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ASSESSOR(S)	Mr GJ Heyns		
MODERATOR(S)	Dr PJ Kilbourn		
DURATION	3 hours (180 min)	TOTAL MARKS	140

NUMBER OF PAGES (Including cover page)	12
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INFORMATION/INSTRUCTIONS:

- This is a closed-book assessment.
- There are 4 questions in Section B.
- Use the multi-choice answer sheet provided to register your answers.
- Read the questions carefully and answer only what is required.
- Number your answers clearly and correctly as per the question paper.
- Write neatly and legibly on both sides of the paper in the answer book, starting on the first page.

SECTION A [50 MARKS]

Important note: Use the multi-choice answer sheet provided to register your answers.

1. Which one of the following is incorrect? Conveying items by air is the most desirable form of transport when the demand is ...
 - A. unpredictable
 - B. price-sensitive
 - C. infrequent
 - D. in excess of local supply
 - E. seasonal
2. Which one of the following is a typical strength of pipeline transport?
 - A. Pipelines are able to transport a large range of products commercially.
 - B. Pipelines are flexible geographically in that they are designed to serve many locations.
 - C. There is a variable and divisible capacity that can be altered to accommodate sudden changes in demand.
 - D. Pipelines require low investment cost.
 - E. Pipelines are able to move bulk loads of fluids and gas very reliably over long distances at a low unit cost and low risk.
3. Freight forwarders and brokers act as _____ service providers.
 - A. first-party
 - B. second-party
 - C. third-party
 - D. fourth-party
 - E. multiparty
4. Agents who bring shippers (i.e. consignors) and carriers together in transport transactions are known as:
 - A. Freight forwarders
 - B. Ancillary operators
 - C. For hire operators
 - D. Freight consolidators
 - E. Freight brokers
5. Which one of the following is NOT a sea transport standing cost item?
 - A. Vessel inspection and check-ups
 - B. Insurance
 - C. Depreciation
 - D. Fixed crew costs
 - E. Insurance to cover risks on the water
6. As the number of storage facilities increases, total annual transport cost initially decreases to a point where it reaches a minimum, after which it immediately starts to rise. Which one of the following is NOT a reason for the rise in transport costs?
 - A. The number of trips decreases.
 - B. The trips become shorter.
 - C. Vehicle loading and unloading times increase relative to travel time.
 - D. More vehicles are required to maintain service levels.
 - E. Although the number of storage facilities increases, their individual capacities decrease, so that the proportion of transit stock decreases at the cost of the transport function.

7. 'Obtaining signed PODs are truly the responsibility of the financial department and not the operation of a facility.' Do you agree with this statement?
 - A. Only in the case of problems
 - B. Always
 - C. Usually
 - D. No, they are the responsibility of the operations department.
 - E. The POD is only a paperwork exercise of little importance
8. How far is the equal cost distance for the carriage of standard intermodal containers by road and rail?
 - A. Approximately 100 km
 - B. Approximately 300 km
 - C. Approximately 400 km
 - D. Approximately 500 km
 - E. Approximately 700 km
9. Which of the following are the correct rating of the different transport modes in respect to its relative performance in general terms what concerns flexibility as service characteristic?
 - A. Road (High); Air (High/moderate); Water (Moderate); Pipeline (Moderate/low); Rail (Low)
 - B. Road (High); Rail (High/moderate); Air (Moderate); Water (Moderate/low); Pipeline (Low)
 - C. Air (High); Road (High/moderate); Rail (Moderate); Water (Moderate/low); Pipeline (Low)
 - D. Rail (High); Air (High/moderate); Road (Moderate); Pipeline (Moderate/low); Water (Low)
 - E. Air (High); Road (High/moderate); Rail (Moderate); Pipeline (Moderate/low); Water (Low)
10. Which of the following statements are correct?
 - A. Vehicle capacity can increase at a greater rate than the costs of transporting the increased capacity
 - B. Economies of scale are achieved when an expanded level of output results in reductions in the total unit cost of transport
 - C. The prerequisite for economies of scale is a cost structure that is characterized by a high ratio of variable to total costs
 - D. A and B
 - E. B and C
11. Which of the following statements are correct in respect to the airfreight transport market?
 - A. Since deregulation there is a trend towards a monopolistic structure in the market
 - B. There is no technical limit to the economies of scale that one can achieve with increasing the fleet size
 - C. On condition that intermediate landing is not necessary, longer route lengths give rise to significant economies of scale
 - D. A and B
 - E. A and C

