FACULTY/COLLEGE	College of Business and Economics
SCHOOL	Johannesburg Business School
DEPARTMENT	Transport and Supply Chain Management
CAMPUS(ES)	APB
MODULE NAME	Transport Operations & Costing
MODULE CODE	TOC01B1
SEMESTER	Second
ASSESSMENT OPPORTUNITY, MONTH AND YEAR	Supplementary Summative Assessment Opportunity January 2020

ASSESSMENT DATE	January 2020	**SESSION**	
ASSESSOR(S)	Mr GJ Heyns		
MODERATOR(S)	Mr H Lemmer		
DURATION	3 hours (180 min)	**TOTAL MARKS**	120

NUMBER OF PAGES OF QUESTION PAPER (Including cover page)	9

INFORMATION/INSTRUCTIONS:

- Question papers must be handed in.
- This is a closed-book assessment.
- Use the multi-choice answer sheet provided to register your answers.
- There are 7 questions in Section B.
- Answer each question in a separate book.
- 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 [30 MARKS]

1. Logistics managers use the _____ approach to coordinate inbound logistics, materials management, and physical distribution in a cost efficient manner.
   A. total cost
   B. supply chain
   C. mass logistics
   D. interfunctional
   E. strategic

2. A cost trade-off is a situation where:
   A. all costs react according to their individual degrees of inflation in the economy
   B. all costs are reflected as a percentage variation from standard costs
   C. some costs increase, some decrease, and the net effect is that total costs decrease
   D. some costs are eliminated by efficient management controls
   E. all costs are minimised

3. Which one of the following is not a potential logistics trade-off when production runs are increased?
   A. production unit costs will decrease
   B. more warehouse space is required
   C. increased warehouse costs
   D. higher prices for customers
   E. production unit costs increase

4. A decision to develop and expand your business focus up stream in the Supply Chain is a _____ decision:
   A. Strategic
   B. Tactical
   C. Operational
   D. Functional
   E. Innovative

5. A decision to purchase a specific type of fork-lift truck is a _____ decision:
   A. Strategic
   B. Tactical
   C. Operational
   D. Functional
   E. Innovative

6. To debrief returning drivers and check goods returns is a _____ decision:
   A. Strategic
   B. Tactical
   C. Operational
   D. Functional
   E. Innovative

7. Which stage of the planning and control cycle might include a logistics audit?
   A. Feedback stage
   B. Determining of objective stage
   C. Planning stage
   D. Monitoring stage
   E. None of the above

8. Which one of the following statements regarding return on investment (ROI) is incorrect?
   A. It is a key measure of success
   B. Inventory plus cash and receivables plus fixed assets equals capital employed
   C. Inventory minus cash and receivables plus fixed assets equals capital employed
   D. Inventory plus cash and receivables minus fixed assets equals capital employed
   E. Profits can be enhanced through increased sales

9. Which integrated logistics approach have the objective to eliminate costly and wasteful elements from production processes?
   A. DPP
   B. MRP
   C. MRPII
   D. DRP
   E. JIT

10. Transportation models can be used for which of the following decisions?
   A. facility location
   B. production mix
   C. media selection
   D. portfolio selection
   E. employee shift scheduling

11. The two most common objectives for the assignment problem are the minimization of
   A. uncertainty or inexperience.
   B. total costs or inexperience.
   C. total costs or total time.
   D. total time or inexperience.
   E. total costs or uncertainty.

12. The shortest-route technique would best be used to
   A. assign workers to jobs in the cheapest manner.
   B. determine the number of units to ship from each source to each destination.
   C. determine the amount of LAN network wiring within a building.
   D. minimize the amount of traffic flow on a busy highway.
   E. determine the path for a truck making frequent but repeatable drops.

13. All the nodes must be connected in which of the following techniques?
   A. minimal-flow
   B. maximal-spanning tree
   C. shortest-route
   D. maximal-flow
   E. minimal-spanning tree

14. The maximal-flow technique might be used
   A. to help design the moving sidewalks transporting passengers from one terminal to another in a busy airport.
   B. by someone designing the traffic approaches to an airport.
   C. by someone attempting to design roads that would limit the flow of traffic through an area.
   D. All of the above
   E. None of the above

15. Freight forwarders and brokers act as _____ service providers.
    A. first-party
    B. second-party
    C. third-party
    D. fourth-party
    E. multiparty

16. A professional carrier is a _____ service provider.
    A. first-party
    B. second-party
    C. third-party
    D. fourth-party
    E. multiparty

17. Toll roads impact the ---------- of a transport operator.
    A. Overhead costs
    B. Standing costs
    C. Variable costs
    D. None of the above
    E. All of the above

18. Which of the following statements is NOT true with respect to sea transport?
    A. A low-cost service can be supplied. Large volumes of high-density freight can be conveyed over long distances.
    B. Standard intermodal containers can be utilised to facilitate freight handling.
    C. On the open sea, traffic congestion is virtually non-existent.
    D. A high-frequency service is supplied.
    E. The safety and security of service is high.

19. 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

20. Which of the following transport modes provide terminal-to-terminal services only?
    A. Road and Air
    B. Road and Rail
    C. Rail and Air
    D. Rail and Sea
    E. Sea and Air

21. Which of the following is an overhead cost item in road transport?
    A. Depreciation
    B. Licenses
    C. Fuel consumption
    D. Managerial and administrative expenditure
    E. None of the above

22. Which of the following is/are fixed cost items in road transport?
    A. Overhead costs
    B. Standing costs
    C. Variable costs
    D. A and B
    E. Only A

23. Rail transport is primarily a …
    A. long-distance, large-volume mover of low-value, high-density goods.
    B. short-distance, large-volume mover of low-value, high-density goods.
    C. long-distance, low-volume mover of low-value, high-density goods.
    D. long-distance, large-volume mover of high-value, high-density goods.
    E. long-distance, large-volume mover of low-value, low-density goods

24. 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

25. When the free periods of storage prior to loading of the ship or after the unloading of the vessel is exceeded, ports may charges ……
    A. a tracking charge
    B. an expediting charge
    C. a diversion charge
    D. a demurrage charge
    E. a detention charge

26. Which one of the following is not a way to assess vehicle utilisation?
    A. Time utilisation
    B. Distance related
    C. Weight utilisation
    D. Deck utilisation
    E. Vehicle running empty

27. Which one of the following is not one of uses of tachograph analysis packages?
    A. Vehicle licence renewal
    B. Improved planning and routing of vehicles
    C. More economical driving habits
    D. Reduced vehicle accidents
    E. Managing driving hours

28. Which type of routing and scheduling problems address regular delivery to regular customers?
    A. Resource planning
    B. ‘What if’ planning
    C. Fixed-route schedule planning
    D. Daily route schedule planning
    E. None of the above

29. Which one of the following is not an advantage of routeing and scheduling software?
    A. Decreased vehicle standing costs
    B. Reduced customer service
    C. Less need for hire-in vehicles
    D. Decreased running costs
    E. Management time saving

30. The logistics activity where customer orders need to be consolidated from a variety of goods that are sourced from a number of different supplier locations.
    A. Distribution centre operations
    B. Trans-shipment
    C. Excess storage
    D. Cross-docking
    E. Break bulk operations

SECTION B [90 MARKS]

QUESTION 1 **[20 MARKS]**

Freight shipping solutions for your Ecommerce business

Freight shipping is an integral piece to the logistic ecosystem many businesses rely on for growth in highly competitive markets. By merging modern technology and logistics expertise, 3PL providers can empower their customers' brand and ship freight with enhanced visibility, accurate transit times and individualized solutions that give them peace of mind in their supply chain.

What is Freight Shipping?

In a nutshell, freight shipping companies enable businesses to ship large quantities of merchandise goods and cargo (non-parcel) by either air, rail or truck. This type of transaction typically takes place between a freight broker, a merchant, or an eCommerce business owner. Shipment sizes transported by truck are placed in one of three sizes including less than truckload (LTL), partial truckload (PTL), or full truckload (FTL). The freight industry is one of the most substantial contributors to the overall health of the U.S. economy. To give you a better understanding of the significance of freight shipping, $106.2 billion of total freight goods were moved in the U.S. by all modes of transportation (air, rail, truck, vessel, pipeline) in 2018. That's a 6.4% jump from 2017. Additionally, freight shipping is responsible for importing 1,145 million tons to the U.S., exporting 992 million tons from the U.S., and moving 15.975 million tons within the U.S. The top commodities moved in the U.S. last year included computer parts ($11.5 billion), electrical machinery ($9.8 billion) and finally motor vehicles and parts ($9 billion).

