	1
Trial4	2min	10	40 sec.	0
Trial5	1.40min	9	40 sec.	0
Trial6	1.5min	7	35 sec.	0
Trial7	1min	7	35 sec.	0
Trial8	50 sec	7	35 sec.	0

Analyze and answer each of the following requirements

1- Define the learning curve

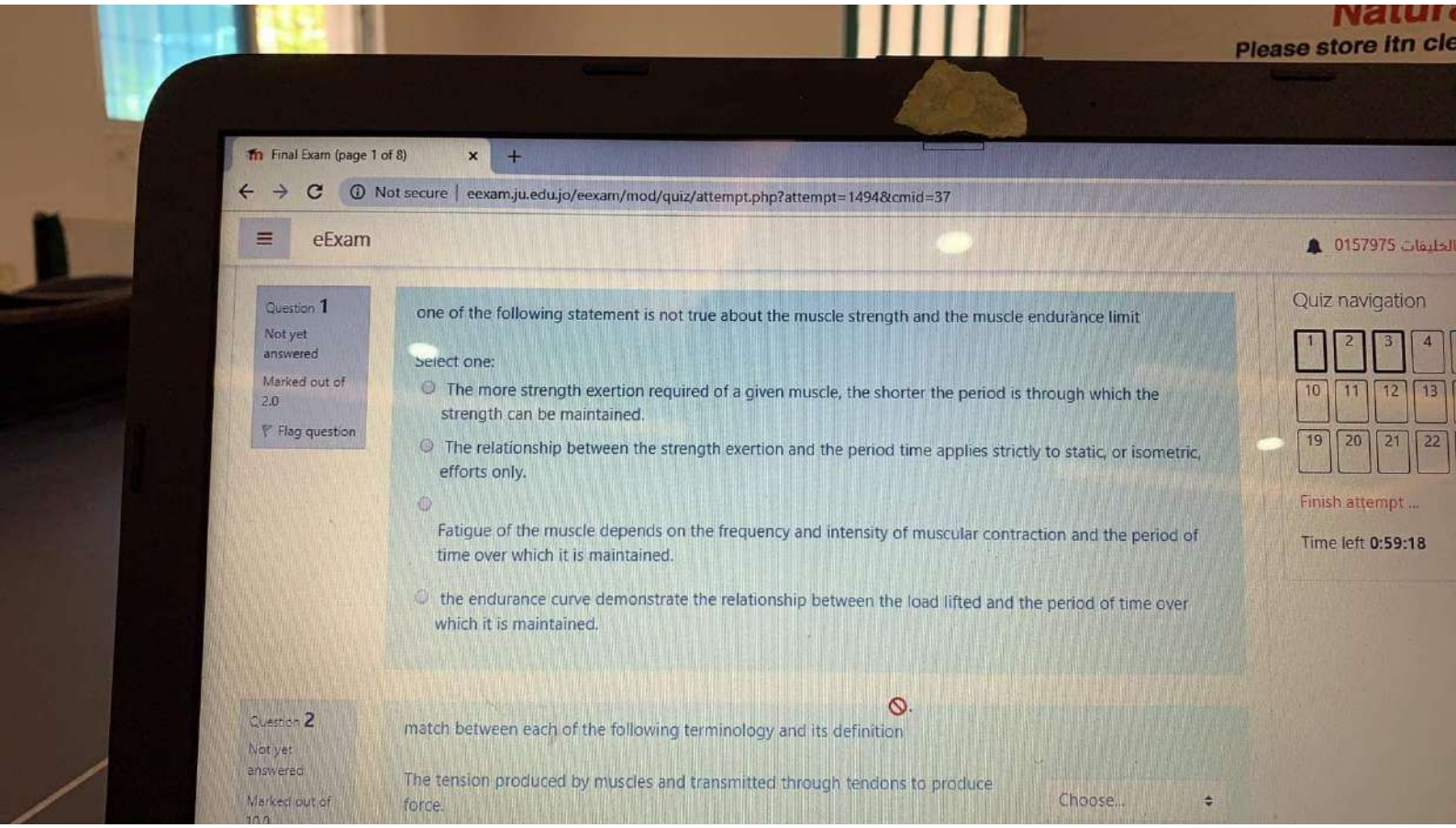
2- Calculate the mean and the standard deviation for the two student's trial times.

