

# 2026 Master's Program, Graduate School of Design (General Entrance Examination) Achievement Test

## Question and Answer Sheets

Examination Subject Landscape architecture
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Examinee's number
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### Question 1 (Compulsory)

Describe each of the following 20 keywords related to environmental design. (5 points × 20 questions)

- (1) Short-term load : The design load consisting of the long-term load (such as dead and live loads) that acts continuously, combined with one of the following variable actions: snow load, wind pressure, or seismic force. It is used for allowable stress design. The snow load, wind pressure, and seismic force are assumed to represent a heavy snowfall, strong wind, or moderate earthquake that is likely to occur at least once during the building's service life (typically 50 years).
- (2) *Zenshuyo* Style : An architectural style established in medieval Japan under the influence of Chinese architecture. Characteristic features include securing pillars with nuki, techniques such as intermediate bracket complexes and ougi-daruki (fan rafters), and the use of components like taiheizuka (bottle-shaped strut), ebi-koryo (s-shaped tie beam), and soban (footing stone). Representative examples include the Shari-den Hall at Engaku-ji Temple. It was also widely used in architecture other than Zen temples.
- (3) Garden city : Ebenezer Howard (UK) authored "Garden Cities of Tomorrow" in 1898, the Garden City concept he proposed there became one of the most influential urban planning philosophies of the 20th century. As a response to the overcrowding of large cities, the idea of building "Garden Cities" that combined the strengths of both urban and rural areas had a significant impact on urban policies worldwide, leading to the construction of suburban housing areas and new towns around major cities.
- (4) Cross rib vault : A type of ceiling generalized in Gothic architecture. Its basic form is a cross vault created by intersecting two pairs of semi-cylindrical (tunnel) vaults at right angles, reinforced along its ridgeline with linear members called ribs. Because the load concentrates on the four corner pillars supporting the ribs, large openings can be created in the walls between the pillars.
- (5) Territory : Unlike "personal space", "territory" refers to a non-moving area that belongs to the environment in which someone has certain rights. A territory does not disappear even when its owner is not present, and is often marked by the placement of possessions.
- (6) Asbestos : Asbestos is a fibrous mineral formed through the alteration of serpentine and amphibole rocks. It possesses excellent heat, chemical, and wear resistance. Because of its high tensile strength and low cost, it was widely used as a spray-on material for fireproofing, thermal insulation, and sound absorption. However, since inhalation into the lungs causes severe health hazards, its import, manufacture, and use are currently prohibited.
- (7) Landscape Act in Japan : The Landscape Act is a law enacted in 2004 (Heisei 16) that establishes a system to promote the good landscapes in cities, agricultural areas, mountain villages, and fishing villages. This law enables the formulation of landscape plans, the designation of landscape districts, and regulations on the form and color of buildings. Local governments can enact ordinances and give legal effect to residents' agreements, thereby aiming to form a beautiful national land that harmonizes with the region's nature, culture, and history.
- (8) Plane (tool) : A type of woodworking tool used to shave thin layers from the surface of wood to achieve a smooth

finish. In Japan, yari-ganna, a tool with a spear-like blade used to shave surfaces, was used in ancient times, while the dai-ganna, which fixes the blade to a base, appeared around the 16th century. While most planes worldwide are pushed to shave, Japanese planes are pulled.

