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Faculty of Management and Social Sciences
Department of Logistics & Transport
BSc in International Transportation Management and Logistics
Course CODE: COM550

Year 2 Semester II

SEMESTER END EXAMINATION

Maritime Law – MLAW0331

- This paper consists of EIGHT questions on TWO (02) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly

Date: 2022.09.25   Pass mark: 50%   Time: 03 Hours

Question-1:

What do you understand by the term FON and Innocent Passage in relation to Maritime Transportation?   (20 marks)

Question-2:

As described under SCGA, list down 15 explained statements to each of the following:

  a. Seaworthiness
  b. Cargo-worthiness   (20 marks)

Question-3:

Write about a Switch B/L?   (20 marks)

Question-4:

Discuss between regular Paper B/Ls vs Electronic B/Ls   (20 marks)

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Question-5:

Discuss differences and responsibilities amongst between the following:

- Ship owner
- disponent owner
- ship-management
- ship operator
- charter.

(20 marks)

Question-6:

Salvage:

(a) What do you understand by the term "Salvage" in relation the maritime transportation environment"? (10 marks)

(b) What are the three conditions which must be fulfilled before the research of maritime property can give rise to a valid claim for a salvage award?

(10 marks)

Question-7:

Discuss to basic concept of marine losses in the aspect of marine insurance.

(20 marks)

Question-8:

Discuss about the standard salvage agreement, its advantages and disadvantages.

(20 marks)

------------------END OF THE QUESTION PAPER----------------

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Year 2 Semester II

SEMESTER END EXAMINATION

Shipping Management – SPMG0306

- This paper consists of EIGHT questions on FOUR (04) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly

Date: 2022.09.22   Pass mark: 50%   Time: 03 Hours

Question 01 (Compulsory)

When one party (a 'Principal') cannot participate to contract with a third party involving the ship, another party may be appointed as the representative. This commences an 'Agency' relationship, with obligations and rights that are recognized by others in the shipping business and maritime industry.

(a) The principal-agent relationship inflicts several duties upon the agent because of the contractual nature of the relationship.

   (i)   Who is a ship agent?   (01 Marks)
   (ii)   Write down four duties of a ship agent.   (04 Marks)
   (iii) Sea-port operations are affected by a vast area of geopolitical, economic & technological developments. Also, changes in global production & international trade affect port activity levels & operations. The demand for

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port traffic is decided by world trade. What is the economic term used to express this nature of shipping? (01 Marks)

(b) A legal document called "X" is issued by the carrier to the shipper when shipping goods internationally, and it is an essential element of the process. It is used as proof of shipment. This is particularly important for use in the customs process, insurance, and financial instruments. It is also used as commercial proof to show agreements have been fulfilled.

(i) What is "X"? (01 Marks)
(ii) What are the main three functions of this document? (03 Marks)
(iii) Give five facts indicating as content information in this specific document.
(10 Marks)

Question 02

A CFS is also a place where goods for import and export are stored temporarily. It is an extension of a port or terminal and was conceived with the objective of clearing congestion at India's ports and terminals. Elaborate the concept of CFS & its functions in a broad view. (20 Marks)

Question 03

Documentary credits (Ex. Letter of Credit) are controlled by an international code of practice drawn up by the International Chamber of Commerce, known as UCP. These rules were adopted to relieve the difference between national and regional rules on documentary credit practice.

(a) UCP had been revised six times in the history so far.

(i) What does mean by the short form UCP? (01 Marks)
(ii) How many articles are there in UCP 600? (01 Marks)
(iii) Name three major parties involved in documentary credit transactions.
(03 Marks)

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(b) UCP 600 play a vital role in international trade today.

    (i)   Summarize the importance of UCP 600 in shipping industry.   (05 Marks)

    (ii)   Explain any four articles of UCP 600.   (10 Marks)

Question 04

Dangerous cargo must be handled with severe care and consideration of its dangerous nature. Any mis-declaration, mis-communication or incorrect documentation might cause severe consequences and could prove disastrous to human lives on shore or on a ship. Illustrate dangerous cargo handling precautions including a proper definition for them.   (20 Marks)

Question 05

Draw down a structure of a typical documentary Letter of Credit transaction & explain the steps in an order.   (20 Marks)

Question 06

Note of Protest is a notarized statement & its purpose is to protect the ship's charterer or owner from liability for damage to the cargo, the ship or to other ships in a collision, where this was caused by the perils of the sea (for example, bad weather). Provide a lengthy discussion on note of protest while highlighting when the note of protest is applicable.   (20 Marks)

Question 07

Renting a ship is called as ship chartering and it begins with the shipowner and a second party entering into an agreement. Discuss the three main chartering types separately.

