



**PAMIBIA UNIVERSITY**  
OF SCIENCE AND TECHNOLOGY

**FACULTY OF COMMERCE, HUMAN SCIENCES AND EDUCATION**

**DEPARTMENT OF MARKETING AND LOGISTICS**

<b>QUALIFICATION:</b> BACHELOR OF TRANSPORT MANAGEMENT	
<b>QUALIFICATION CODE:</b> 07BTRA	<b>LEVEL:</b> 6
<b>COURSE:</b> INTELLIGENT TRANSPORT SYSTEMS	<b>COURSE CODE:</b> ITT611S
<b>SESSION:</b> JUNE 2022	<b>PAPER:</b> THEORY
<b>DURATION:</b> 3 HOURS	<b>MARKS:</b> 100

<b>FIRST ATTEMPT EXAMINATION</b>	
<b>EXAMINERS</b>	Dr. Smart Dumba
<b>MODERATOR:</b>	Ms. Gloria Tshoopara

<b>INSTRUCTIONS</b>	
<ol style="list-style-type: none"><li>1. Answer <b>ALL</b> questions from <b>Sections A and B</b>, and any <b>three (3)</b> questions from <b>Section C</b></li><li>2. Number your answers clearly.</li><li>3. The number of marks per each question or part question is given in square brackets [ ]. These should guide you in the content of your answers.</li><li>4. This is a <b>Closed Book Examination</b>. No books or notes may be consulted during the exam.</li></ol>	

**THIS QUESTION PAPER CONSISTS OF 5 PAGES (Including this front page)**

## SECTION A: ANSWER ALL QUESTIONS

### Question 1

- a. Good quality pre trip information from advanced traveller information systems enables travellers achieve route optimization, fare maximisation, costs minimisation and travel time minimisation. [2 marks]
- b. Intelligent Transport Systems (ITS) in commercial vehicle operations deal with efficiency and effectiveness of the service that is being provided and can increase passenger safety, as well. [2 marks]
- c. Adaptive traffic signal control, ramp metering and traffic operations centres are specific applications for advanced traffic management systems. [2 marks]
- d. ITS resemble of an interplay between travellers, data centres, roadside infrastructure, and vehicles. [2 marks]
- e. ITS standards refer to a framework that lays out the boundaries, the players, and the strategies for that process of information management in a specific geographical boundary and specified time period. [2 marks]
- f. An ITS architecture ensures system compatibility, shrinkability, interoperability and standardability. [2 marks]
- g. ITS relies on interactions among three layers of infrastructure, transportation layer, traffic signal layer and the information layer. [2 marks]
- h. Automatic Vehicle Identification (AVI), Weigh in Motion (WiM) technologies, electronic cargo clearance systems and telematics are all examples of ITS in commercial vehicle operations. [2 marks]
- i. Advanced Traveller Information Systems provide travellers with information regarding road conditions and whether conditions only. [2 marks]
- j. Incident Management Systems focus on maximizing the use of available roadway capacity and reducing the impact of nonrecurring congestion resulting from incidents. [2 marks]

## SECTION B: ANSWER ALL QUESTIONS

### Question 2

Select the correct answer, each correct answer carries 2 marks

- a) The following are goals of Advanced Traffic Management Systems, (ATMS) **except**,
- A. Improved safety
  - B. Increase operational efficiencies
  - C. Increase capacity
  - D. Increased axle loading
  - E. All these are goals of ATMS
- b) Which of the following pair of ITS systems represents a **weak** relationship?
- A. Advanced Public Transport Systems and Advanced Traveller Information Systems
  - B. Advanced Public Transport Systems and Information Management Systems
  - C. Advanced Traveller Information Systems and Commercial Vehicle Operations
  - D. Emergency Management Systems and Advanced Traffic Management Systems
  - E. None of these have a weak relationship
- c) Select the **odd** one out from the following key functionality aspects of an ITS system.
- A. Interoperability
  - B. Scalability
  - C. Maintainability
  - D. Deductibility
  - E. None of these is odd
- d) Select the **odd** one out
- A. Advanced Traveller Information Systems, (ATIS)
  - B. Vehicle to Infrastructure Integration (V2I) and Vehicle to Vehicle (V2V) Integration.
  - C. ITS enabled Transportation Marginal Costing Systems, (TMSC)
  - D. Advanced Traffic Management Systems, (ATMS)
  - E. None of these is odd
- e) Integrated Vehicle Health Monitoring Systems, (IVHMS) check the following aspects on a vehicle, **except**
- A. Vehicle upholstery
  - B. Engine monitoring
  - C. Gearbox
  - D. Suspension loads and dynamics
  - E. All these are checked
- f) Variable Messaging Signs, (VMS) assist travellers with the following decisions, **except**
- A. Departure time choice
  - B. Route choice
  - C. Lane choice
  - D. Vehicle choice
  - E. All these are correct

- g) Which of the following **does not** represent an advantage of Global Positioning Systems?
- A. Accurate monitoring of service delivery
  - B. Accurate object position
  - C. Provision of real time data
  - D. Generate data for easy mapping
  - E. None of the above
- h) The following data must be collected under incidents management, **except**
- A. Location
  - B. Vehicle carrying capacity
  - C. Direction of travel
  - D. Date and time
  - E. All these are correct
- i) Advanced Traveller Information Systems information utilise static and real-time information on:-
- A. Traffic conditions
  - B. Tourist information
  - C. Special events
  - D. Weather conditions
  - E. All these are correct
- j) Which of these pairs do not resemble a close relationship?
- A. Transport planning and traffic engineering
  - B. Transport economics and urban planning
  - C. I.T.S and Fleet telematics
  - D. I.T.S and social anthropology
  - E. All these have a close relationship

**Subtotal: 20 marks**

**SECTION C: ANSWER ANY THREE (3) QUESTIONS**

**Question 3**

- (a) Differentiate between I.T.S Standards and I.T.S Architecture [4 marks]
- (b) Write short notes on the following technologies as they apply to I.T.S:-
- i. Sensing technology [4 marks]
  - ii. Positioning technology [4 marks]
  - iii. Mapping technology [4 marks]
  - iv. Communication technology [4 marks]

**Subtotal: 20 marks**

**Question 4**

- (a) Describe the following technologies as they apply to I.T.S
- i. Vehicle to Infrastructure technologies, (V2I) [3 marks]
  - ii. Vehicle to Vehicle technologies [5 marks]

- (b) Describe and explain the functions of an Advanced Traffic Management System, (ATMS) [12 marks]

**Subtotal: 20 marks**

**Question 5**

Evaluate any two (2) sensing technology for measuring average speed of traffic flow ( $v$ ) and two (2) sensing technology for measuring traffic flow rate ( $q$ ) [20 marks]

**Question 6**

Explain in detail the following technologies in Commercial Vehicle Operation, (CVOs)

- i. Automatic Vehicle Identification (AVI) [8 marks]
- ii. Weigh In Motion (WiM) technologies [6 marks]
- iii. Electronic Cargo Clearance Systems [6 marks]

**Subtotal: 20 marks**

**Question 7**

Assess the following Travel Demand Management measures in improving traffic flow conditions in a city such as Windhoek

- i. Reversible lanes [5 marks]
- ii. High Occupancy Vehicle lane management [5 marks]
- iii. High Occupancy Toll [5 marks]
- iv. Rider sharing [5 marks]

**Subtotal: 20 marks**

**TOTAL: 100 MARKS**

**END OF QUESTION PAPER**

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