- (9) Law for the Protection of Cultural Properties (Japan) : The Law for the Protection of Cultural Properties was enacted in 1950. It was newly established through the integration of three earlier laws: the Historic Sites, Places of Scenic Beauty, and Natural Monuments Preservation Law of 1919, the National Treasures Preservation Law of 1929, and the Law Concerning the Preservation of Important Works of Fine Arts of 1933. Under the current law, the following categories of cultural properties are defined: tangible cultural properties, intangible cultural properties, folk cultural properties, treasure trove (buried cultural properties), monuments, cultural landscapes, groups of traditional buildings preservation districts, and techniques for the conservation of cultural properties. Based on this law, important cultural properties may be designated or selected. The law also provides for the establishment of local councils for the protection of cultural properties.
- (10) Marine pollutant : Substances that are released into the ocean primarily as a result of human activity and cause pollution. These cause the problems that include the mass death of farmed fish due to eutrophication, the impact on ecosystems of crude oil spills due to tanker accidents, damage caused by the accumulation of toxic chemicals in living organisms, and, more recently, the adverse effects of trace amounts of plastic.
- (11) Urban park : Urban parks are public green spaces, including park facilities such as pathways, plazas, playground equipment, and sports facilities, that are established and managed by local governments or the national government within city planning areas based on the Urban Park Act. These facilities serve diverse purposes, including providing citizens with places for relaxation, recreation, disaster prevention, and environmental conservation. There are also various types such as historical parks and athletic parks, and technical standards for their establishment and management are stipulated by government ordinances and local ordinances.
- (12) Crowd : In architectural planning, a crowd refers to a condition in which a large number of people simultaneously occupy a space at a specific time or under particular circumstances, exhibiting patterns of movement, stay, and collective behavior. It is analyzed through indicators such as crowd density (degree of concentration) and crowd flow (speed, volume, and effective width of movement paths), and constitutes a fundamental concept in evaluating spatial safety, comfort, and evacuation planning.
- (13) Conservation of *satoyama* : In its narrow sense, satoyama refers to secondary forests, mixed woodlands, and agricultural forests created by thinning and cutting natural forests and growing coppiced or planted trees to form mature forests. These areas have traditionally been used as sites for producing firewood, charcoal, green manure, shiitake mushrooms, and other products. In its broad sense, the term can also include coniferous plantations, residential lots, and farmland, referring to the entire system where material circulation takes place. Satoyama is a concept that involves achieving harmony with the natural environment through people's lifestyles and maintenance practices, conserving biodiversity, and preserving local culture in a sustainable manner.
- (14) Brutalism : An architectural movement that spread internationally from the 1950s to the 1970s, characterized by the “raw” expression of materials and construction methods, particularly exposed concrete. It originated in the concept of “New Brutalism” proposed by Peter and Alison Smithson and was later theorized by the architectural historian Reyner Banham.
- (15) Habitat 67 : The residential complex designed by Moshe Safdie for the Montreal World Expo. Employing an industrialised construction method involving factory-produced precast reinforced concrete units. By combining and stacking these units, it overcame the weakness of industrialisation to achieve innovative

architecture featuring diverse, independent dwellings with terraces.

- (16) La Ville Radieuse : Le Corbusier's ideal urban model proposed in the 1930s. The city was divided into four functions: "residence," "work," "leisure," and "transportation." Emphasis was placed on creating a comfortable environment through high-rise construction and surrounding greenery, along with separating pedestrians and vehicles and improving traffic efficiency. Designed using the Modulor, a human-scale standard, it aimed to solve the challenges of modern cities. This concept significantly influenced urban planning worldwide, with the Unité d'Habitation serving as a representative example of its implementation.
- (17) Art nouveau : Around 1900, An artistic style that flourished primarily in European cities such as Brussels and Paris. Characterized by organic forms modeled after nature, particularly plants, rather than historical styles. The architecture uses extensively decorative elements made from cast iron and glass. Representative architects include Victor Horta, Hector Guimard, and Antoni Gaudí.
- (18) Other effective area-based conservation measures (OECM) : One of the targets adopted at the COP10 to the CBD in 2010. A means to achieve the conservation targets of 17% of terrestrial areas and 10% of marine areas. Areas outside current protected areas where ecosystem functions and services are maintained and managed over the long term. The Ministry of the Environment certifies these as Nationally Certified Sustainably Managed Natural Sites.
- (19) Heat pump : A heat transfer device that utilizes a refrigerant cycle to transport heat from a low-temperature source to a high-temperature destination. It consists of a compressor, condenser, expansion valve, and evaporator. The refrigerant vapor condenses in the condenser, releasing heat, while the refrigerant liquid evaporates in the evaporator, absorbing heat. By switching the refrigerant circuit, this system can be used for both cooling and heating applications.
- (20) Carbon negative : Carbon negative refers to a state in which the amount of greenhouse gases (CO<sub>2</sub>, water vapor, etc.) absorbed by forests, oceans, etc. is greater than the amount emitted into the atmosphere through economic activity. In order to prevent global warming, which is a cause of abnormal weather, the development of technology to capture and fix CO<sub>2</sub> in the atmosphere and remove it is expected.