    (20 Marks)

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Question 08

Shipping industry has a different vocabulary set which are used to express or name different conditions, scenarios, intermediaries and shipping related employees. Write down short notes for four preferred topics from the below. (Use suitable diagrams when necessary). (4*5 Marks)

(a) Ship Manifest

(b) Free Pratique

(c) Letter of Credit

(d) Pilotage

(e) Maritime Piracy

(f) Break-bulk cargo

(g) Received for shipment bill of lading & shipped bill of lading

(h) Load Line Certificate

-------------------END OF THE QUESTION PAPER-----------------

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Year 2 Semester II

SEMESTER END EXAMINATION

Transport Economics – ECON0319

- This paper consists of EIGHT questions on SIX (06) pages.
- Answer FIVE (05) Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly

Date: 2022.09.17   Pass mark: 50%   Time: 03 Hours

Question 01 (Compulsory)

Select the most suitable answer.

1. The difference between price what you have to pay for a product/ service and utility what you subjectively feel is arise,
    - (a) Dissatisfaction
    - (b) Bargain
    - (c) Argument
    - (d) Misunderstanding

2. Demand for transport and logistics services has
    - (a) Direct demand
    - (b) Unlimited demand
    - (c) Derived demand
    - (d) Effective demand.

3. Demand for Cruise ships by tourist have

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(a) Direct demand
(b) Derived demand
(c) Indirect demand
(d) Effective demand.

4. Supply of transport is consisted with,

   (a) Frequency

   (b) Coverage

   (c) Infrastructures

   (d) All of above

5. Generalize price of a transport mode is not included,

   (a) Monetary cost

   (b) Time cost

   (c) Security cost

   (d) Externalities

By taking an airplane person X can travel from A to B in one hour. The same trip takes 5 hours by bus. Airfare is $ 90 and the bus fare is $ 20. When person X not travelling, can work and earn $ 30 per hour. Answer question 6 and 7

6. The implicit cost for person X of travelling by bus,
   (a) $ 30
   (b) $150
   (c) $100
   (d) $120

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7. Which one of following is incorrected,
   (a) The implicit cost of travelling bus is greater than airplane.
   (b) The opportunity cost of travelling bus is more than airplane.
   (c) Travel by airplane is the best option
   (d) None of above.

Table 1.1: Elasticity co-efficient of Car Traffic.

	Short run	Long run
Car traffic with respect to price	-0.16	-0.43
Car traffic with respect to petrol price	-1.02	-0.36
Car traffic with respect to Per Capita GDP	+0.75	+1.5
Car traffic with respect to public bus ticket price	+0.5	+1.02

Answer Questions 8,9 and 10 using above Table1.1

8. The Car is,
   (a) A normal service for the consumer
   (b) An Inferior service for the customer
   (c) A merit services
   (d) A demerit services

9. The cross-price elasticity between car traffic and public bus shows that,
   (a) Weak complement relationship in short run
   (b) Strong substitute relationship in short run
   (c) Close substitute relationship in long run.
   (d) None of above.

10. Which one is incorrect statement,
    (a) Car traffic is more sensitive for price than income of passengers in short run.
    (b) Car traffic is more sensitive for income than price of bus ticket in short run.
    (c) Car traffic is more sensitive for price in long run than short run.
    (d) Car traffic is more sensitive for income than bus ticket price in long run.

