



## Question and Answer Sheets

Human Life Design and Science

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466
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### < Compulsory Question – 2 >

Keyword Group: Maximum Likelihood Estimation (MLE), Erect Bipedalism, Paid Publicity, Cortisol, Personal Space, Photoreceptor Cell, Bearing, Wicked Problem, White Cube, Disuse Syndrome, Affordance, Minimal Group Paradigm, Public Art, Least Squares Method (LSM), Power Transmission Device, Anthropometry, Synapse, Procedural Justice

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2025 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

( Page 3 of 16 )

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< Elective Question – 1 >

Explain and elaborate how you would design an experiment to study gender differences in the recognition of human facial expressions using EEG measurements and cognitive tasks. (at least 300 words) <50 points>



2025 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 – 2 >

Explain the circulatory and metabolic responses to long-duration jogging (slow running). (at least 300 words) <50 points>

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2025 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

( Page 5 of 16 )

< 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  $\beta$  when a nonimmune non-infected person (“*susceptible person*”) and an infected person dine together. Besides, assume that no infection occurs when infected or susceptible persons dine with each other. Suppose that the ratio of infected people in a city where Mr. A lives is  $\alpha$  ( $0 < \alpha < 1$ ), then the probability that a person who lives in the city is infected is  $\alpha$ . <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 by the dinner using  $\alpha, \beta$ .
- (2) Suppose that Mr. A is found to be infected after a dinner with one of his friends who lives in the same city. Answer the probability that Mr. A got infected by the dinner using  $\alpha, \beta$ .
- (3) Suppose that Mr. A is found to be infected after Mr. A had dinner with  $n$  friends who lived in the same city one by one in turn. Answer the probability that Mr. A got infected by the series of dinner using  $\alpha, \beta, n$ .



2025 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)



2025 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

( Page 7 of 16 )

-----

< Elective Question – 4 >

Describe your views on the importance of storytelling in advertising expression, with specific examples. <50 points>



2025 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

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< Elective Question – 5 >

Describe natural selection in evolution. Explain an example of a phenotype in humans that is likely to have been subject to positive natural selection, including the reasons for this natural selection. (at least 300 words) <50 points>

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2025 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

( Page 9 of 16 )

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< Elective Question – 6 >

Outline the circulatory regulatory responses when changing position from supine to standing and explain the reasons for the increased prevalence of orthostatic hypotension in hot weather. (at least 300 words) <50 points>



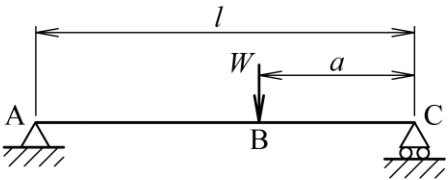
Examination Subject
Human Life Design and Science

Examinee’s number

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

The designed bench was modeled as a beam as shown in the figure. It shows a person with weight  $W$  sitting in point B on the bench. The length of the beam is as shown in the figure. Answer the following questions. Note that 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 the beam. <50 points>

- (1) Determine the size of the reaction forces  $R_A$ ,  $R_C$  at point A and C and their directions.
- (2) Draw the shearing force diagram (SFD) and bending moment diagram (BMD), and find the maximum bending moment  $M_{\max}$  between A and C. In addition, show the derivation process.
- (3) Determine the maximum stress  $\sigma_{\max}$  in the beam and its location with as much detail as possible.



SFD		
BMD		

2025 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

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< Elective Question – 7 > Answer sheet (continued)

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Examination Subject
Human Life Design and Science

Examinee’s number

< Elective Question – 8 >

According to the American philosopher Charles Sanders Peirce, the inference we conduct in our daily lives can be classified into deduction, induction, and abduction. Deduction is a type of inference that derives particular conclusions from general and universal propositions or laws based on logical forms. Induction is inference that derives general propositions or laws from individual concrete empirical cases. Abduction is a type of reasoning that involves coming up with a plausible hypothesis as an explanation for a surprising fact. Please answer the following questions. <10 points + 40 points = 50 points>