12. Which of the following statements are correct?
 - A. Relative to other modes of transport, road transport does not enjoy significant economies of distance
 - B. Road transport infrastructure such as terminals, provides further opportunities for economies of scale
 - C. Increased vehicle sizes coupled with productive utilization result in increased economies of scale
 - D. None of the above is correct
 - E. All of the above are correct
13. A high ratio of variable costs to total costs per transport unit is a characteristic of which mode of transport?
 - A. Air transport
 - B. Road transport
 - C. Rail transport
 - D. Pipeline transport
 - E. Sea transport
14. Which of the following are variable costs for an air transport operation?
 - A. Maintenance of buildings
 - B. Insurance of assets other than aircrafts
 - C. Training costs
 - D. Engine and component overhaul costs
 - E. Salaries
15. Which mode of transport ranks highest in terms of accessibility as service characteristic?
 - A. Sea transport
 - B. Road transport
 - C. Pipeline transport
 - D. Air transport
 - E. Rail transport
16. When a consignee receives a rail wagon, the rail carrier allows the firm a specified amount of free time to unload the wagon. When the rail wagon is retained beyond the allowable time, the rail carrier assesses ...
 - A. a tracking charge
 - B. an expediting charge
 - C. a diversion charge
 - D. a demurrage charge
 - E. a detention charge
17. Which one of the following cost items continuously accumulates as flying time increases?
 - A. Fuel cost
 - B. Airframe maintenance necessitated by the number of landings
 - C. Overhead costs
 - D. Landing charges
 - E. Terminal services
18. Which one of the following is NOT a road transport overhead cost item?
 - A. Land and buildings (premises, offices and warehouses)
 - B. Terminal facilities (vehicle depots, parking areas, garages, fixed loading facilities and equipment)
 - C. Managerial and administrative expenditure and other support functions
 - D. Expenditure relating to support functions
 - E. Vehicle insurance payments

19. Which of the following is NOT a quality principle on which TQM is based?
- A. Focus on continuous improvement
 - B. Consistency of input/output ratio
 - C. Involvement of all employees
 - D. Customer focus and customer involvement
 - E. Consistency of purpose
20. The third step of the problem-solving discipline (PSD) of TQM is ...
- A. aimed at identifying as many possible causes of the problem.
 - B. the standardisation of the quality improvement process.
 - C. the planning and implementation of proposed improvements.
 - D. the identification of the root cause of the problem.
 - E. the generation of possible solutions to the root cause.
21. Diagnostic performance measures can be defined as being ...
- A. based on facts and can be measured directly and accurately.
 - B. strategic in nature and describe how well a business is prepared for the future.
 - C. indirect measures of business performance that measure critical success factors.
 - D. intangible in nature and have to be measured indirectly.
 - E. direct measures of business achievement that have limited predictive validity.
22. Which of the following performance measures would you use to measure the performance of customer service?
- A. Inventory turnover
 - B. Asset utilisation
 - C. System up-time
 - D. Fill rate
 - E. Order picking time
23. Which of the following performance measures would you use to measure the performance of the procurement function?
- A. Standardisation quota
 - B. Total cycle time
 - C. Fill rate
 - D. Percentage of demand met
 - E. Inventory turnover
24. Non-operating transport service providers can be classified into two groups. These are ...
- A. freight consolidators and ancillary carriers.
 - B. freight agents and ancillary carriers.
 - C. freight forwarders and freight brokers.
 - D. freight forwarders and ancillary carriers.
 - E. freight brokers and ancillary carriers.
25. Transportation, both inbound and outbound, is one of the most significant areas of logistics management because of its impact on _____ levels and the firm's _____ structure.
- A. Inventory; organisational
 - B. Customer service; cost
 - C. Price; profit
 - D. Managerial; organisational
 - E. Price; costs

26. External areas for trucks moving to receiving or dispatch need to be big enough ...
- A. to allow the truck to park.
 - B. for the largest possible truck to reverse comfortably to the door.
 - C. for an average truck to reverse comfortably to the door.
 - D. to allow two trucks to pass.
 - E. for the average truck to back up against the door.
27. Should the temperature-controlled area determine the layout of the facility in all cases?
- A. Yes, as the cheapest method of creating a temperature-controlled area is to use the external walls.
 - B. Only when the temperature-controlled area is located within the building.
 - C. No, the flows and layout within the facility should determine the most effective layout.
 - D. (A) and (B)
 - E. None of the above
28. Someone states that the floor area needed to house their storage racks is approximately three times larger than the floor area of the actual racks. Is this the correct proportion?
- A. It is the correct proportion.
 - B. They made a calculation error.
 - C. This would require special equipment to be correct.
 - D. This is not a cost-effective design.
 - E. This would require special racks to be correct.
29. To handle inventory in high racks, the best piece of equipment is the ...
- A. reach truck
 - B. pallet truck
 - C. reach stacker
 - D. crane
 - E. turret truck
30. The movement of containers for some distance on the quayside is best done by ...
- A. spreaders
 - B. straddle carriers
 - C. cranes
 - D. mobile crane
 - E. reach stacker
31. Small items that are of high value and that need to be accessed frequently are best stored in ...
- A. small boxes
 - B. shelves
 - C. mobile shelves
 - D. carousels
 - E. storage cabinets
32. Which stacking method gives the densest stacking per floor area where the boxes, which are 300 mm by 400 mm by 300 mm, can support 20 boxes on top of one another?
- A. Block stacking
 - B. Racking
 - C. Mobile racking
 - D. Narrow aisle racking
 - E. All of the above

33. The connection to a container is done via a support frame and special equipment. The equipment comprises of:
- A. Frame and relay
 - B. Twistlock and frame
 - C. Spreader and Twistlock
 - D. Spreader and frame lock
 - E. Twistlock and relay
34. The supportive role of logistics in the returns management process can be regarded as being ...
- A. physical and supportive
 - B. analytical and physical
 - C. supportive and technical
 - D. operational and strategic
 - E. physical and strategic
35. Which of the following is NOT one of the most important factors determining the size of a firm's warehouse?
- A. Size of markets served
 - B. Number of segments served via competitors
 - C. Material handling systems used
 - D. Stock layout
 - E. Throughput requirements
36. Are the basic operating principles the same for a paper terminal in a port as for a grocery distribution centre?
- A. Always
 - B. Sometimes
 - C. Mostly
 - D. It depends on the terminal type
 - E. Never
37. How many processes are there in a warehouse facility?
- A. 5
 - B. 12
 - C. 13
 - D. 19
 - E. Differs from facility to facility
38. An error is made in the physical operation of a facility. What is the consequence of rectifying the error?
- A. Twice as much work
 - B. Two additional steps in the process
 - C. Three times as much work
 - D. Four times as much work
 - E. None of the above
39. All the processes in a facility have an influence on ...
- A. inventory
 - B. management of receipts
 - C. delivery
 - D. confirmation of orders
 - E. picking and packing operations

40. How big should the receiving area be?
- A. Twice the size of the largest load
 - B. Half the size of the largest load
 - C. Large enough to identify the goods and the quality before moving inventory into the facility
 - D. The size of an average load
 - E. Sized for the smallest truck
41. Packaging has an impact on the cost and service characteristics on which of the following logistics system component(s)?
- A. Transportation
 - B. Inventory management
 - C. Warehousing
 - D. Communications
 - E. All of the above
42. Which of the following statement is correct?
- A. The packaging of air shipments is regulated by the South African Revenues Services.
 - B. The packaging of air shipments is regulated by the South African Association of Airfreight Forwarders.
 - C. The packaging of air shipments is regulated by the International Air Transport Association.
 - D. Every airline regulates itself in terms of packaging requirements.
 - E. None of the above
43. What is the standard international pallet size?
- A. 1 m x 1 m
 - B. 0,8 m x 1 m
 - C. 1,2 m x 1,2 m
 - D. 0,8 m x 1,2 m
 - E. 1 m x 1,2 m
44. Which of the following is NOT an ISO standard container length?
- A. 20 ft
 - B. 40 ft
 - C. 60 ft
 - D. 45 ft
 - E. 53 ft
45. The Logistics performance measure 'Average cost per order' is calculated with the following formula: Total cost of orders / _____
- A. Market Price
 - B. Total Number of orders
 - C. Price and cost
 - D. Total demand
 - E. Cost of goods sold during the time period
46. The logistics performance measure 'Inventory turnover' is calculated with the following formula: _____ / Average inventory valued at cost during the period
- A. Total turnover
 - B. Total number of items shipped
 - C. Price and cost
 - D. Cost of goods sold during a time period
 - E. Purchasing price of goods

