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2026年度（第2次）

大学院（博士後期）入試

問題

（該当する方に○印をお願いします。）

答案

（科目名 英語）

（注）辞書は持ち込み可（電子辞書等は不可）

電気・材料工学 専攻

番

氏名

問1 下記の文章はScience 338, 643 (2012) から抜粋したものである。問に答えよ。

この部分につきましては、
著作権の都合により公開いたしません。

(1) 次の質問に日本語で答えなさい。

- The authors mention "tightly bound excitons" as a source of energy loss.
Explain what an exciton is and why separating it efficiently is important in solar cell operation.
- What is the meaning of "solution-processable solar cell"?
Briefly describe why such a property is advantageous for device fabrication.
- According to the passage, what is the measured power conversion efficiency and open-circuit voltage (V_{oc}) of the reported perovskite solar cell?
- Why did the researchers replace the mesoporous TiO_2 layer with Al_2O_3 ?
What was the effect of this replacement on the device performance?

(2) 次の用語を日本語で簡潔に説明せよ（各20～30字程度）。

- (a) Band gap (b) Open-circuit voltage (V_{oc}) (c) X-ray diffraction (XRD)

(3) 上記の文章をもとにして、 $CH_3NH_3PbI_3$ の結晶構造を図示せよ。

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答案

（科目名 英語）
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電気・材料工学 専攻	番	氏名
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問2 近年、半導体デバイスにおいて、Gate-All-Around (GAA) transistorsの実用化が進んでいる。このGAA transistorsについて英語100単語前後で説明せよ。

2026年度（第2次）

大学院（博士後期）入試

問題

（該当する方に○印をお願いします。）

答案

（科目名 英語）

生産・建設工学専攻	番	氏名
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※問題1に関しては、1-1および1-2に解答すること

※問題2に関しては、2-1もしくは2-2、いずれかを選択し解答すること

1. **Directions:** Read the following passage carefully. After reading, choose the best answer for each question based on the information provided in the text. Answer all questions by selecting the letters (A), (B), (C), or (D) that answer the question. (Must-answer questions)

1-1 Automation Brings Efficiency and New Challenges

The company recently completed the first major phase of its digital transformation project, which focuses on automating several areas of daily operation. The initiative began a little over a year ago, when management recognized the need to modernize outdated systems that relied heavily on manual work. Many of these processes, including data entry, order processing, and inventory management, were time-consuming and prone to human error. Leaders hoped that by implementing automation, they could improve productivity, reduce delays, and create a more consistent workflow across departments.

The project started with a six-month assessment of existing systems. During this period, a task force of engineers, IT specialists, and operational managers analyzed how different departments used technology. They discovered that while some units had already adopted digital tools, others were still using spreadsheets or even paper-based tracking. The inconsistency made collaboration difficult and created barriers to information sharing. The report from this initial stage concluded that automation would bring significant benefits if applied company-wide, but also warned that employee training and support would be critical to success.

In the second phase, the company introduced a centralized automation system that connected departments through a shared database. This allowed order information, shipment updates, and inventory levels to be monitored in real time. Employees who previously spent hours verifying records could now access accurate data instantly. As a result, productivity in logistics and customer service increased by more than 25 percent within the first few months. Customers also began to notice faster response times and fewer delivery errors.

However, the transition was not entirely smooth. Some employees initially resisted the change, worried that automation might make their roles unnecessary. The management addressed these concerns by emphasizing that technology was meant to support people, not replace them. They introduced training sessions designed to help employees develop digital literacy and learn how to use the new tools efficiently. Managers reported that, after a few weeks, most team members became more comfortable with the system and started suggesting ways to improve it further.

Despite these improvements, several technical issues emerged during the rollout. In particular, older company databases were not fully compatible with the new platform, causing temporary delays in data synchronization. The IT Department worked overtime to create patches that resolved these problems. A dedicated helpdesk was also established to respond to employee inquiries and provide immediate assistance when needed. According to internal surveys, user satisfaction with the new system has now reached over 80 percent.