1. Please explain a specific example of induction. <10 points>

2. How can learning about these types of reasoning be useful when designing products? Discuss your thoughts. <40 points>

Question and Answer Sheets

Examination Subject
Human Life Design and Science

Examinee’s number

< Elective Question – 9 >

Appropriateness-evaluation of behavior is a crucial concept in the context of individual’s social adaptation since it reflects the understanding of the social norm in the respective society. Deviations in the appropriateness-evaluation of behavior are perceived as deviations from those social norms, which can ultimately lead to social exclusion within a closed community. Answer to the queries (1) to (3) in accordance with the following assumptions and hypotheses about appropriateness-evaluation of interpersonal behaviors under social conflicts. <50 points>

■ Premises

- Criteria for evaluating the appropriateness of interpersonal behavior
  - Whether it is a rational choice of action aiming at a social state that improves the benefits of all members of society.
- Social conflict structures
  - Exchanging conflict: A behavior that results in a benefit (loss) for oneself causes a loss (benefit) for the other.
  - Coordination conflict: Someone must lose relatively in order to make a decision to improve the benefits of all members of society.
- Social relationships
  - Irreplaceability: Degree of social mobility.
  - Hierarchical roles: Existence of distinct roles that should accept the hierarchical disparity in benefits.

■ Hypotheses

- The conflict resolution strategies that people evaluate as appropriate are distinguished based on two perspectives: social conflict structure and social relationship.
- Under exchanging conflict situations, altruistic behavior in a society with low social mobility, whereas reciprocal behavior in a society with high social mobility.
  - Under coordination conflict situations, submissive behavior toward superiors, whereas behavior based on logic and correctness toward others without clear hierarchical roles.

- (1) Select and circle three options that are logically consistent with the hypothesis above.
- A. The roles of authority and submissiveness are efficient within the scope of the roles' efficacy, in that they obviate the need for debate about behavioral choices.
  - B. Unconditional cooperation is an adaptive strategy for the member of closed community, where the probability of survival outside the community is low and social relationships are highly irreplaceable.
  - C. Under exchanging conflict situations, a strategy that aims at maximizing individual benefit is effective in order to maximize the benefit of all members of a society.
  - D. A strategy to avoid conflicts by accepting external norms (e.g. logicity) is effective only where social roles are clear between the parties involved.
  - E. In a society with high mobility, the strategy of cooperating as long as the counterparts cooperate is adaptive, which enables to initiate an immediate relationship with resource holders.

- (2) Based on the hypothesis above, name a concrete example of interpersonal behavior that would be evaluated as appropriate by people with the assumed conflict situation, and indicate the reason for it.

Assumed conflict situation and interpersonal behavior: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Reason: \_\_\_\_\_

- (3) Give possible reasons why people might not evaluate the behavior (2) as appropriate even if the hypothesis is valid.
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

2025 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 – 10 >

Answer the names of the five urban environmental installation classification systems listed below and explain any design and installation considerations using the words specified. <10 points x 5 questions = 50 points>

1. dust-box

Classification system name:

Explanation of design and installation considerations.

【specified words】 Timing of refuse collection, sorting, garbage disposal point, damage from crows, etc.

2. kiosk

Classification system name:

Explanation of design and installation considerations.

【specified words】 Temporary and permanent installations, traction, food and beverage, energy equipment

3. Tourist information signs

Classification system name:

Explanation of design and installation considerations.

【specified words】 Digital signage, guide signs, placement, maintenance

4. bus stop

Classification system name:

Explanation of design and installation considerations.

【specified words】 Maintenance, advertising revenue, route maps, adjacent street furniture

5. bench

Classification system name:

Explanation of design and installation considerations.

【specified words】 Single-seat, row-seat, unit, material



2025 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

( Page 15 of 16 )

-----

< Elective Question – 11 >

Elaborate and explain the design dimensions for chairs in the waiting area of a general hospital based on human body anthropometry of the people visiting the hospital. (at least 300 words) <50 points>



2025 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

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< Elective Question – 12 >

What is circadian rhythm and what are the consequences of disrupting it? Explain what we need to be careful of in our daily lives to prevent disruptions to our circadian rhythm. (at least 300 words) <50 points>

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