University of East London

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SCHOOL OF ARCHITECTURE, COMPUTING & ENGINEERING

Submission instructions

- Submission will be On-line via Turn-it-in/Moodle

Module code	**EG7031**		
Module title	**Intelligent Transport System**		
Module leader	**Dr Alex Apeagyei**		
Assignment tutor	**Dr Alex Apeagyei**		
Assignment title	**Individual Coursework**		
Assignment number	**1**		
Weighting	**100%**		
Handout date	**20 October 2022**		
Submission date	**05 January 2023 16:00**		
Learning outcomes assessed by this assignment	**Learning Outcome 1-6**		
Turnitin submission requirement	**Yes**	**Turnitin GradeMark feedback used?**	**No**
Grade Book submission used?	**No**	**Grade Book feedback used?**	**No**
Other electronic system used?	**No**	**Are submissions / feedback totally electronic?**	**No**
Additional information	• All contents to be compiled into one file for uploading • You may upload as many times as you wish before the deadline • All pages to be numbered sequentially		
Internal Verification	Verifier: **Dr Julius Akotia** Date verfified: **23/09/2022**		

Form of assessment:

☒ Individual work ☐ Group work

For **group work** assessment which requires members to submit both individual and group work aspects for the assignment, the work should be submitted as:

☐ Consolidated single document ☒ Separately by each member

Number of assignment copies required:

☒ 1 ☐ 2 ☐ Other

Assignment to be presented in the following format:

☒ On-line submission
☐ Stapled once in the top left-hand corner
☐ Glue bound
☐ Spiral bound
☐ Placed in a A4 ring bound folder (not lever arch)

Note: To students submitting work on A3/A2 boards, work has to be contained in suitable protective case to ensure any damage to work is avoided.

Soft copy:

☐ CD (to be attached to the work in an envelope or purpose made wallet adhered to the rear)
☐ USB (to be attached to the work in an envelope or purpose made wallet adhered to the rear)
☐ Soft copy not required

Note to all students

All work has to be submitted to Module MOODLE.

Project Brief

1. System performance (40%)

Figure Q1.1 shows a section of a road network around a major city consisting of 16 nodes and 22 links. The travel time on each link (in minutes) is as depicted.

a) Find the route with the shortest path from Node 9 to Node 16 **using Dijkstra algorithm by hand**. Show all your work including a tabular summary of the steps and the final results. **(20%)**

b) Determine the route with the shortest time from Node 1 to Node 15 assuming System Optimum conditions apply. Use a suitable optimization software such as Matlab for this problem. Make sure to state the software used and include all the input data. **(15%)**

c) Assuming the coordinates of the nodes (junctions) of the network are as shown in Table Q1.1, use a suitable mapping software to show the shortest path determined in b) on a UK map. **(5%)**.

In your asnwers, clearly show all the appropriate steps you took to arrive at your answers in a) and b). The inputs and outputs from the software used in c) should also be documented in your report. Provide high quality diagrams to depict your results in order to get top marks.

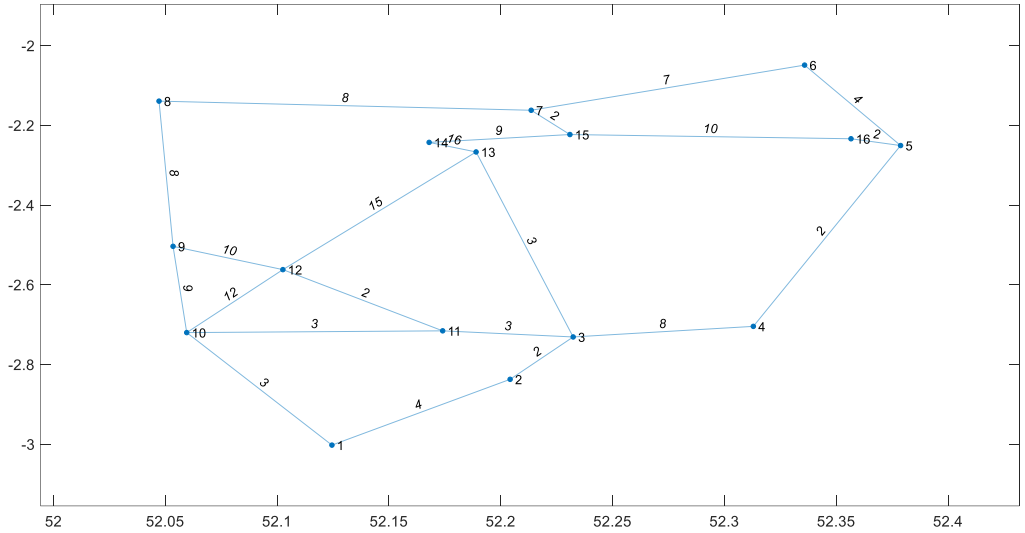

Figure Q1.1. Network location details.