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- \* Choose and answer two questions from Question 2 to Question 4. If you answer more than three questions, your answer will not be marked.
- \* When answering the questions, use a separate answer sheet for each question. Each answer should be on a single sheet. The first question of your choice must be answered on the third sheet of paper and the second question on the fourth sheet of paper.

## Question 2: Questions on Conservation of the Natural Environment (Elective)

Please answer the following three questions on the knowledge and ideas regarding the conservation of the natural environment.

1. Regarding Japan's vegetation: Please explain the succession process of laurel forests (evergreen broad-leaved forests), indicating representative tree species names

"The succession of laurel forests (evergreen broad-leaved forests) progresses through the following stages from bare ground to a stable climax forest.

Pioneer stage (bare ground to herbaceous community): On bare ground or disturbed sites, grasses such as *Miscanthus sinensis* and *Imperata cylindrica* first invade, forming grasslands dominated by annual and perennial herbaceous plants.

Shrub stage: Following the herbaceous community, sun-loving shrubs such as *Rhus succedanea*, *Mallotus japonicus*, and *Zanthoxylum ailanthoides* invade and develop into a shrub forest. These are pioneer tree species that grow rapidly and prefer sunny environments.

Sun tree stage (secondary forest): Subsequently, a bright sun tree forest is formed consisting of deciduous broad-leaved trees such as *Quercus acutissima* and *Quercus serrata*, and coniferous trees such as *Pinus densiflora*. However, since these species require strong light, if the shrub forest transitions to a sun tree forest at an early stage, these species will not grow and the succession will move to the intermediate stage described below.

Intermediate stage (transitional forest): In the understory of the sun tree forest, shade-tolerant evergreen broad-leaved tree seedlings gradually begin to grow. Species such as *Machilus thunbergii*, *Neolitsea sericea*, *Camellia japonica*, and *Eurya japonica* invade the forest floor and gradually come to occupy the interior of the forest.

Climax stage (laurel forest): Finally, a stable laurel forest dominated by evergreen broad-leaved trees such as *Castanopsis cuspidata* (Sudajii), *Quercus glauca*, *Quercus myrsinifolia*, *Machilus thunbergii*, and *Camellia japonica* is established. At this stage, the forest floor is dark and only shade-tolerant laurel tree seedlings can grow, resulting in a climax state where the same tree species composition is maintained."

2. UN Secretary-General Guterres stated at a press conference on July 27, 2023, that the era of global warming has ended and the era of global boiling has arrived. What phenomena are occurring due to this climate change, and what countermeasures are needed? Choose one topic and discuss your thoughts on the matter.

"Topic: Intensification of Urban Heat Island Phenomena and Cool Island Strategies through Green Spaces

In the era of global boiling, urban areas are experiencing the compounding effects of climate change and the heat island phenomenon, resulting in the intensification of extreme heat. From a landscape perspective, I believe the following measures are necessary to address this issue.

In urban areas, the heat island phenomenon occurs due to increased artificial surface coverage, reduction of green spaces, and anthropogenic heat emissions, causing temperatures to be 2-3°C or more higher than surrounding regions. Combined with global warming, the number of days when maximum summer temperatures exceed 40°C is increasing, creating a vicious cycle of rising heat-related deaths, declining labor productivity, and increased energy consumption.

As necessary countermeasures, first, the construction of green networks in cities is essential. By strategically arranging parks, street trees, rooftop greening, and wall greening, and securing wind corridors, it is necessary to suppress temperature rises across the entire city. In particular, tree canopies from tall trees have the effect of reducing ambient temperatures by 2-4°C through solar radiation shielding and transpiration. Second, existing paving materials should be converted to water-retentive pavements, allowing rainwater to infiltrate into the ground to utilize the cooling effect of latent heat of evaporation. Third, at the urban planning level, it is important to review building placement and height restrictions to secure 'wind corridors' that allow sea breezes and cool air from rivers to reach the interior of cities."