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(20 Marks)

Question 02

(a) Explain that how does the transport and logistics services influence on the functions of economic activities. (10 Marks)

(b) Explain that initiatives, strategies taken by different types of transport related social and economic infrastructures (Road infrastructure, road passenger, rail, air and port sector) in year 2021. (10 Marks)

Question 03

(a) Explain the determinants of travel demand for airline industry. (10 Marks)

(b) "The elasticity of travel demand is an important concept in strategic decision-making process in the transport market" do you agree? Explain. (10 Marks)

Question 04

(a) What do you mean by excess supply? illustrate with diagram and explain the reasons for excess supply in the transport field (07 Marks)

(b) What do mean by elasticity of transport supply? Explain that factors which are determine the elasticity of supply with examples. (07 Marks)

(c) Explain the behavior of shipping supply curve. (06 Marks)

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Question 05

Price discrimination is the term used to describe a pricing policy in the transport industry, then explain that,

a) Briefly explain types of price discriminations   (06 Marks)

b) What are the market conditions required for price discrimination?   (06 Marks)

c) What are the advantages and disadvantages of price discrimination (04 marks)

d) Is price discrimination depending on relative elasticity of the services? (Explain with an appropriate diagram.)   (04 Marks)

Question 06

In transport economy it can be seen negative externalities and positive externalities. The government intervenes to control and promote those externalities through their economic policies. Justify your answer with appropriate examples and diagrams.

(20 Marks)

Question 07

Shipping economics is the study of the structure and interaction of shipping markets and the behavior of the stakeholders within these markets and study of this subject provides macroeconomic understanding of how commodities are transported by sea in most economical way as it is responsible for approximately 80% of the world trade. The shipping supply as well as shipping demand are complicated phenomenon, and its derived demand nature makes the pricing of liner shipping volatile.

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(a) How shipping lines address the volatility nature in pricing?   (05 Marks)

(b) Explain how shipping lines minimize the impact of constant changes in external

trading and business environment though applying various surcharges.

(15 Marks)

Question 08

Write short notes on any four (4) of the followings.

(a) Factors of Production in transport market

(b) Cost classification in airline industry

(c) Cost classification in railway

(d) Cost classification in road transportation

(e) Public Private Partnership Program in Sri Lanka

(20 Marks)

-------------END OF THE QUESTION PAPER-------------

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Year 2 Semester II

SEMESTER END EXAMINATION

Air Cargo and Passenger Transport – ACPT0305

- This paper consists of EIGHT questions on FOUR (04) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly

Date: 2022.09.14   Pass mark: 50%   Time: 03 Hours

Question 01 (Compulsory)

(a) Compare All cargo carriers and Belly cargo carriers under the following categories:
- Cost of service
- Dimensions and type of cargo
- Flight schedules and network   (09 Marks)

(b) Ascent Logistics Pvt. Ltd. is going to ship some cargo from Colombo to Manila, Italy. The shipment consists of 04 boxes, each weighing 21 kg, and each measuring 11 x 21 x 31 inches. Find the chargeable weight.   (05 Marks)

(c) Explain general commodity rate, Specific commodity rate and Classification Commodity rate with examples.   (06 Marks)

Question 02

(a) Most of the major airlines today have codeshare agreements with other airlines. The main motivation of codeshare agreements is to boost business for airlines by increasing the number of flights that passengers have access to. Explain how codeshare agreements work with an example.   (08 Marks)

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(b) SriLankan airlines is a member of the prestigious Oneworld global airline alliance. List down the advantages of alliances taking SriLankan airlines as an example.

(04 Marks)

(c) Aviation's global economic impact is estimated at $2.7 trillion, equivalent to 3.6% of world gross domestic product (GDP). Its contribution includes direct, indirect, induced and tourism catalytic impacts. Briefly explain these impacts with examples.

(08 Marks)

Question 03

(a) Explain each of the following with an example.
   i.   Hazard
   ii. Consequence of a hazard
   iii. Safety Risk

(10 Marks)

(b) Safety management is a core business function of air transport that must be delivered through a dedicated management system. Explain initiatives taken by airlines for safety management to balance protection and production goals.

(10 Marks)

Question 04

(a) Explain characteristics of air cargo with examples.

(05 Marks)

(b) ULDs are expensive assets that are considered as aircraft parts. List advantages of ULDs.

(05 Marks)

(c) The Covid-19 pandemic has had a significant impact on the air transportation industry. Identify measures adopted by the aviation industry in response to Covid-19.

(10 Marks)

Question 05

(a) Explain the weight buildup of an aircraft with the aid of a diagram.