47. Which of the following is NOT a performance measure for warehousing?
- A. Order picking time
 - B. Inventory turnover
 - C. Warehouse throughput
 - D. Equipment utilisation
 - E. Picking speed per hour
48. Which of the following is NOT a step in the benchmarking process?
- A. Ensure management support and set objectives
 - B. Recruit new staff for vacant positions
 - C. Compare performance
 - D. Find benchmarking partner
 - E. Develop best practice
49. What is the correct term for the relationship between the mass and the volume of an item?
- A. Density
 - B. Value
 - C. Stowage ability
 - D. Form
 - E. Destructibility
50. Which of the following is generally NOT a factor influencing package design?
- A. Standardization
 - B. Globalisation
 - C. Price and cost
 - D. Protection level
 - E. handling
-

SECTION B [90 MARKS]

QUESTION 1

[50 MARKS]

Doing more with less through technology

The concept of scale is critical to enable a business to be cost-effective and efficient. Economies of scale may sound like a simple concept but there are many variables to consider to avoid compromising on quality and service while "right-sizing" the business to service the volume at hand. "Volume fluctuation coupled with distance and hours worked are some of the key components that we measure to ensure we're able to identify break-even points for marginal costing opportunities," notes Marcus Ellappan, road freight director at Bidvest Panalpina Logistics (BPL).

Technology, of course, plays a significant role in economies of scale. "Automation of information can be accommodated a lot more easily than employing additional staff," says international logistics director, Bruce Thoresson, noting that BPL operates substantially on a single technology platform. He does add, however, that while technology can help in cutting out waste and reducing cost, "having the right skills to interpret automated outputs will result in the delivery of better and value-adding service to clients, so while automation adds great value, so do staff who have the necessary skills."

Diversity and versatility

BPL Roadfreight operates out of Axle Park, a purpose-designed premises in Mahogany Ridge in Pinetown, KwaZulu-Natal, that boasts a multipurpose cross-dock facility close to the N3, nine loading bays and over 100 trailer bays, 12,000m² of yard space, and a food-grade-

compliant facility. Ellappan notes that BPL is often able to keep costs below inflation where volumes increase significantly, and this is partly because the roadfreight division has a diverse service offering, with various vehicle configurations in its business units.

In addition, “Increasing our capacity with vehicles that are versatile has enabled us to get better utilisation, which means we’re able to move more volume safely and increase our productivity factor.” Some of these new vehicles include ergonomically designed trucks to ensure driver comfort (eg. stop/start ignition, automated transmission, suspension seats and economy driving mode), vehicles fitted with lifting axles to reduce tyre wear when travelling without cargo, and safety features such as active brake assist, stability control, lane assist, proximity control assist, and LED daytime-running headlamps.

Applying scientific principles

Supply-chain solutions manager, Willem Bekker explains, “Traditionally, in the freight-forwarding/international logistics landscape, determining optimal resources for a specific operation can be a problem because of the large number of variables in the system, differences in client requirements, the impact on services required, and so on. This means that the ‘output’ of the service we offer in this space isn’t a tangible product, but the safe, efficient, on-time movement of cargo across borders. With this in mind, we decided to apply some engineering/scientific principles to the operation, in order to model and simulate resource capacity.” Value-stream mapping is a great driver for scale, says Bekker, because “we’re moving away from a ‘gut-feel’ approach to resource calculations, and also not just applying accounting principles, but using engineering techniques in areas that have traditionally shied away from data-driven decision making.”

Standardising operational processes

Standardisation of operational processes is another area in which scale counts. “We’ve standardised our operational processes throughout the country, which means that if we have capacity in a particular region, then we can direct new volumes to be processed in that region rather than in the region where new business has been signed up, if there is no capacity in that region,” Thoreson explains.