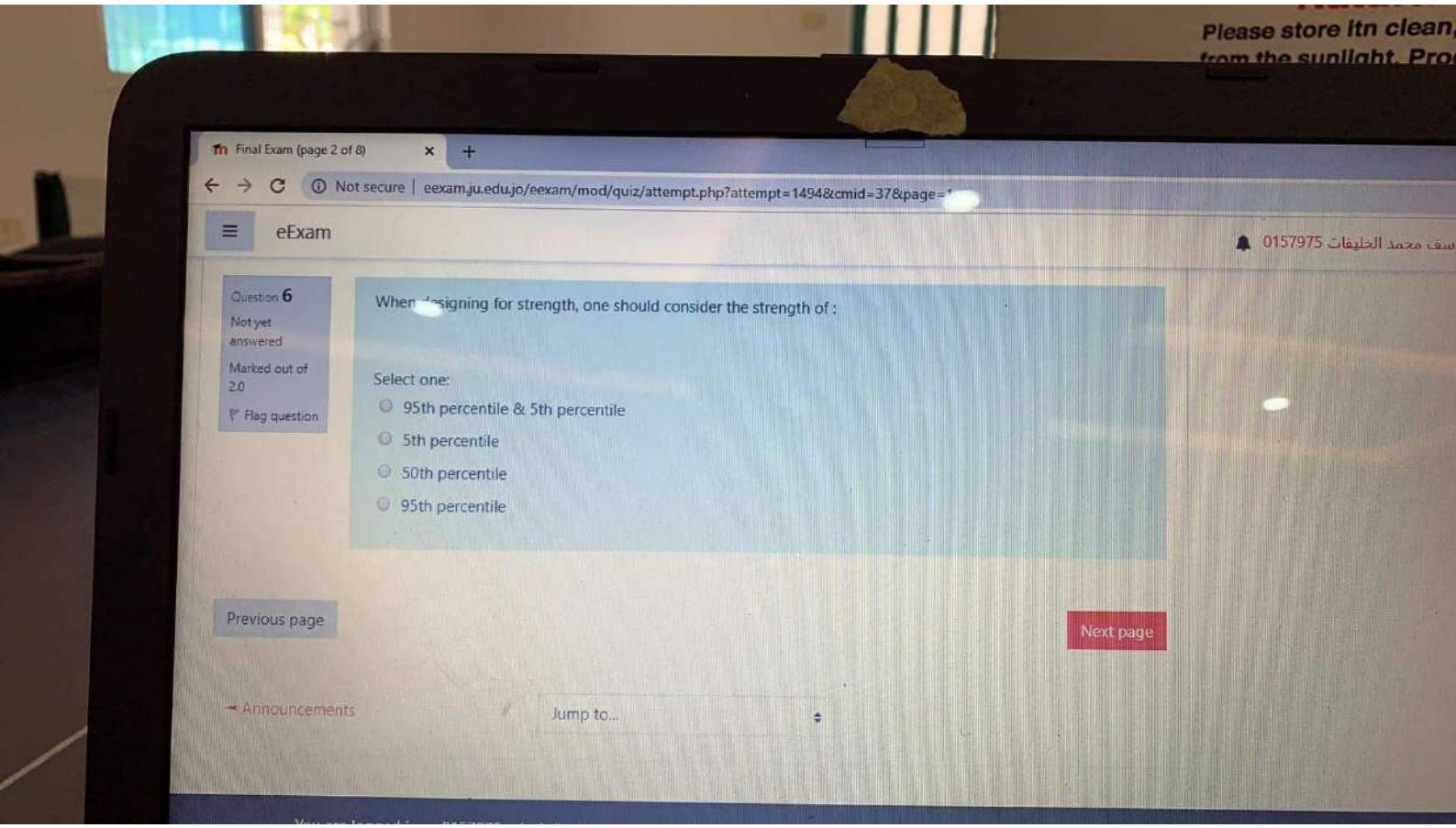
3- Draw a learning curve using the trial times and show the standard time for each student on your graph.(Discuss your graph)

4- Discuss the improvement in the number of errors by plotting the trial number Vs the number of errors for the student's -comment on your figure.

5- Which of the two students have the best records for the time and the number of errors; discuss the possible reasons behind that

6- What is the type of workstation used in this experiment and what is the anthropometric reference for the dimension used in it.


Please store itn cle
Final Exam (page 1 of 8)
Not secure | eexam.ju.edu.jo/eexam/mod/quiz/attempt.php?attempt=1494&cmid=37
eExam
0157975
Question 1
Not yet answered
Marked out of 2.0
Flag question
one of the following statement is not true about the muscle strength and the muscle endurance limit
Select one:
The more strength exertion required of a given muscle, the shorter the period is through which the strength can be maintained.
The relationship between the strength exertion and the period time applies strictly to static, or isometric, efforts only.
Fatigue of the muscle depends on the frequency and intensity of muscular contraction and the period of time over which it is maintained.
the endurance curve demonstrate the relationship between the load lifted and the period of time over which it is maintained.
Quiz navigation
1 2 3 4
10 11 12 13
19 20 21 22
Finish attempt ...
Time left 0:59:18
Question 2
Not yet answered
Marked out of
match between each of the following terminology and its definition
The tension produced by muscles and transmitted through tendons to produce force.
Choose...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Final Exam (page 2 of 8)
Not secure | eexam.ju.edu.jo/eexam/mod/quiz/attempt.php?attempt=1494&cmid=37&page=
eExam
0157975
Question 6
Not yet answered
Marked out of 2.0
Flag question
When designing for strength, one should consider the strength of :
Select one:
95th percentile & 5th percentile
5th percentile
50th percentile
95th percentile
Previous page
Next page
Announcements
Jump to...