(05 Marks)

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(b) The six basic flight instruments in the cockpit are categorized into two as pitot-static instruments and gyroscopic instruments. Briefly explain 1(one) instrument from each category. (06 Marks)

(c) Explain the 3(three) axis of rotation of an aircraft (09 Marks)

Question 06

(a) An Air Service Agreement (ASA) is to be signed between New Zealand and China. Newzea Airways is an airline whose home state is New Zealand. Identify which freedom of air is given by each example. (06 Marks)

I.	A flight from New Zealand to China, flown by Newzea Airways	
II.	A flight between China and Russia, flown by Newzea Airways without operating to New Zealand.	
III.	A flight between Shanghai (China) and Beijing (China), flown by Newzea Airways.	
IV.	A flight from New Zealand to China and from China to Russia, flown by Newzea Airways.	
V.	A flight from Australia to China, through New Zealand flown by Newzea Airways.	
VI.	A flight from New Zealand to Shanghai (China) and from Shanghai (China) to Beijing (China), flown by Newzea Airways.	

(b) Briefly explain the Chicago Convention. (05 Marks)

(c) Describe the advantages and disadvantages of adopting an open skies policy for air transportation in Sri Lanka. (09 Marks)

Question 07

Skyway airline is a major airline of Australia. The table depicts the passenger movements of the airline performed by the B777 aircraft of the airline with a seat capacity of 310 seats. Airline operates two flights daily to KUL originating from MEL.

Note: Consider a calendar month as 31 days

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Sector length	MEL-KUL (4500 Km)	
Sector	MEL-KUL	KUL-MEL
	Passengers	Passengers
APR	10200	10200
MAY	12200	10020
JUN	11200	10520
JUL	10200	11050
AUG	12000	10020

(a) What will be the ASK by Skyway airline in MEL-KUL for the month of **August** for **round trips**? (04 Marks)

(b) What will be the RPK by Skyway airline in MEL-KUL for the month of **August** for **round trips**? (04 Marks)

(c) What will be the passenger load factor by Skyway airline in MEL-KUL for the month of **August** for **round trips**? (03 Marks)

(d) Explain why a high load factor and high yield are not ideal indicators of an airlines success and profitability. (09 Marks)

Question 08

(a) Identify reasons for ratification of the Montreal Convention. (04 Marks)

(b) Explain the air passenger rights applicable in the event of a flight delay, flight cancellation, denied boarding, delayed, lost or damaged baggage in the context of EC Regulation 261. (08 Marks)

(c) Explain the change in civil aviation management that occurred when the state functions were transferred into public corporations or limited liability companies with the use of a diagram. (08 Marks)

--------------------END OF THE QUESTION PAPER----------------

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Year 2 Semester II

SEMESTER END EXAMINATION

Port Management – PORT0352

- This paper consists of EIGHT questions on TWO (02) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly

| Date: 2022.09.12 | Pass mark: 50% | Time: 03 Hours |

Question 01 (Compulsory)
a) Explain what is a Sea Port on your own words? (10 Marks)
b) What are the activities involved in Ship Turnaround Time (Ship Time in Port) (5 Marks)
c) What is Service Marketing Triangle? (5 Marks)

Question 02
a) What are the Powers of SLPA as per the SLPA Act? (10 Marks)
b) Explain how Sri Lanka Ports Authority was formed? (5 Marks)
c) What are the Objectives & Duties of SLPA? (5 Marks)

Question 03
a) Who are the port customers & list out their expectations (10 Marks)
b) Name commercial ports in Sri Lanka? (5 Marks)
c) What are the salient facilities of the Port of Colombo? (5 Marks)

Question 04
a) What are the salient features of the Port of Galle? (5 Marks)
b) What are the salient features of the Port of Trincomalee? (5 Marks)
c) "Port is known as Heart of the Nation" Explain Why? (5 Marks)
d) List Navigational Facilities? (5 Marks)

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Question 05
a) List out Logistics Division Functions?   (5 Marks)
b) Why measure business performance?   (5 Marks)
c) Describe types of performance measures?   (10 Marks)