For the warehousing division, it’s all about centralisation of procurement, as well as adding more facilities to the BPL portfolio or adding storage space to existing facilities, says warehouse director Steve Smith. The larger the storage capacity of the facility, the lower the overhead cost per unit. “The addition of storage space takes two forms: increasing the footprint, and installing racking or increasing the height of racking which reduces the cost of storage per square metre,” he notes. The capacity of the warehouse facility at Rosslyn in Pretoria, Gauteng, in the meantime, has been increased by installing 2,206 additional bin locations. “This was achieved without any increase in overhead staffing, resulting in the realisation of significant economies of scale,” Smith says. And in Port Elizabeth in the Eastern Cape, the warehouse recently underwent a complete makeover, from efficiency improvements, such as the addition of a receiving bay, to the installation of more racking.

Training to improve efficiencies

BPL is continuously striving to achieve economies of scale in order to realise continuous cost reduction, one aspect of which is ongoing training of all employees to continuously identify opportunities to improve efficiencies and effectiveness of operations at all levels throughout the company. Economies of scale flow from these opportunities.

Source: Adapted from Bidvest Panalpina Logistics (www.iol.co.za – 16 January 2019)

- 1.1. The article state that “concept of scale is critical” for organisations to be efficient. Define economies of scale and road transport efficiency by referring to the existence (if any) of economies of distance and economies of vehicle size in road freight operations (12)

- 1.2 The article alludes to the productivity factor of transport operators can be increased through better utilisation of vehicles. Explain how the different methods of freight traffic consolidation can contribute to achieving efficiency in transport operations. (8)
- 1.3 BPL Roadfreight operates a multipurpose cross-dock facility. Cross-dock facilities can be used to increased focus on reducing cycle time and improve efficiencies. Define a cross-dock facility and discuss the characteristics of a supply chain that will enable it to operate with a cross-dock facility (8)
- 1.4. According to the article, BPL Roadfreight improved their warehouse efficiency by increasing their racking capacity and receiving bays. Discuss the characteristics and requirements of receiving areas and movement zones in the warehouse design process. (8)
- 1.5 The efficient and effective operation of a warehouse requires the use of various types of equipment and the combination of a complex series of processes. Discuss the following warehouse processes, a) delivery of goods and b) stock picking (9) and further list 10 other processes inherent to all warehouse facilities. (5). (14)

QUESTION 2**[15 MARKS]**

Translog Carriers (Pty) Ltd operates as a logistics service provider and has a fleet of several combination vehicles operating in various industries throughout Southern Africa. One of these vehicles is a 6x2 rigid vehicle with a two-axle trailer that covers 48 000 km per annum. Use the assumptions below to answer the following questions (show all calculations):

Overheads - Administration	R 117 000
Cost of capital (% of purchase price per annum)	10.30%
Annual License Fees	R 14 100
Driver Monthly cost	R 32 700
Assistant Monthly cost	R 12 500
Purchase price - Rigid	R 950 000
Overheads - Operations	R 78 000
Depreciation - straight line method	
Rigid residual value	25%
Rigid economic life (years)	5
Purchase price - Trailer	R 498 000
Tyre usage and cost (c/km)	147
Trailer residual value	0%
Trailer economic life (years)	10
Fuel consumption (liter /100km)	47
Fuel price (c/liter)	1490
Insurance (% of cost price)	7.50%
Maintenance cost (c/km)	403
Distance travelled per annum (km)	48000
Rigid (tyres)	10
Drawbar-trailer (tyres)	8
New tyre price (each)	R 24 000
Lubricants (% of fuel cost)	2.50%
Working weeks	50
Working days	5 days / week

- 2.1. Calculate the total vehicle costs per kilometre. (12)
- 2.2 What will the total vehicle cost (TVC) per annum be at an annual travel distance of 40 000 km and 60 000 km respectively? What do you observe of the total vehicle cost per km? (3)

QUESTION 3

[10 MARKS]

There are a diverse range of motives for government involvement in transport. Discuss government's role in:

- 3.1 Control of excessive competition (3)
- 3.2 Regulation of harmful conduct and externalities (2)
- 3.3 Restraint of monopoly power (2)
- 3.4 List a further six reasons for government's involvement in transport (3)

QUESTION 4

[15 MARKS]

Discuss the following logistics management concepts:

- 4.1 Logistics planning and control cycle (4)
- 4.2 Total Quality Management (TQM) (4)
- 4.3 Drive-in / drive-through racks (4)
- 4.4 Demurrage and detention (3)