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Section no:

Qustion5 (8 marks)

Carry out the risk assessment using NIOSH equation for the following work task: a worker lifts 15 Kg load of loosely piled pieces of metal from the floor to the table six times every minute over 2 hours. Write down a redesign suggestion for the task - if required.

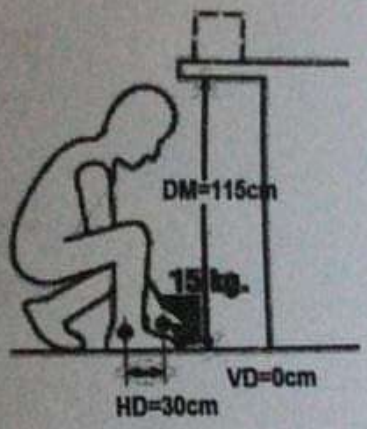


Figure 2

Student name:
Student Number:

Question 1(10 points):

The following table present the recorded data of a student assigned to a strength evaluation experiment using the Jackson platform (load and the time spent in lifting each loads).

Analyze and **answer** each of the following requirements:

1. define the endurance limit:

2. If the maximum lifting capacity for the student was **35KG,** Plot the time Vs the percentage of the maximum muscle exertion and discuss the endurance limit.

3. Find the muscle strength that the student can preserve for 8 hours industrial shift duration.

4. Discuss the following: the static muscle strength measured in this experiment is more stressful compared to the dynamic muscle strength.

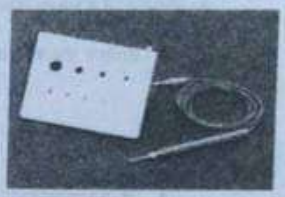
Experiment NO	Load in KG	Time	
1	31	45 sec	
2	24.5	1.20 min	
3	17	2min	
4	12.5	2. 30min	
5	11	3.50min	
6	7	8min	

Student name:
Student Number:

Question2(10 points):

A manipulative dexterity test is done using the Hole plate shown in the figure .the test is done in two parts the first part is to examine the aiming for the student and the second part the steadiness of the same student was examined. **Analyze** and **answer** each of the following requirements:

1- Define both Aiming and steadiness



2- What are the procedures and the score output for each test.

3- Compare between aiming and steadiness in terms of the involvement of eye-hand coordination, and the level of visual acuity used.

4- What types of work this ability is related to-name an application.

5- What is the effect of decreasing the hole-diameter on both tests.

The University Of Jordan
School of Engineering
Department of Industrial Engineering

Student name:
Number:

Mid term Exam (MW)
Date:7.11.2018
Time:45 Minutes

Question 1(12 marks):

Fill in the blank space with the best answer:

1- The main objective of measuring physical workload experiment is _____.

2- _____is described as the ability to bend without sustaining any injury.

3- _____is the study of the physical dimensions, proportions and composition of the human body.

4- _____is the tension produced by muscles and transmitted through tendons to produce force.

5- The heart and oxygen consumption have a linear and reliable relationship in the range between _____.

6- Static strength is stressful in the conditions including: _____.

7- The heart rate and oxygen consumption have a linear and reliable relationship in the range between _____.

8- MVC is an indication of the muscles_____.

9- _____The ability of a muscle to sustain repeated contractions over a period of time without becoming exhausted.

10- The oxygen needed to release energy in the nutrient metabolism is in the ration of _____

11- _____ is the Dynamic muscle activity where muscle either contracts or elongate

12- The FITTING DESIGN is a design principle that lay on the _____.

- A heavy work is correspond to heart rate of _____.

Student name:
Number:

Qustion2 (6 marks):

Discuss the following:

1. "More Muscle work is required to grip an object when the wrist is bent"

2. Changing the grip size, results in different grip strength for the same subject (person).

3. 15% of MVC result in discomfort and pain on the muscles.

Qustion3 (6 marks):

Based on the anthropometric data in the tables provided with the exam paper, determine each of the following:

a- The coefficients of variance for females elbow height standing.

b- The 20th percentile for male's stature height.

c- A female eye height sitting of 75cm correspond to a percentile of: