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Design technology
Higher level
Paper 3

19 May 2025

Zone A morning | **Zone B** morning | **Zone C** morning

Candidate session number

1 hour 30 minutes

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Instructions to candidates

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Answer all of the questions.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[40 marks]**.



Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

1. In the mountain town of Takachiho, Japan there is a sightseeing tourist train that runs on biodiesel (**Figure 1**).

Figure 1: Sightseeing biodiesel tourist train



The biodiesel fuel is derived from cooking fat made from leftover ramen soup broth (**Figure 2**). The process of using the biodiesel in the train is the first of its kind.

Figure 2: Ramen meal



The cost of the biodiesel is the same as traditional diesel, however the biodiesel eliminates black smoke and the smell of exhaust gases typically associated with conventional trains. The Takachiho tourist train emits a fragrance reminiscent of the meals of which the cooking fat is a by-product.

(This question continues on the following page)



(Question 1 continued)

Equipment was created to help local restaurants remove unwanted ingredients when recovering the cooking fat from the soup broth. They then sell the cooking fat for refinement. Currently, one company is refining 3000 litres per day.

- (a) Initial tests of the Takachiho tourist train were conducted on an original train track, in the mountains with the actual train conductors. Outline **one** advantage of using a natural environment to test the train. [2]

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- (b) Outline how the Takachiho tourist train might appeal to tourists' physio-pleasure. [2]

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- (c) Describe how the Takachiho tourist train is an example of a micro energy sustainability. [2]

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2. Bangladesh is vulnerable to some of the world’s most severe weather.

Every year monsoons flood the low-lying river deltas. Annual riverbank erosion changes the landscape, and towns disappear into the water, leaving people landless and without homes.

Marina Tabassum, Principal Architect at her own company and the 2016 winner of the Aga Khan Award for Architecture, began researching this issue in 2018 developing a housing solution for landless people that considers user behaviour.

Stilted homes called “Khudi Bari” (meaning “tiny house”), are made from locally sourced bamboo. The structure is modular and can be folded, packed and relocated by the families who own them. The Khudi Bari can withstand heavy rain, wind, and high water.

The first three Khudi Bari were built in collaboration with families living in flood conditions, who adapted the modules to their needs. The architects continued to learn from these families to produce more. Currently 100 tiny homes have been built.

Figure 3: Khudi Bari in construction



[Source: © Asif Salman.]

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Turn over

(Question 2 continued)

Figure 4: Exterior of a Khudi Bari.



[Source: © Asif Salman.]

Figure 5: The Khudi Bari is modular and customizable



[Source: © Asif Salman.]

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(Question 2 continued)

- (a) User-centred design (UCD) must consider user, task, and environment. List **two** user requirements of the Khudi Bari. [2]

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- (b) Outline how Architect Marina Tabassum utilised a participatory design to develop the Khudi Bari. [2]

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Section B

Read the case study. Answer the following question. Answers must be written within the answer boxes provided.

3. Thousands of “fast fashion” designs are mass produced and sold at a low cost each day. Quick manufacturing brings the designs to retail whilst demand is at its peak. However, as a result, the synthetic fibre textile waste which includes microplastics often enters the water supply during production.

Once a trend is identified through use of social media, a similar garment can be produced within a few days, in part through lowered labour costs.

Figure 6: Discarded fast fashion textile waste landfill



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(Question 3 continued)

- (a) List **two** characteristics of lean production. [2]

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- (b) Fast fashion has a very short lead time. Outline what is meant by lead time. [2]

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- (c) Outline psychological pricing, relating to fast fashion's push for social media users to buy more products. [2]

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References:

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- Figure 2:** Lisovskaya, 2018. *Ramen noodles with Duck, egg and pak choi cabbage – stock photo*. Available at: <https://www.gettyimages.co.uk/detail/photo/ramen-noodles-with-duck-egg-and-pak-choi-cabbage-royalty-free-image/925331114> [Accessed 5 November 2024].
- Figure 3:** © Asif Salman.
- Figure 4:** © Asif Salman.
- Figure 5:** © Asif Salman.
- Figure 6:** SergeyZavalnyuk, 2009. *Giant bulldozer destroying garbage at the dump – stock photo* [image online] Available at: <https://www.gettyimages.co.uk/detail/photo/giant-bulldozer-destroying-garbage-at-the-dump-royalty-free-image/147013314?phrase=landfill+site&adppopup=true> [Accessed 5 November 2024].

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