2023 Master's Program, Graduate School of Design (General Entrance Examination) Achievement Test Question and Answer Sheets

Examination Subject
Human Life Design and Science

Examinee's number

In addition to the following 2 required questions (100 points), select 2 elective questions from page 3 to page 16 onwards (50 points each). In total, 200 points for 4 questions, 2 required and 2 elective questions.

< Required Question – 1 >

Select three words from the following words group and discuss their roles in Hyper-Aged Society* in about 400 words. In your answer, underline the three words you selected. < 60 points>

Words Group: Advertising, Environmental Adaptability, Simulation, Interior Design, Activities of Daily Living, Creativity, Cognitive Function, Universal Design, Science and Technology

*Hyper-Aged Society: A society in which more than 21% of the total population is 65 years old or older. As of October 1, 2021, 28.9% of the total population in Japan reached 65 years old or older.

< Required Question – 2 >

Select 5 from the following keywords and explain each in about 40 words <40 points, 8 points each>

Sweating, Bearing, Personal Space, Allen's & Bergmann's Rules, Dystopian Movies, Sleep Debt, Matrix Diagonalization, Analogy, Transmission Device, Creative Commons License, Mirror Neuron System, Abduction, Percentile, Civic Pride, Cognitive Dissonance, Interlock, Owned Media, Numerical Solution of Differential Equations

Selected Keyword 1 [ ]

Selected Keyword 2 [ ]

Selected Keyword 3 [ ]

Selected Keyword 4 [ ]

Selected Keyword 5 [ ]

2023 Master's Program, Graduate School of Design (General Entrance Examination) Achievement Test Question and Answer Sheets

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< Elective Question – 1 > Japanese animation is highly regarded overseas, such as in France and China. Explain your thoughts on why it is so, with specific examples. <50 points>

(Any number of characters)

Do not write on the back side of the answer sheet. Your answers not being scored.

Examination Subject	Examinee's number
Human Life Science Design and Science	

< Elective Question – 2 >

Please describe the method/s to measure the burden on the agonist muscles when standing up from a chair. (at least 400 words)

Examination Subject
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< Elective Question – 3 > (You may also use the following sheet to answer. Do not use the back side.)

We consider the transmission of an infectious disease using probabilities. This infection is assumed to occur with probability β ($0 < \beta < 1$) when a nonimmune non-infected person ("*susceptible person*") and an infected person dine together. However, no infection occurs when infected persons, or susceptible persons, dine with each other. Suppose that the ratio of infected people in the city where Mr. A lives is α ($0 < \alpha < 1$), based on which the probability that the residents in the city are infected is assumed to be α. <50 points>

(1) Suppose that Mr. A is found to be infected after a dinner with an infected person. Answer the probability that Mr. A got infected at the dinner using α and β.

(2) Suppose that Mr. A is found to be infected after dining with one of his friends who lives in the same city. Answer the probability that Mr. A got infected at the dinner using α and β.

(3) Suppose that Mr. A is found to be infected after he had dinner with n friends who lived in the same city one by one in turn. Answer the probability that Mr. A got infected at the series of dinner using α, β, and n.

2023 Master's Program, Graduate School of Design (General Entrance Examination) Achievement Test
Question and Answer Sheets

Examination Subject
Human Life Design and Science

Examinee's number

< Elective Question – 3 > answer sheet (continued)

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Examination Subject	Examinee's number
Human Life Science Design and Science	

< Elective Question – 4 >

List three or more physiological responses to cold environment that relate to peripheral nervous system, and explain the regulatory mechanism of each. (at least 400 words)

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2023 Master's Program, Graduate School of Design (General Entrance Examination) Achievement Test Question and Answer Sheets

Examination Subject
Human Life Design and Science

Examinee's number

< Elective Question – 5 > First, explain the concepts of sociopetal and sociofugal respectively. Next, give a specific example from your daily living space, and discuss the effects that you can expect in the place given as a specific example by allocating sociopetal aspect and sociofugal aspects to the place, respectively.
<20 points + 30 points = 50 points>

<10 points + 10 points = 20 points>

Explanation of sociopetal	
Explanation of sociofugal	

<30 points>

A concrete example in everyday life	
Discuss expected effects.	

Do not write on the back side of the answer sheet. Your answers not being scored.

2023 Master's Program, Graduate School of Design (General Entrance Examination) Achievement Test Question and Answer Sheets

Examination Subject	Examinee's number
Human Life Science Design and Science	

< Elective Question – 6 >

Explain how to design an experiment to investigate arousal in humans using EEG frequency analysis. (at least 400 words)

2023 Master's Program, Graduate School of Design (General Entrance Examination) Achievement Test Question and Answer Sheets

Examination Subject
Human Life Design and Science

Examinee's number

< Elective Question – 7 > (You may also use the following sheet to answer. Do not use the back side.)