One of the unexpected benefits of automation has been the improvement of data accuracy. Because information is now updated automatically, the number of duplicate or missing entries has dropped dramatically. This has helped management make better business decisions based on real-time insights. For example, the purchasing team can now identify which products are selling quickly and restock them before shortages occur.

Looking ahead, the company plans to move into the next stage of its digital transformation: integrating artificial intelligence tools to analyze trends and predict customer demand. These AI modules will help the company optimize resource allocation and anticipate inventory needs before problems arise. The leadership team believes that combining automation with AI will create a truly intelligent system that adapts to changes in the market.

At the same time, management is aware that technology alone cannot guarantee long-term success. The CEO emphasized in a recent internal message that the company's strength lies in its people—their creativity, flexibility, and willingness to learn. Continuous training programs are being developed to ensure that employees remain confident and capable in an increasingly digital workplace. The report concludes that, while the automation project has presented challenges, it has already delivered measurable results in productivity, accuracy, and customer satisfaction. The experience has also provided valuable lessons about communication, adaptation, and the importance of human involvement in technological change. As the company prepares for the next phase, it views automation not as a destination, but as a foundation for ongoing innovation and growth.

Questions

1) What was the main purpose of the digital transformation project?

- (A) To reduce the number of employees
- (B) To automate and modernize outdated processes
- (C) To expand into international markets
- (D) To replace the IT Department

2) What problem was identified during the initial assessment?

- (A) High employee turnover
- (B) Inconsistent technology use across departments
- (C) Poor communication with customers

- (D) Excessive marketing costs
- 3) How did employees initially react to automation?
- (A) They were excited immediately.
 - (B) They resisted due to job security concerns.
 - (C) They ignored the new tools.
 - (D) They volunteered to redesign the system.
- 4) What improvement resulted from automation?
- (A) Increased data accuracy and faster access
 - (B) Reduced product quality
 - (C) Lower employee satisfaction
 - (D) Fewer training sessions
- 5) What will the next phase of the project involve?
- (A) Hiring new managers
 - (B) Integrating artificial intelligence tools
 - (C) Expanding physical warehouses
 - (D) Outsourcing logistics services

1-2 Performance-Based Evaluation Encourages Employee Growth

The Human Resources Division recently completed a detailed review of the company's new performance-based evaluation program, which was introduced last year to create a stronger link between individual performance and compensation. Before this change, many employees had expressed frustration that promotions and bonuses did not clearly reflect their actual contributions. Management hoped that the new system would improve motivation, transparency, and fairness across departments.

The program operates on a simple principle: measurable results should be the primary basis for evaluation. To achieve this, the HR Division worked with department heads to establish specific performance indicators, such as project completion rates, quality scores, and client feedback ratings. These indicators are recorded quarterly and reviewed during semiannual meetings.

In the past, annual evaluations were largely subjective, relying heavily on managers' personal impressions. The new system, however, provides both quantitative and qualitative assessments. For instance, an employee who completes projects on time and receives positive client reviews is rated more highly than someone who consistently misses deadlines. Managers also conduct structured interviews to discuss progress and set clear goals for the next term.

According to a company-wide survey, 76 percent of employees feel that the new system is fairer and more transparent than the previous one. Many said they now have a clearer understanding of what is expected of them. This sense of clarity has led to improved focus and engagement. "It's easier to stay motivated when you know how success is measured," one participant commented in the report.

Despite the positive feedback, several challenges have also emerged. Some employees feel pressured to meet high targets, leading to increased stress and competition within teams. Others worry that focusing too much on measurable results might discourage creativity. To address these issues, the HR Division has introduced training sessions for managers on how to balance quantitative goals with supportive leadership. These sessions emphasize recognizing effort as well as achievement.

In addition, managers are now required to hold one-on-one meetings with each employee every quarter. These meetings allow staff members to discuss not only their progress but also their career development plans. Many employees have appreciated this opportunity to receive regular feedback and guidance. As a result, overall communication between supervisors and team members has improved significantly.