Question 06
a) What are the Navigational Charges   (5 Marks)
b) Name main Tariff items in the SLPA Tariff 2022?   (5 Marks)
c) Describe Colombo Port Expansion Project (Colombo South Harbour) & salient features?   (10 Marks)

Question 07
Consider the Hambanthota port and answer the following questions
a) Explain the Port Management?   (5 Marks)
b) What are the Navigational Facilities?   (5 Marks)
c) What are the Cargo Handling Facilities?   (5 Marks)
d) List out Tank Farm (Liquid Bulk Handling) Facilities?   (5 Marks)

Question 08
a) Name port related Value-added Logistic services?   (10 Marks)
b) What is Port Marketing and list out marketing tools to promote the port?
                                                          (10 Marks)

-----------------END OF THE QUESTION PAPER-----------------

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Year 2 Semester II

SEMESTER END EXAMINATION

Inventory and Warehouse Management – IWMG0348

- This paper consists of EIGHT questions on ELEVEN (11) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly
- Required statistical tables are attached.

Date: 2022.09.20   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)

SELECT MOST APPROPRIATE ANSWER OUT OF THE GIVEN CHOICES.

1. Traditional global trends in competition based on;

    (a) Quality, Cost, Organization Vs Organization

    (b) Quality, Flexibility, Responsiveness

    (c) Quality, Cost, Supply Chain Vs Supply Chain

    (d) Quality, Cost, Responsiveness

2. Inventory is;

    (a) Moving goods and material held available by a business to meet future demand

    (b) A collection or stock of goods and material held available by a business to meet future demand

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(c)   A collection or stock of goods and material held available by a business to meet its goals

(d)   Moving goods and material held available by a business to meet its goals

3. Independent demand items

    (a)   are the items which are used to produce a finished product

    (b)   demand is dependent upon the demand for some other item in the inventory

    (c)   are the Items which are shipped as end items to customers

    (d)   demand is certain and can be derived

4. Composition of the Inventory

    (a)   Material, Work in-progress, Finished goods, Supplies

    (b)   Raw material, Work in-progress, Maintenance, Supplies

    (c)   Raw material, Repair, Finished goods, Supplies

    (d)   Raw material, Work in-progress, Finished goods, Supplies

5. Reorder point is

    (a)   the quantity on hand when items to be reordered

    (b)   the quantity on hand when items dropped

    (c)   the odder quantity when items to be reordered

    (d)   the order quantity when items dropped

6. Why the inventory should be hold?

    (a) To meet the variations in demand

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(b) Because low demand items need to be held in inventory

(c) To meet the demand

(d) Because low demand items need not to be held in inventory

7. Classifications of Inventory

    (a) ABC, VED, SDC

    (b) ABC, VED, SDE

    (c) ABD, VED, SDC

    (d) ABC, VEC, SDC

8. Assumption of EOQ model

    (a) Only few products involved

    (b) Annual demand requirements unknown

    (c) Annual demand requirements known

    (d) Lead time is varied

9. Minimum Total Cost is the point that

    (a) The total cost curve reaches its minimum where the total and ordering costs are equal.

    (b) The total cost curve reaches its minimum where the carrying and ordering costs are equal.

    (c) The total cost curve reaches its minimum where the carrying and total costs are equal.

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(d) The total cost curve reaches its minimum where the carrying and setup costs are equal.

10. Fixed Order Interval

   (a) Not require only periodic checks of inventory levels

   (b) May require continuous and periodic checks of inventory levels

   (c) May require only continuous checks of inventory levels

   (d) May require only periodic checks of inventory levels

11. In what form does warehouses store products in the facilities?

   (a) Raw Material

   (b) Work in Progresses/ Semi finished products

   (c) Finished Products.

   (d) All of the above.

12. What's NOT a warehouse operating principle?

   (a) Stock location

   (b) Physical control and security

   (c) Single story facility

   (d) Order picking and assembly.

13. What are the two major categories that warehouses can be classified into?

   (a) Public and private.

   (b) Contract and multi-client.

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(c) Ownership and Operations

(d) Consolidation and break-bulk.

14. What's <u>NOT</u> an objective of a warehouse?

(a) Providing a timely customer service.

(b) Providing communication links.

(c) To keep track of items.

(d) To share the storage space.