Freight shipping qualifiers

To qualify for freight, you must have a shipment that's either over 150 lbs (± 68kg) or it must be larger than 30 in. (±76 cm) x 30 in. (±76 cm) x 30 in (±76 cm). If a shipment falls below these dimensions, it is likely more cost-effective to ship via parcel.

In addition to weight/dimension requirements, it is important to note the type of freight materials that can and can't be handled. Typical products shipped include:

- Auto parts
- Electronic Devices and Batteries
- Garments
- General merchandise
- Merchandise packaged on skids or pallets
- Textiles

Typical freight transportation load sizes

To better serve customers' business needs, three freight sizes are typically on offer transport customer's inventories safely:

Less Than Truckload (LTL): Items included in LTL freight shipments do not solely occupy an entire truck trailer and they typically weigh between 90 and 4,500 kg.

Partial Truckload (PTL): Opposed to their size or weight, PTL's are differentiated from LTL's by the way it transports. For example, if the shipment is over six pallets and 4,100 kg.

Full Truckload (FTL): Per the name, FTL's are large volume or weight shipments that solely occupy an entire trailer bed. Typically, these shipments weigh more than 4,500 kg.

Intermodal: Typically, it transport inventory from shipper to warehouse via two or more modes of transportation. For domestic freight shipping, the efficiency of rail meets the responsiveness of truck to securely deliver shipments to its final destination.

Other benefits include:

Freight insurance - One in ten packages are damaged during transit. Ultimately, this means your business stands to lose considerable amounts of revenue over time if your products are not insured.

Manageability, organization, and simplicity - No online business owner wants to endure a delay or conflict with their freight shipment, but these types of hiccups do happen due to unforeseen circumstances. In these cases, control over your supply chain is vital to recovering from a loss.

3PL order fulfilment centre access - In most cases, a 3PL provider and a freight forwarder serve as two separate resources in a supply chain. However, some 3PL's may offer order fulfilment and freight transportation through one integrated platform to better manage customers' entire supply network from a central, highly transparent source.

Source: Adapted from article by Marco Raye in SupplyChain247.com (26 August 2019)

1.1. Intermodal transport services maximises the advantages inherent in the combined modes and aim to avoid their operationally weak characteristics. Discuss the modal characteristics of international road freight, while highlighting its typical strengths and limitations. (10)

1.2. There is a multitude of different elements that need to be considered when a company assesses the question of whether or not to outsource its logistics operation. A number of advantages and disadvantages can be claimed both for and against third-party and in-house distribution. Discuss the organisational factors that must be considered in the outsourcing decision. (15)

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)

2.1. 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 number of aspects that need to be considered when trying to make the most appropriate choice of vehicle for a road vehicle fleet. Discuss the **technical** criteria that must be considered in the vehicle selection process.

QUESTION 4 **[17 MARKS]**

4.1 High vehicle and fleet utilization is of fundamental importance to successful road freight transport planning and operations. Discuss why vehicle utilisation can be difficult to achieve. (12)

4.2 Many different factors that need to be taken into account when planning the delivery operation of a road transport fleet. These factors require a great deal of data and information to be collected and collated. Briefly discuss some of the customer and service constraint information that must be considered in the operational planning of a road transport fleet. (5)

QUESTION 5 **[5 MARKS]**

Given the following distances between destination nodes, what is the minimum distance that connects all the nodes?

From	To	Distance
1	2	100
1	3	200
2	3	100
2	4	150

2	5	200
3	4	150
3	5	300
4	5	250
4	6	200
5	6	100

QUESTION 6 **[13 MARKS]**

The Table 1 below describes a transportation problem:

Table 1

TO / **FROM**	**Town D**	**Town E**	**Town F**	**Town G**	**Supply**
Town A	50	30	60	70	35
Town B	20	80	10	90	60
Town C	100	40	80	30	25
Demand	30	45	25	20	120

6.1. Use the northwest corner method to get an initial solution.

6.2. What is the cost of the initial solution?

6.3. Use the stepping-stone method to find the optimal solution.

6.4. What is the cost of the optimal solution?

QUESTION 7 **[5 MARKS]**

The nature of distribution and logistics operations require that planning and control activities follow a systematic approach. Briefly discuss a framework that represents the planning and control cycle.