The designed exhibition stand was modeled as a beam as shown in the figure. The figure shows how the uniformly distributed load q is placed between B and C and displayed. The length of the beam is as shown in the figure. Answer the following questions. Modulus of longitudinal elasticity (Young's modulus) is E, the cross-sectional area is A, the moment of inertia of area is I, and the section modulus is Z (not all of these variables may be necessary for the answer). In addition, neglect the weight of AC.

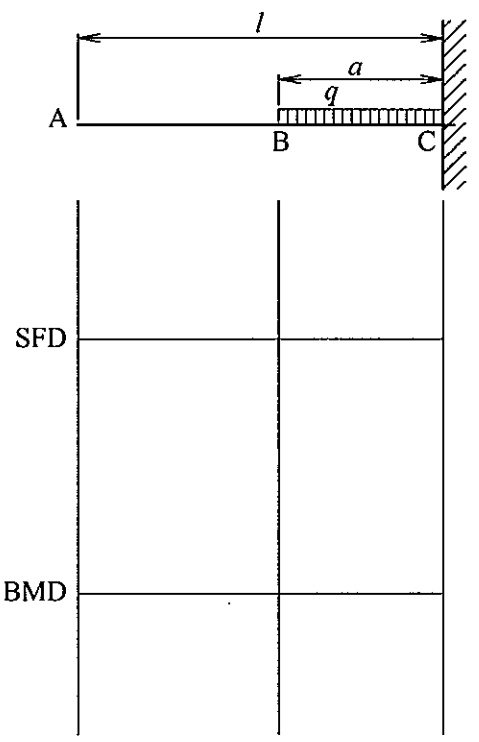
<50 points>

(1) Determine the size of the reaction force R_C at point C and its direction.

(2) Draw the shearing force diagram (SFD) and bending moment diagram (BMD). Determine the maximum bending moment M_{max} between A and C. In addition, show the derivation process.

(3) Determine the maximum stress σ_{max} and its location as much detail as possible.

(4) Determine the downward deflection δ_A at the point A. Here, the deflection and the slope at the chip of the cantilever beam with the uniformly distributed load q over the span l are $ql^4/8EI$ and $ql^3/6EI$, respectively.



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2023 Master's Program, Graduate School of Design (General Entrance Examination) Achievement Test
Question and Answer Sheets

Examination Subject
Human Life Design and Science

Examinee's number

< Elective Question – 7 > answer sheet (continued)

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Examination Subject	Examinee's number
Human Life Science Design and Science	

< Elective Question – 8 >

Explain acute physiological responses and long-term adaptation to high-altitude environment in humans. (at least 400 words)

< Elective Question – 9 >

Based on the following experimental outline, answer questions (1) - (3). Assume that descriptions are omitted, every part of the experiment, including the selection of the subject population, was conducted properly, and the results are significant. <50 points>

<Outline of Experiments>

A group of subjects who did not know each other at all and did not interact with each other was gathered and divided into two groups by lottery (formation of minimal groups). Then, the subjects were asked to carry out the task to distribute their rewards to one other member of their own group and one member of the other group without any opportunity to contact each other. The results showed that they distributed more rewards to the members of the group to which they belonged.

(1) Select and circle 2 appropriate human characteristics that can be derived from the interpretation of the above experiment.

A. People tend to favor members of their own group simply by recognizing that they belong to the specific group.
B. People tend to favor members of a different group simply by recognizing that they belong to the specific group.
C. Social identity can be formed simply by distinguishing one's own group from other groups.
D. People tend to be aggressive toward members of a different group simply by recognizing that they belong to the specific group.
E. People tend to be aggressive toward members of their own group simply by recognizing that they belong to the specific group.

(2) Based on your answer to (1), propose one organization design that could induce/deduce a change in human behavior. Specify the assumed situation, expected behavior change and indicate why you believe the rule is effective.

Assumed situation:

Expected behavior change:

Proposed organization design:

Reason:

(3) Give possible reasons, in the case where the organization design proposed in (2) did not bring the expected behavior change.

Examination Subject	Examinee's number
Human Life Science Design and Science	

< Elective Question – 10 >

Please describe and explain the consideration in designing the width of hallways (corridors) within a building. (at least 400 words)

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2023 Master's Program, Graduate School of Design (General Entrance Examination) Achievement Test Question and Answer Sheets

Examination Subject
Human Life Design and Science

Examinee's number

< Elective Question – 11 > Especially in the design of public facilities that are used by various users, it is required to design appropriate signifiers to enhance safety and convenience. Answer the following questions.
<10 points + 40 points = 50 points>

1) Explain "signifier". <10 points>

2) How should signifiers be designed for public barrier-free toilets (multifunctional toilets) that can be used by a wide range of people, including wheelchair users, the elderly, people with internal disabilities, and people with children? Discuss how the signifiers should be designed using specific examples from the perspectives of safety and convenience, respectively. <40 points>

Examination Subject	Examinee's number
Human Life Science Design and Science	

< Elective Question – 12 >

Based on the physiological characteristics of humans, discuss what should be taken into account for good quality sleep. (at least 400 words)

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