Table Q1.1

Label	Node	Latitude	Longitude
A	1	52.12451	-3.00213
B	2	52.20418	-2.83707
C	3	52.23237	-2.73078
D	4	52.31293	-2.70422
E	5	52.37877	-2.25051
F	6	52.33584	-2.0487
G	7	52.2136	-2.16201
H	8	52.0472	-2.13908
I	9	52.05348	-2.50342
J	10	52.05959	-2.71982
K	11	52.17402	-2.71543
L	12	52.10258	-2.56183
M	13	52.18896	-2.26662
N	14	52.16797	-2.24258
O	15	52.23092	-2.22291
P	16	52.35659	-2.23348

2. Management of transport systems (30%)

A borough in charge of a city plans to adopt intelligent transportation systems solution to improve travel on their network for two locations A and B. Analysis shows the three alternative routes between the origin-destination pair A-B have travel times which is related to the volume rate of flow (Figure Q2.1). If x_i (i = 1, 2, 3) represents the number of vehicles per unit time, the travel times are given by equations 1, 2, and 3:

$$t_1 = 3x_1^2 + 5x_1 - 2 \quad (1)$$

$$t_2 = 4x_2^2 - 2x_2 + 1 \quad (2)$$

$$t_3 = 2x_3^2 + 5x + 7 \quad (3)$$

If 1000 vehicles per unit time leave A, determine the optimal division of traffic between the three routes so that

a) the overall travel times will be minimized **(15%)**
b) the total disutility in commuter-hours will be minimized **(10%)**
c) based on the results obtained b), recommend two Intelligent Transport System solutions for improving travel in the borough. Briefly explaining the reasons for your choices. **(5%)**

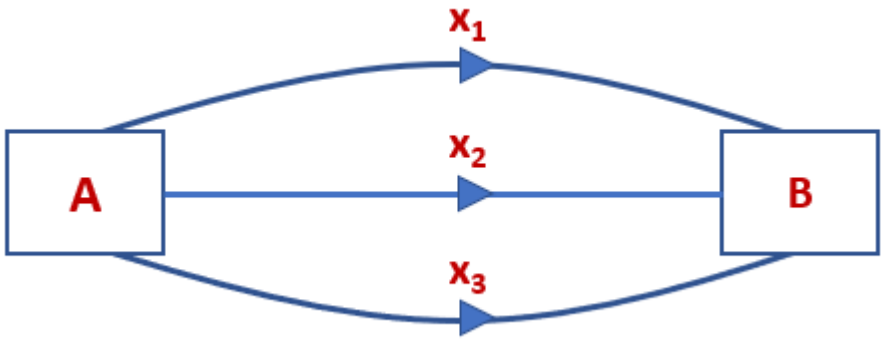

Figure Q2.1 Alternative routes between origin-destination pair A-B

3. Transportation modelling (10%)

Briefly discuss how transportation planning is intricably linked with land use planning in urban areas. Discussion should include the major factors often in many transport demand models.

4. Transport and the environment (10%)

Discuss the main problems related to the sustainability of modern transportation systems and how technology could be used to address them.

5. Presentation (10%)

Top marks to be awarded to well-presented submission satisfying all submission requirements.

Submission Requirements

1. Work is to be word-processed and this should be in a clear legible typeface.
2. All the work must be the student's own. All written work to be put through 'Turnitin' and final report included with submission (maximum similarity index 30%).
3. Submissions must be properly structured; this may involve pre-planning your work. The report must have an introduction, a contents page, rationale and conclusion as well as the main subject matter.
4. All figures and tables must be appropriately titled within the body of the text.
5. All pages should be clearly numbered.
6. A bibliography and/or any references used must be provided. Referencing to be Harvard Notation (if in doubt, check 'Cite them Right').
7. Sketches may be in pencil with inked notes or produced by computer.
8. Calculations must be logically laid out so that they can be easily checked.
9. All work submitted must have a front sheet that clearly shows the student ID, module code and title, module instructor (s), academic term and academic year.
10. The work must be submitted on MOODLE "Turnitin" before the deadline.
11. Work which is submitted after the deadline but within 24 hours of the due date and time will have 5% deduction in the marks, submission which is beyond 24 hours will receive zero marks, unless extenuating circumstances are approved.

SUBMISSION DATE : 05 January 2023 16:00