The HR Division is also developing an online evaluation platform to streamline the process. The system will automatically track performance indicators and compile reports, reducing administrative workload for managers. It will also allow employees to record their accomplishments throughout the year, ensuring that achievements are not overlooked at review time.

The report concludes that the performance-based evaluation program has already produced visible results. Productivity in most departments has increased by nearly 20 percent, and voluntary turnover has declined. However, HR leaders acknowledge that a balance must be maintained between accountability and well-being. The next phase of the project will integrate career development programs, providing high-performing employees with opportunities such as leadership workshops, mentoring sessions, and cross-department projects.

Ultimately, the company aims to build a culture where effort and growth are recognized as much as results. As the HR Director wrote in the final summary, "Performance should be a path toward development, not pressure. When people feel supported, they achieve more than numbers can show."

Questions

- 1) What was the main goal of introducing the new HR program?
- (A) To reduce labor costs
 - (B) To link employee performance with compensation
 - (C) To simplify administrative procedures
 - (D) To hire more managers
- 2) How does the new evaluation system differ from the previous one?
- (A) It is based on measurable indicators.
 - (B) It relies more on personal impressions.
 - (C) It eliminates supervisor feedback.
 - (D) It focuses only on teamwork.
- 3) What concern did some employees express?
- (A) Lack of communication with managers
 - (B) Excessive stress due to high performance targets
 - (C) Unclear promotion opportunities
 - (D) Decrease in teamwork quality

4) What improvement has been reported since the program began?

- (A) Fewer one-on-one meetings
- (B) Improved communication between managers and staff
- (C) Higher employee turnover
- (D) Reduced employee training

5) What is planned for the next phase of the program?

- (A) Expanding international operations
- (B) Adding career development opportunities
- (C) Replacing online evaluations with paper forms
- (D) Limiting bonuses to managers only

2. English in Civil Engineering

2-1 Geotechnical Engineering (Multiple-choice questions)

Directions: Read the following passage carefully. It discusses recent advances in pile foundation design and performance.

After reading, answer the five questions that follow. Your answers should demonstrate a clear understanding of the technical content, logical reasoning, and use of appropriate academic English. Write your answers concisely but precisely in sentences within 100 words.

Advances in Pile Foundation Design and Performance

Pile foundations are widely used to transfer structural loads to deeper, more competent soil or rock layers when surface soils are weak or highly compressible. The design of piles involves understanding complex interactions between the pile, surrounding soil, and the superstructure. Both axial and lateral load-bearing capacities, as well as settlement behavior, must be carefully evaluated to ensure long-term performance and safety.

Traditional pile design often relies on empirical correlations or simplified analytical models based on standard penetration tests (SPT) or cone penetration tests (CPT). While these approaches provide practical guidance, they may not accurately capture site-specific soil variability, pile-soil interaction, or time-dependent effects such as consolidation and creep. In recent years, numerical modeling using finite element methods (FEM) and advanced constitutive models has become increasingly important for predicting pile behavior under complex loading conditions.

Load transfer in piles is governed by shaft friction along the pile surface and end-bearing resistance at the pile tip. In cohesive soils, shaft friction develops gradually with pile penetration and is influenced by consolidation state, soil plasticity, and installation method. In granular soils, skin friction depends on relative density, confining stress, and pile roughness. Negative skin friction, induced by soil settlement relative to the pile, can impose additional loads and must be accounted for in design. End-bearing capacity is largely controlled by the strength of the underlying layer, pile cross-section, and tip shape. For large-diameter or bored piles, group effects and interaction with neighboring piles may reduce ultimate capacity, requiring careful layout and spacing consideration.

Lateral load performance is critical for structures subjected to wind, seismic, or wave forces. Lateral resistance depends on soil stiffness, pile flexibility, embedment depth, and pile spacing. Nonlinear p-y curves are commonly used to model lateral soil-pile interaction, allowing engineers to predict bending moments, deflections, and stresses under service and ultimate loads. Advanced 3D numerical analyses can simulate the combined effects of axial and lateral loads, including pile group behavior and dynamic response during earthquakes.