3. Hilly and mountainous areas face disadvantageous conditions in terms of industrial infrastructure and living environment compared to flat areas, leading to problems such as depopulation, aging populations, and declining community functions. Regarding this fundamental issue, select one recent government support measure and discuss your thoughts on the matter.

"I will focus on the 'Direct Payment System for Hilly and Mountainous Areas' by the Ministry of Agriculture, Forestry and Fisheries, and discuss its significance and future development.

This system was initiated in 2000 and provides direct payments to farmers and others who continue agricultural production activities in hilly and mountainous areas to compensate for the disparity in production conditions compared to flatland areas. The greatest significance of this system lies not in mere income compensation, but in maintaining the multifunctional roles of farmland (flood prevention, water source conservation, landscape preservation, etc.) through collective activities under 'community agreements.'

This system has achieved certain results in preventing farmland abandonment. A particularly noteworthy point is that through the conclusion of community agreements, farmland management at the community level rather than individual level has been promoted, enabling farmland preservation through collaborative work even amid advancing population aging.

However, this system also has challenges. First, the number of areas where maintaining community agreements themselves has become difficult due to aging is increasing. Second, in many cases, the subsidies remain limited to maintaining the status quo and do not lead to proactive agriculture or the creation of new industries.

The challenges of hilly and mountainous areas are not only economic disadvantages but also the fundamental issue of community sustainability. While the Direct Payment System for Hilly and Mountainous Areas serves as an important foundation for maintaining community cohesion, a 'landscape management' perspective that comprehensively promotes landscape preservation, industry creation, and exchange promotion based on this foundation is essential. The beautifully maintained landscapes of hilly and mountainous areas should be re-evaluated not merely as sites of agricultural production, but as places for national land conservation, cultural inheritance, and new value creation."

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Question 3: Questions on Landscape Ecology & Urban Environmental Design (Elective)

Please answer the following three questions on the knowledge and ideas regarding landscape ecology & urban environmental design.

1. The City Planning Act was enacted in 1968. This law establishes plans related to land use, urban facility development, and urban development projects. Describe an overview of city planning areas(都市計画区域), area divisions(区域区分), and districts and zones(地域地区).

"An urbanization promotion area is a zone designated by prefectures as an area that needs to be comprehensively developed and conserved as an integrated city. In principle, it includes the central urban areas of cities or towns and villages with populations and numbers of workers above certain levels, and is designated taking into consideration natural and social conditions as well as the current status and trends of population, land use, traffic volume, etc. Quasi-urbanization promotion areas can be designated outside urbanization promotion areas. Within urbanization promotion areas, urban plans for districts and zones such as use districts and urban facilities (roads, parks, etc.) are established.

Area division is a system that divides urbanization promotion areas into 'urbanization areas' and 'urbanization control areas.' Urbanization areas are areas that have already formed urban districts and areas that should be preferentially and systematically urbanized within approximately 10 years. Urbanization control areas are areas where urbanization should be suppressed; in principle, development activities are restricted to prevent disorderly urban sprawl.

Districts and zones is a general term for districts established to regulate and guide land use, building uses, forms, etc. within urbanization promotion areas. The primary ones include, first, use districts, which are the most basic districts and zones that define land use in urban areas such as residential, commercial, and industrial, with 13 types established. In each use district, the types of buildings that can be constructed, building coverage ratio, floor area ratio, height restrictions, etc. are specified. Others include height districts, landscape districts, scenic districts, fire prevention districts, and green space conservation districts."

2. Explain the overview of Japan's comprehensive design system (総合設計制度), and discuss the building name, planning, and characteristics of an implementation example that you are familiar with.

"The comprehensive design system is a system that relaxes restrictions under the Building Standards Act, such as floor area ratio and height restrictions, for building plans that are recognized as contributing to the improvement of the urban environment by providing public open spaces such as plazas and open areas on sites of a certain size or larger.

Roppongi Hills Mori Tower is a large-scale redevelopment project that comprehensively integrates residential complexes, commercial facilities, cultural facilities, hotels, movie theaters, and other uses. While the standard floor area ratio is 400%, it actually achieves a floor area ratio of approximately 730%. For public open spaces, approximately 40% of the site area has been developed, including the restoration of the Edo-period Mouri Garden, the creation of the green and pedestrian-friendly Roppongi Keyakizaka Street, the securing of plaza space called 66 Plaza, and the development of a rooftop garden.

