

## Transport Infrastructure Engineering

### 23CVC110

Semester 2 2024

Online Short-window Exam paper

This is an online short-window examination, meaning you have a total of **2 hours plus an additional 30 minutes** to complete and submit this paper. The additional 30 minutes are for downloading the paper and uploading your answers when you have finished. If you have extra time or rest breaks as part of a Reasonable Adjustment, you will have further additional time as indicated on your exam timetable.

**It is your responsibility to submit your work by the deadline for this examination. You must make sure you leave yourself enough time to do so.**

**It is also your responsibility to check that you have submitted the correct file.**

#### Exam Help

If you are experiencing difficulties in accessing or uploading files during the exam period, you should contact the Exam Helpline. For urgent queries please call **01509 222900**.

For other queries email [examhelp@lboro.ac.uk](mailto:examhelp@lboro.ac.uk)

You may handwrite and/or word process your answers, as you see fit.

Answer **FOUR** questions.

All questions carry equal marks.

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1. a) Briefly define the concepts of 'route capacity', 'usage' and 'utilisation' within a transport system context. [10 marks]
- b) A metro system operates in peak hours with 7-carriage trains at a frequency of one train every 4-minutes and carries 10,800 passengers per hour at maximum load. The seating capacity of each carriage is 80, and there is room in the carriage for 30 standees. The minimum headway for the system is 210 seconds.
  - i) What is the scheduled capacity of the line? [5 marks]
  - ii) What is the maximum load factor (utilisation) at present? [5 marks]
  - iii) What is the maximum capacity of the line? [5 marks]
2. a) Describe the fundamentals of asset management. [10 marks]
- b) In the context of the UK rail industry, discuss the factors that may influence the development of an asset management strategy especially when it comes to inspecting the condition of these assets and deciding how to allocate maintenance funds. (~400 words). [15 marks]
3. a) Identify the principal stages of an Environmental Impact Assessment (EIA). [5 marks]
- b) The development of a third runway at Heathrow Airport will require an EIA. Discuss how an EIA can be used to manage the environmental impacts associated with this development. (~500 words) [20 marks]
4. a) Explain the principles of a Social Cost Benefit Analysis when applied to a large-scale transport infrastructure project. [10 marks]
- b) Leicestershire County Council are considering dualling 3 miles of the A6 road between Loughborough and Hathern. The primary aims are to reduce journey times and improve transport safety. The scheme is expected to have a design life of 20-years. Develop an outline of how a SCBA could be constructed to appraise the project. Your developed outline should consider the range of costs and benefits that could arise and explain how they would be integrated in the assessment. (~400 words). [15 marks]
5. a) Explain the physical functions of a railway track structure. [5 marks]
- b) Evaluate the factors which influence railway alignment. (~500 words) [20 marks]

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