Installation methods, such as driven, bored, or screw piles, significantly influence pile performance. Driven piles generate soil densification and increased lateral stresses, enhancing shaft friction, while bored piles may induce soil disturbance or require temporary casing or drilling fluids. Vibratory effects, noise, and environmental constraints must also be considered, particularly in urban settings. Additionally, durability concerns such as corrosion, chemical attack, or frost heave can affect long-term pile integrity, requiring material selection and protective measures.

Recent research focuses on hybrid and sustainable pile systems, such as combining high-strength concrete with geosynthetics, using recycled or low-carbon materials, or employing energy-efficient installation techniques. Monitoring of pile performance using embedded sensors, strain gauges, and load tests provides valuable feedback for design validation and structural health assessment. Integration of machine learning and data-driven approaches is emerging, allowing predictive modeling based on historical performance, site conditions, and environmental factors.

In conclusion, advances in pile foundation design emphasize a holistic approach that combines soil mechanics, structural behavior, numerical modeling, and sustainability considerations. Accurate assessment of axial and lateral capacities, installation effects, and long-term performance ensures safe and efficient deep foundation systems. Ongoing innovation in materials, monitoring, and predictive modeling is expected to enhance pile performance and reduce environmental impacts, supporting resilient infrastructure development.

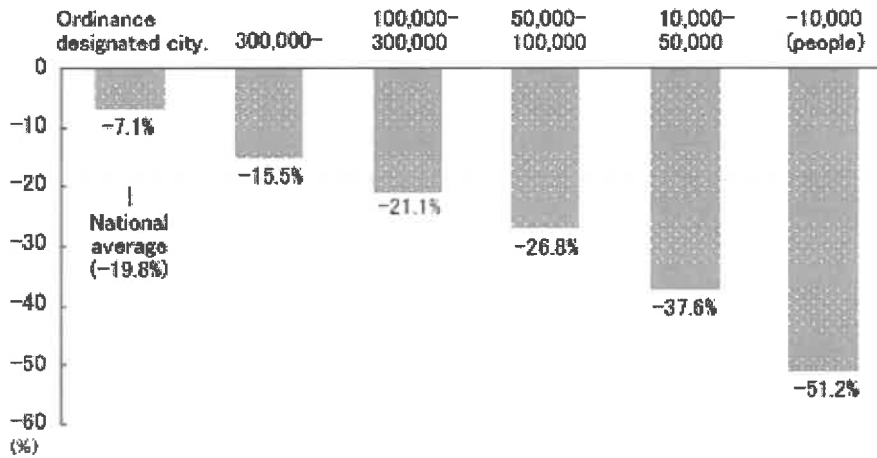
Questions

- 1) What are the primary functions of pile foundations?
- 2) How did traditional pile design typically estimate capacity?
- 3) Name two numerical approaches used for advanced pile design.
- 4) What factors affect shaft friction in cohesive versus granular soils?
- 5) What determines lateral load resistance of piles?

2-2 Planning Science (Multiple-choice questions)

出典：Summary of the White Paper on Land, infrastructure, Transport and Tourism in Japan, 2023

