

IE-341

Section 1, CRN: 30512/513/514

Section 2, CRN: 30515/516/517

Section 3, CRN: 38299/300/301

First Semester 1436-37 H (Fall-2015) – 3(2,1,2)

“HUMAN FACTORS ENGINEERING”

Sunday, Oct 11, 2015 (28/12/1436H)

Homework 1 (MIDTERM 1)

Name:	Student Number:	Section:
	4	9 / 10

Place the correct LETTER in the box at the right of each question [0.5 Points Each]

1. Name an example of a *physiological* topic related to human factors engineering.

- A. psychology
- B. ergonomics
- C. body functions
- D. human sociology
- E. anthropometry

2. Organize the following events in correct chronological order:

- A. HF in PCs; HF in medical devices; HF profession is born
- B. HF in medical devices; HF profession is born; HF in PCs
- C. HF profession is born; HF in medical devices; HF in PCs
- D. HF in PCs; HF profession is born; HF in medical devices
- E. HF profession is born; HF in PCs; HF in medical devices

3. Which of the following is NOT a type of Human-Machine system?

- A. open loop system
- B. semi-open loop system
- C. closed loop system
- D. semiautomatic system
- E. automated system

4. A system consists of 1 main and 5 redundant components, and all components have

the same reliability of 42.8%. What is Rel_{sys} ?

- A. 96.5%
- B. 57.2%
- C. 0.6%
- D. 3.5%
- E. 93.9%

5. Reliability of a human-machine system connected in series is usually as follows:

- A. $Rel_{human} < Rel_{sys} < Rel_{machine}$
- B. $Rel_{machine} < Rel_{human} < Rel_{sys}$
- C. $Rel_{machine} < Rel_{sys} < Rel_{human}$
- D. $Rel_{sys} < Rel_{machine} < Rel_{human}$
- E. $Rel_{sys} < Rel_{human} < Rel_{machine}$

6. In the Information Theory, information is defined as ..., with emphasis on

- A. reduction of certainty; highly likely events
- B. reduction of uncertainty; highly likely events
- C. reduction of certainty; highly unlikely events
- D. reduction of uncertainty; highly unlikely events
- E. measurement of events; highly likely events

7. How much information should be drawn from selecting a card from a 52 card-deck

(given all cards are equally likely to be chosen)?

- A. 1.72 Bits
- B. 0.175 Bits
- C. 5.70 Bits
- D. 0.858 Bits
- E. 26.0 Bits

8. **When randomly selecting one of two alternatives which do NOT have equal probabilities of occurrence, the information in bits conveyed is**
- A. less than one
B. greater than one
C. equal to 1
D. greater than or equal to one
E. cannot be determined
9. **Which of the following laws involves establishing reaction time as a function of stimuli having variable probability of occurrence?**
- A. Hick's law
B. Hick-Hyman law
C. Fitts's law
D. Law of redundancy
E. Information theory law
10. **Auditory presentation is preferred in the following cases ...**
- A. job allows person to remain in one position; message will be referred to later
B. job allows person to remain in one position; message will not be referred to later
C. message calls for immediate action; message will be referred to later
D. job requires moving around continually; message will be referred to later
E. job requires moving around continually; message will not be referred to later
11. **Information displayed by a blue-colored pipe in a chemical facility is considered ...**
- A. static, identification information
B. static, alphanumeric information
C. static, representational information
D. dynamic, identification information
E. dynamic, representational information



12. **Qualitative information ...**

- A. indicates danger or emergency
- B. changes continuously with time
- C. represents an approximate value or rate of change
- D. displays pulsed signals
- E. shows pictorial or graphical information

13. **Determining the correct switch to use on an electric stove is part of ...**

- A. conceptual compatibility
- B. modality compatibility
- C. movement compatibility
- D. spatial compatibility
- E. judgement compatibly



14. **Determining (in P13) the direction that the switch should be rotated is part of ...**

- A. modality compatibility
- B. conceptual compatibility
- C. spatial compatibility
- D. movement compatibility
- E. judgement compatibly

15. **The pupil ..., while the lens**

- A. focuses light onto the retina; controls the amount of light entering the eye
- B. controls the amount of light entering the eye; focuses light onto the retina
- C. focuses light onto the retina; is the colored part of the eye
- D. is the colored part of the eye; focuses light onto the retina
- E. is the colored part of the eye; controls the amount of light entering the eye

16. Visual angle and Snellen acuity are used with ...

- A. Minimum perceptible acuity
- B. Vernier acuity
- C. Stereoscopic acuity
- D. Minimum separable acuity
- E. Maximum identification acuity

17. The ... is known as convergence, while adaptation is the

- A. ability of the eye to fuse images; eye's sensitivity to light
- B. eye's sensitivity to light; ability of the eye to fuse images
- C. ability of the eye to focus; eye's sensitivity to light
- D. ability of the eye to focus; ability of the eye to fuse images
- E. ability of the eye to fuse images; ability of the eye to focus

18. The property of a letter to be identifiable from others is its ..., i.e. its

- A. readability; discriminability
- B. readability; meaningfulness
- C. visibility; detectability
- D. legibility; meaningfulness
- E. legibility; discriminability

19. According to the data below, a person needs to have what *minimal* acuity (in fixed position) to view all warning signs at a 28 in viewing distance in poor lighting?

- A. $\frac{20}{491}$
- B. $\frac{20}{492}$
- C. $\frac{20}{368}$
- D. $\frac{20}{369}$
- E. $\frac{20}{123}$

TABLE 4-2
ONE SET OF RECOMMENDED HEIGHTS OF ALPHANUMERIC CHARACTERS FOR CRITICAL AND NONCRITICAL USES UNDER LOW AND HIGH ILLUMINATION AT 28 IN VIEWING DISTANCE

	Height of numerals and letters*	
	Low luminance (down to 0.03 fL)	High luminance (1.0 fL and above)
Critical use, position variable	0.20–0.30 in (5.1–7.6 mm)	0.12–0.20 in (3.0–5.1 mm)
Critical use, position fixed	0.15–0.30 in (3.8–7.5 mm)	0.10–0.20 in (2.5–5.1 mm)
Noncritical use	0.05–0.20 (1.27–5.1 mm)	0.05–0.20 (1.27–5.1 mm)

* For other viewing distances (D), in inches, multiply tabled values by D/28.
Source: Adapted from Heglin (1973) and Woodson (1963).

20. Using the above table, what is letter-size range for *noncritical use*?

- A. 15 – 30 pt
- B. 5 – 20 pt
- C. 12 – 20 pt
- D. 10 – 20 pt
- E. 20 – 30 pt

Rules:

- You must prepare and submit the homework **individually**.
- All work must be neatly typed and printed.
- Use **proper English**.
- Show all work.
- **BOX** your answer(s) and include the **units** (if applicable).
- **Due date:** the first class of Week 7 (beginning of class). NO late homework will be accepted.

$$H_{max} = \log_2 N$$

$$H_{ave} = \sum p_i \log_2 \left(\frac{1}{p_i} \right)$$

$$\% Red = \left(1 - \frac{H}{H_{max}} \right) * 100$$

$$Rel_{sys} = 1 - (1 - Rel_{c1})(1 - Rel_{c2}) \dots (1 - Rel_{cn})$$

$$Rel_{sys} = Rel_{c1} * Rel_{c2} * \dots * Rel_{cn}$$

$$VA = 3438 * \frac{H}{D}$$