NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

SBA4202

FACULTY OF APPLIED SCIENCE

DEPARTMENT OF STATISTICS AND OPERATIONS RESEARCH

SBA 4202: TRANSPORTATION & LOGISTICS

BSc. Business Analytics: Part IV

MAY 2025 EXAMINATION

Time : 3 hours

Candidates may attempt **ALL** Questions in Section **A** and at most **THREE** Questions in Section **B**. Each question should start on a fresh page.

SECTION A: Answer all questions in this section (40 marks).

A1. Define the following terms,

(a) Logistics, [3]

(b) Supply Chain Management, [3]

(c) Pro Forma Invoice, and [3]

(d) Shipment Tracking Report. [3]

A2. Explain the Four Rights of Logistics and highlight the importance of each in ensuring the efficiency of a logistics system. [8]

A3. List five advantages and five disadvantages of containerisation in logistics and transportation. [10]

A4. Explain the role of packaging in transportation and logistics. [10]

SECTION B: Answer any three questions in this section (60 marks).

B5. Quick Delivery is a leading e-commerce company that specializes in fast and reliable delivery of products to its customers. The company's warehouse manager is responsible for assigning five different products to five storage areas within the warehouse. The products include electronics (Product A), furniture (Product B), clothing (Product C), home appliances (Product D), and sports equipment (Product E).

The five storage areas within the warehouse have different characteristics, including climate-controlled (Storage Area 1), secure storage (Storage Area 2), easy access (Storage Area 3), bulk storage (Storage Area 4), and overflow storage (Storage Area 5). The cost of storing each product in each storage area varies, and the warehouse manager needs to determine the optimal assignment of products to storage areas to minimize the total storage cost.

Table 1: Storage costs

	Storage Area				
Product	Area A	Area B	Area C	Area D	Area E
Product A	9	11	14	11	7
Product B	6	15	13	13	10
Product C	12	13	6	8	8
Product D	11	9	10	12	9
Product E	7	12	14	10	14

(a) Formulate a linear programming model that minimises the total storage cost. [8]

(b) Solve the above assignment problem using the Hungariam method. [12]

B6. The Israeli Defense Forces (IDF) have identified a critical need to deploy F-35 aircraft to support military operations aimed at neutralizing specific adversary targets across the region. These targets include a Houthi base in Yemen, a Hezbollah base in Lebanon, a Hamas base in Gaza, and a base in Tehran, Iran. The following transportation table outlines the logistics of deploying available F-35 aircraft from three Israeli airbases—Nevatim Airbase, Ramat David Airbase, and Hatzor Airbase—while accounting for the required number of aircraft to reach each target location. Additionally, Table 3 includes transportation costs associated with moving the aircraft to these four locations, highlighting the logistical challenges and cost efficiency of each deployment.

Table 2: Military Aircraft Transportation problem

SOURCE	IDF TARGETS Yemen	Lebanon	Gaza	Iran	SUPPLY
Nevatim Airbase	3	1	7	4	250
Ramat David Airbase	2	6	5	9	350
Hatzor Airbase	8	3	6	3	400
DEMAND	200	300	350	150	1000

(a) Find the Initial basic feasible solution (IBFS) of the above Transportation problem (TP) by using the North-West Corner Cell Method (NWCCM). [8]

(b) Optimise the IBFS using the U-V Method. [12]

B7. Discuss the role of Information and Communication Technology (ICT) in transportation and logistics. [20]

B8. Discuss the following types of logistics, highlighting their key characteristics and roles.

(a) Inbound Logistics [5]

(b) Green Logistics [5]

(c) Reverse Logistics [5]

(d) City Logistics [5]

END OF QUESTION PAPER