



PAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF COMMERCE, HUMAN SCIENCES AND EDUCATION

DEPARTMENT OF MARKETING, LOGISTICS AND SPORT MANAGEMENT

QUALIFICATION: BACHELOR OF TRANSPORT MANAGEMENT	
QUALIFICATION CODE: 07BTRA	LEVEL: 6
COURSE: INTELLIGENT TRANSPORT SYSTEMS	COURSE CODE: ITT611S
SESSION: JULY 2025	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINERS	PROF. SMART DUMBA (PM) MS. MARTHA POLLA (FM) MR. BONNY CHICKEN (DI) MR. THOMAS MWAHENUKANGE (EF)
MODERATOR:	DR HELVI PETRUS

INSTRUCTIONS
<ol style="list-style-type: none">1. Answer ALL questions from Sections A and B, and any three (3) questions from Section C2. Number your answers clearly3. 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.4. This is a Closed Book Examination. No books or notes may be consulted during the exam.

THIS QUESTION PAPER CONSISTS OF 7 PAGES (Including this front page)

**SECTION A:
ANSWER ALL QUESTIONS**

Question 1: State whether the following statements are TRUE OR FALSE

- 1.1 Advanced Traffic Management Systems (ATMS) lack the flexibility to address congestion caused by temporary incidents or disruptions. [2 marks]
- 1.2 Vehicle-to-vehicle (V2V) communication enhances ride quality but does not contribute significantly to road safety. [2 marks]
- 1.3 LiDAR sensors provide consistent accuracy regardless of weather conditions, including heavy rain or dense fog. [2 marks]
- 1.4 Travel Demand Management strategies supported by ITS can include pricing models that influence when and where people travel. [2 marks]
- 1.5 Variable Message Signs (VMS) are primarily installed for pedestrian notification and crosswalk assistance. [2 marks]
- 1.6 High Occupancy Toll (HOT) lanes enable lower-occupancy vehicles to use priority lanes upon payment of a fee. [2 marks]
- 1.7 A consistent ITS vocabulary facilitates coordination and mutual understanding between different stakeholders and systems. [2 marks]
- 1.8 ITS sensing technologies cannot distinguish between different categories of vehicles (e.g., cars, trucks, buses). [2 marks]
- 1.9 GPS-based automation and data-driven scheduling are fundamental to the operation of modern Advanced Public Transport Systems (APTS). [2 marks]
- 1.10 A common drawback of Intelligent Transport Systems is their tendency to increase overall vehicle fuel consumption. [2 marks]

Sub Total 20 marks

SECTION B:
ANSWER ALL QUESTIONS

Question 2: Select the correct answer, each correct answer carries 2 marks

2.1 Which of the following are core components of a dead-reckoning system used to supplement GPS in ITS? [2 marks]

- A. Odometer
- B. Gyroscope
- C. Accelerometer
- D. Steering angle sensor
- E. All of the above

2.2 Which ITS technology enables authorised emergency vehicles to receive priority at intersections? [2 marks]

- A. Adaptive Signal Control Technology (ASCT)
- B. Variable Messaging Signs (VMS)
- C. Electronic Toll Collection (ETC)
- D. Automatic Passenger Counting (APC)
- E. None of the above

2.3 Which institution has played a key role in funding Namibia's ITS initiatives such as ASOD and public transport vehicle tracking? [2 marks]

- A. Roads Authority
- B. Ministry of Urban and Rural Development
- C. Road Fund Administration (RFA)
- D. Namibia Transport Planning Council
- E. All of the above

2.4 What is one of the persistent global challenges in the development and adoption of ITS standards? [2 marks]

- A. Resistance from hardware manufacturers
- B. Rapid evolution of transport technologies
- C. Lack of international funding for ITS
- D. Mismatch between vehicle and infrastructure data protocols
- E. All of the above

2.5 Which system is best suited to detecting traffic incidents and coordinating immediate response actions? [2 marks]

- A. AVL – Automatic Vehicle Location
- B. ATIS – Advanced Traveller Information Systems
- C. ATMS – Advanced Traffic Management Systems
- D. IVHMS – Integrated Vehicle Health Monitoring Systems
- E. None of the above

2.6 What is the role of an Integrated Vehicle Health Monitoring System (IVHMS) in fleet management? [2 marks]

- A. Detect faults in mechanical and electrical components in real-time
- B. Support proactive maintenance scheduling
- C. Reduce operational costs through early fault identification
- D. Improve safety through constant monitoring of vehicle status
- E. All of the above

2.7 What best distinguishes ITS architecture from ITS standards? [2 marks]

- A. Architecture outlines what systems should do; standards describe how systems interact
- B. Architecture defines policy tools; standards establish funding sources
- C. Architecture refers to vehicle-side technologies; standards apply only to infrastructure
- D. Architecture is operational; standards are strictly conceptual
- E. All of the above

2.8 Which V2X communication mode allows direct sharing of hazard information between nearby vehicles? [2 marks]

- A. V2I – Vehicle to Infrastructure
- B. V2N – Vehicle to Network
- C. V2V – Vehicle to Vehicle
- D. V2P – Vehicle to Pedestrian
- E. All of the above

2.9 In the context of ITS, which of the following are common functions of Variable Message Signs (VMS)? [2 marks]

- A. Displaying lane closure or detour alerts
- B. Broadcasting travel time to key destinations
- C. Issuing real-time speed limit changes
- D. Warning about hazardous conditions ahead
- E. All of the above

2.10 Which technologies are typically integrated into an Advanced Public Transport System (APTS) to support real-time fleet monitoring and service optimisation? [2 marks]

- A. Automatic Vehicle Location (AVL)
- B. Global Positioning System (GPS)
- C. Onboard Communication Modules
- D. Control Centre Dashboards
- E. **All of the above**

Sub Total 20 marks

SECTION C:

ANSWER ANY THREE (3) QUESTIONS, EACH QUESTION CARRIES 20 MARKS

Question 3

Recent advancements in Intelligent Transport Systems (ITS) have significantly transformed urban mobility across various African cities. For instance, in February 2025, Lagos State partnered with Huawei Technologies to deploy four new ITS sites aimed at enhancing traffic management and road safety. These sites utilize advanced monitoring and AI-powered traffic solutions, including Automatic Number Plate Recognition (ANPR) cameras and Traffic Management Solution (TMS) devices, to streamline traffic flow and reduce congestion.

Analyse the benefits and challenges associated with implementing Intelligent Transport System (ITS) solutions in African cities, using Lagos as a case study. [20 marks]

Question 4

Advanced Traveller Information Systems (ATIS) support users throughout the travel experience by providing timely and relevant information.

Analyse the types of information provided at each stage of a trip and explain how this information enhances traveller decision-making. [20 marks]

Question 5

Discuss how GPS and gyroscope-based dead-reckoning systems work together to improve accuracy and reliability in Advanced Public Transport Systems (APTS). [20 marks]

Question 6

The architecture of Intelligent Transport Systems (ITS) is built upon multiple interrelated layers that ensure seamless functionality and integration across technical and institutional domains.

- I. Describe the purpose and key functions of the Transportation Layer in ITS. [8 marks]
- II. Discuss the role of the Communication Layer and how it facilitates data exchange within ITS environments. [6 marks]
- III. Explain the significance of the Institutional Layer in the planning, implementation, and coordination of ITS initiatives. [6 marks]

Question 7

Assess the effectiveness of the Average Speed Over Distance (ASOD) system as a policy tool for improving compliance with speed regulations and influencing road user behaviour in Namibia. [20 marks]

Sub Total 60 marks

**TOTAL 100 MARKS
END OF QUESTION PAPER**