

試験科目名 Subject
科目名 理工学融合 (開発科学)
(英文) Transdisciplinary Science and Engineering (Development Science)

受験番号 Applicant Number	M
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令和2年度 広島大学大学院先進理工系科学研究科 (博士課程前期) 入学試験問題 (4月入学)
Entrance Examination for Master's Programs (April 2020 Enrollment), Graduate School of Advanced Science and Engineering

<注意事項> 1) 日本語または英語のどちらかで解答してもよい。
<Notice> 1) You can answer either in Japanese or English.

Answer one question out of the following two questions.

Question 1.

Pick up an emerging technology contributing to the reduction of greenhouse gas emissions, and list conditions that need to be met for the diffusion of the technology. Also, explain positive and negative social impacts when the technology is diffused.

Question 2.

The world is facing multiple challenges, including 1) food security, 2) income inequality, 3) habitat and biodiversity loss, 4) ocean conservation, 5) water scarcity, 6) large-scale natural disasters, and 7) the health impacts of environmental pollution and climate change. To achieve a better and more sustainable future for all, the Sustainable Development Goals (SDGs) are calling for actions by all countries. Select one out of the above seven challenges, and describe your original ideas about how to utilize science and technology to tackle the challenge, by focusing on a specific country.

試験科目名 Subject
科目名 交通計画・都市計画 (英文) Transportation and Urban Planning

受験番号 Applicant Number	M
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Choose two out of the following four questions.

Question 1

Describe the development levels of autonomous vehicle (AV). Then comprehensively discuss the advantages and disadvantages of the full automation level of AV, and illustrate its impacts on urban form.

Question 2

Select a tourist choice behavior associated with sustainable development and discuss how it is associated with sustainable development. Keeping the aforementioned associations in mind, describe a suitable survey method and a behaviorally-oriented modeling approach that can capture the effects of a not-yet-existing sustainable development policy on the behavior in the future.

Question 3

Streetscape is an important part of attractive built environment. First, name a survey method that can measure people's perception about streetscape and a survey method that can quantify the benefits of streetscape improvements as a public good. Second, describe how to implement these two survey methods. Finally, discuss the advantages and disadvantages of these methods, separately.

Question 4

Choose four out of the following technical terms and explain the meaning of each term using about 100 words in English or about 150 characters in Japanese.

- (1) Overtourism
- (2) Traffic impact assessment
- (3) Induced traffic
- (4) Smart growth
- (5) Ridesourcing
- (6) Complete street
- (7) Shared space
- (8) Healthy city
- (9) Nested logit model
- (10) Structural equation model

試験科目名
Subject

科目名 都市・建築環境学

(英文) Urban and Building Environment

受験番号
Applicant
Number

M

令和2年度 広島大学大学院先進理工系科学研究科（博士課程前期）入学試験問題（4月入学）

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問題 [1] 建築設備に関する次の4項目(a)~(d)から2項目を選び、説明せよ。

Question [1] Choose two from the following four items (a) to (d) concerned with building equipment and explain each one.

- (a) 中水
Reclaimed water
- (b) 水撃作用（ウォーターハンマー）
Water hammer
- (c) ファンコイルユニット方式
Fan coil unit system
- (d) 顕熱負荷と潜熱負荷
Sensible heat load and latent heat load

問題 [2] 都市域のヒートアイランド現象に関する質問(a), (b)に答えよ。

Question [2] Answer the following questions (a) and (b) concerned with the heat island phenomenon in urban area.

- (a) ヒートアイランド現象の発生原因について説明せよ。
Explain the causes of the heat island phenomenon.
- (b) 都市計画におけるヒートアイランド現象の対策について説明せよ。
Explain the countermeasures of the heat island phenomenon in urban planning.

試 験 科 目 名 Subject
科目名 エネルギー技術論 (英文) Energy Science and Technology

受験番号 Applicant Number	M
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令和2年度 広島大学大学院先進理工系科学研究科（博士課程前期）入学試験問題（4月入学）
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次の[1], [2]の両方の問題に答えよ。

Answer the following two questions [1] and [2].

問題[1] 以下の設問に答えよ。

- 1) 2018年秋、九州電力は日本国内で初めて再生可能エネルギーの出力制御を行った。九州において急激に増えている太陽光発電や風力発電により、出力制御なしの安定的エネルギー供給が困難となっている。このような状況下で、もし出力制御を実施しない場合、あり得る結果について述べよ。
- 2) 九州における、安定的エネルギー需給バランスのため実施可能な出力制御方法について、二つ以上説明せよ。

Question [1] Answer the following questions.

- 1) In 2018 autumn, Kyushu Electric Power Company carried out renewable energy curtailments for the first time in Japan. Due to rapidly increasing photovoltaic (PV) solar power generation and wind power generation in Kyushu, it becomes difficult to guarantee stable energy supply without the curtailments. Under these circumstances, describe possible consequences if the curtailments are not carried out.
- 2) Explain two or more examples of possible curtailment measures for stable energy balance between supply and demand in Kyushu.

科目名 エネルギー技術論

(英文) Energy Science and Technology

問題[2] 以下の設問に答えよ。

1) 式(1)は、気候に対する人間活動の影響を説明する「茅恒等式 (Kaya Identity)」である。

$$F = P \times \frac{G}{P} \times \frac{E}{G} \times \frac{F}{E} \dots\dots\dots(1)$$

ここで、 P は人口、 G は国内総生産 (GDP)、 E はエネルギー利用量、 F は CO_2 総排出量を表す。ここで、茅恒等式右辺の G/P , E/G , F/E が持つ意味をそれぞれ述べよ。

2) 異なる社会環境と開発段階にある「日本」と「バングラデシュ」において、両国の CO_2 総排出量の見込みを茅恒等式に基づき分析せよ。

3) 両国の CO_2 総排出量を減らすために講じ得る対策について、自分の意見を述べよ。

Question [2] Answer the following questions.

1) Equation (1) shows the Kaya Identity explaining the impact of anthropogenic activity on climate,

$$F = P \times \frac{G}{P} \times \frac{E}{G} \times \frac{F}{E} \dots\dots\dots(1)$$

where P is population, G is gross domestic product (GDP), E is energy consumption, and F is total emission of CO_2 . Then, describe individually the meaning of G/P , E/G , and F/E on the right-hand side of the Kaya Identity.

2) Analyze the future outlook for total CO_2 emissions in Japan and Bangladesh, which are in different social environments and development stages, based on the Kaya Identity.

3) Describe your opinions on the possible countermeasures to reduce the total CO_2 emissions in both countries.