In addition to creating landscapes that inherit historical character, the features include three-dimensional arrangement of pedestrian circulation and gathering spaces, creation of seasonal streetscapes, and securing spaces for relaxation for workers and tourists as well as event venues."

3. The expansion of bamboo forests is a landscape issue in western Japan. Explain an overview of the characteristics of bamboo forests, the mechanisms of their expansion, and the social issues involved. Also, discuss countermeasures for this problem.

"Bamboo forests are characterized by representative species such as Moso bamboo (*Phyllostachys edulis*), Madake bamboo (*Phyllostachys bambusoides*), and Hachiku bamboo (*Phyllostachys nigra var. henonis*), which propagate through underground rhizomes and possess vigorous growth capacity.

Bamboo was once widely used and appropriately managed for edible bamboo shoots, building materials, agricultural tools, hedges, baskets, and other daily necessities. However, following the period of high economic growth, the economic value of bamboo forests declined due to the spread of plastic products, increased imports of inexpensive bamboo shoots, and depopulation and aging in rural and mountainous villages, leading to abandonment of management. Unmanaged bamboo forests expand into surrounding areas. In particular, it is said that they invade adjacent satoyama forests and abandoned farmland, expanding their distribution range at a rate of several meters per year.

This expansion causes problems including loss of biodiversity, homogenization of landscapes, increased risk of sediment disasters, breeding grounds for wildlife damage, and impacts on adjacent land.

Countermeasures to these problems include preventive measures such as burying barrier sheets, suppression measures such as actively harvesting bamboo shoots, and creating a new circular bamboo economy by generating economic incentives through utilization such as biomass power generation, bamboo chips, bamboo charcoal, and bamboo lanterns."

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Question 4: Questions on Landscape planning and design (Elective)

Please explain the following three questions about landscape planning and management.

1. Give an example of walkable district or street that you know, and explain why they are so appealing. Explain from two or more of the following perspectives: spatial structure, materials/ elements, circulation, landscape, natural environment, building types/ use, and user groups.

Tenjin's walkability stems from its diverse urban fabric. While Kokutai-doro is a key corridor, the true appeal lies in its surrounding mix: large department stores, mid-sized boutiques, bustling multi-tenant buildings, and hidden gems tucked away in narrow traditional alleys. Looking specifically at Kokutai-doro's western stretch toward Ohori Park, mature street trees provide lush shade in summer and vibrant colors in autumn, inviting people to walk. By strengthening this green continuity as an ecological and social link, we can further enhance Tenjin's value as a vibrant, pedestrian-friendly urban center.

2. Nature has a variety of benefits, including disaster mitigation, temperature adjustment, biodiversity, health promotion, and recreational opportunities. Select one or more of these benefits and explain how nature bring benefits to the urban environment.

Integrating greenery and waterfronts into cities yields significant urban benefits:

- Flood Mitigation: Permeable surfaces allow rainwater to soak into the ground, reducing runoff during heavy storms.
- Fire Prevention: Green buffers act as natural firebreaks to slow the spread of urban fires.
- Climate Control: Transpiration and shading from trees mitigate the heat island effect.
- Enhanced Comfort: Abundant shade makes walking pleasant even in the summer heat.
- Human-Scale Vitality: A blend of nature and architecture creates a diverse, human-scale environment that encourages exploration and enlivens the city.

3. Explain the overview of Japan's Park-PFI (Park-Private Finance Initiative) system. Discuss an implementation example of Park-PFI including the name, plan and characteristics of the example.

Park-PFI is a system where private operators manage park facilities, like cafes, to fund the park's construction and maintenance. This model enhances park quality while reducing the public financial burden.

Minami-Ikebukuro Park is an example. It features a sprawling lawn framed by mature trees and native flora- a high-quality, well-maintained landscape made possible by Park-PFI funding. This inviting space attracts a diverse crowd, from families at the playground to couples and cafe-goers, making it a cornerstone of local community life.