問2-2-1 図 (Fig. 2-2-1) および説明文を読んで、以下の問題に答えよ



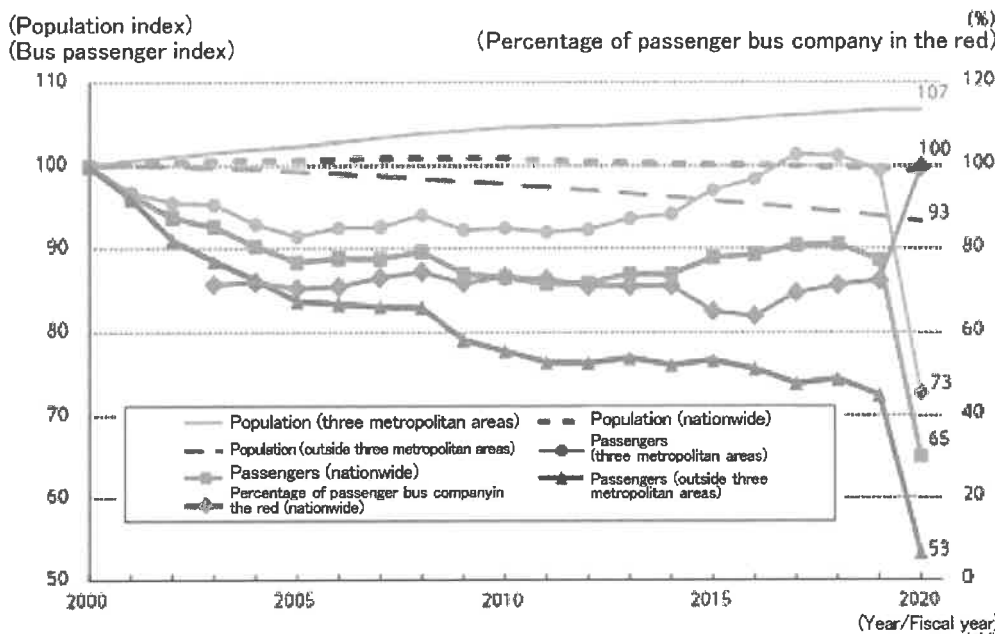
Source: Future population projections by regional mesh (2018 estimates) released by MLIT

Fig. 2-2-1 Estimated rates of population decline in cities, wards, towns, and villages in 2050 by population size (説明文)

- Cities, wards, towns, and villages with smaller populations tend to have higher rates of population decline.
- Cities, wards, towns, and villages with populations of 100,000 or more and less than 300,000 are expected to see their populations decline by about 20%.
- Population declines, which occurred in small cities in the past, are also expected to extend to medium-sized cities in local areas that play a central role in daily lives. There are concerns that functions to provide life-support services may decline and disappear.

- (1) 下線部を訳せ
- (2) この図および説明文で示されている社会問題はどのようなものか、150~200字程度で簡潔にまとめて、和文で述べよ。
- (3) 上記 (2) に対応するための社会基盤整備のあり方について、自分の考えを150~200字程度にまとめて、和文で述べよ。

問2-2-2 図 (Fig. 2-2-2) および説明文を読んで、以下の問題に答えよ。



Source: Created by MLIT based on Population Estimates released by the Ministry of Internal Affairs and Communications and on Annual Report of Automobile Transport released by MLIT

Fig. 2-2-2 Changes in the number of passengers and income and expenditure situation of passenger bus company (説明文)

- The number of passengers in the three metropolitan areas fluctuated until FY2019 compared with FY2000. The number declined by nearly 30% in FY2020 because of the COVID-19 pandemic.
- The number of passengers outside the three metropolitan areas began to fall in FY2000 along with a population decline in local areas. The number declined by nearly 30% in FY2019. In FY2020, it declined by about 50% partly because of the COVID-19 pandemic.
- As for the income and expenditure situation of passenger bus company, about 80% of them were in the red before the COVID-19 pandemic. Their income and expenditure situation further deteriorated amid the pandemic.

- (1) 下線部を訳せ
- (2) この図および説明文で示されている社会問題はどのようなものか、150~200字程度で簡潔にまとめて和文で述べよ。
- (3) 上記 (2) に対応するための社会基盤整備のあり方について、自分の考えを150~200字程度にまとめて、和文で述べよ。

2026年度 大学院 経営情報科学研究科 経営情報科学専攻 博士後期課程 社会人入試3次

(問題・解答) 用紙 (経営システム・情報システム)

科目名	学力試験 (英語)	受験番号	番	氏名
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問1 以下の英文中にある下線部(①~⑩)を和訳してください。(10×7点)

この部分につきましては、
著作権の都合により公開いたしません。

問2 以下の品質マネジメントに関する文中にある下線部(①～⑤)を英訳してください。(5×6点)

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