15. How does warehousing allows firms to use customer service as a value adding competitive tool?

(a) Through storing.

(b) Through short haul transportation.

(c) Through time and place utility.

(d) Through providing communicational links.

16. What's a cost based benefit of warehousing.

(a) Postponement.

(b) Spot stocking.

(c) Full line stocking.

(d) Production support.

17. What's the material handling equipment which is utilized for both horizontal and vertical movements?

(a) Tow tractor.

(b) Power Pallet truck.

(c) Pallet stacker.

(d) Hand pallet truck

18. Not a difference between contract and Public warehouses.
   (a) Difference in contract.

   (b) Difference in space availability.

   (c) Difference in space availability.

   (d) Difference in ownership.

19. What's the type of warehouse which comes under operations?
   (a) Fulfillment centers.

   (b) Public warehouses.

   (c) Private warehouses.

   (d) Multi-client warehouses.

20. What's not a basic function of a warehouse?

   (a) Transport Consolidation.

   (b) Product mixing.

   (c) Docking.

   (d) Break bulk

(20 Marks)

Question 02

(a) A large law firm uses an average of 40 boxes of copier paper a day. The firm operates 260 days a year. Storage and handling costs for the paper are $30 a year per box, and it costs approximately $60 to order and receive a shipment of paper.

    i. What order size would minimize the sum of annual ordering and carrying costs? (02 Marks)

    ii. Compute the total annual cost using your order size from part i.

(03 Marks)

    iii. The office manager is currently using an order size of 200 boxes. The partners of the firm except manager use the optimal order size instead of 200 boxes? The partners of the firm except the office to be managed "in a cost-efficient manner". Would you recommend that the office manager use the optimal order size instead of 200 boxes? Justify your answer. (05 Marks)

(b) A jewelry firm buys semiprecious stones to make bracelets and rings. The supplier quotes a price of $8 per stone for quantities of 600 stones or more, $9 per stone for orders of 400 to 599 stones, and $10 per stone for lesser quantities. The jewelry firm operates 200 days per year. Usage rate is 25 stones per day and ordering costs are $48.

    i. If carrying costs are $2 per year for each stone, find the order quantity that will minimize total annual cost. (05 Marks)

    ii. If annual carrying costs are 30% of unit cost, what is the optimal order size?

(05 Marks)

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Question 03

(a) A drugstore uses fixed-order cycles for many of the items it stocks. The manager wants a service level of .98. The order interval is 14 days, and lead time is 2 days. Average demand for one item is 40 units per day, and the standard deviation of demand is 3 units per day. Given the on-hand inventory at the reorder time for each order cycle shown in the following table, determine the order quantities for cycles 2, 3, and 4: **(10 Marks)**

Table 3.1 – On hand Quantities

Cycle	On Hand
1	42
2	8
3	103

(b) The house keeping section of a motel uses approximately 400 washcloths per day. The actual number tends to vary with the number of guests on any given night. Usage can be approximated by a normal distribution that has a mean of 400 and a standard deviation of 9 washcloths per day. A linen supply company delivers towels and washcloths with a lead time of three days. If the motel policy is to maintain a stock out risk of 2 percent, what is the minimum number of washcloths that must be on hand at reorder time, and how much of that amount can be considered safety stock? **(10 Marks)**

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Question 04

(a) The manager of a store that sells office supplies has decided to set an annual service level of 96 percent for a certain model of telephone answering equipment. The store sells approximately 300 of this model a year. Holding cost is $5 per unit annually, ordering cost is $25, and $\sigma_{dLT} = 7$.

    i.   What average number of units per year will be consistent with the specified annual service level?   (02 Marks)

    ii.   What average number of units short per cycle will provide the desired annual service level?   (03 Marks)

    iii.   What lead time service level is necessary for the 96 percent annual service level?   (05 Marks)

(a) Demand for long stemmed red roses at a small flower shop can be approximated using a Poisson distribution that has a mean of four dozen per day. Profit on the roses is $3 per dozen. Leftover flowers are marked down and sold the next day at a loss of $2 per dozen. Assume that all marked-down flowers are sold. What is the optimal stocking level.   (10 Marks)

Table 4:1 - Demand

Demand (dozen per day)	Cumulative Frequency
0	0.018
1	0.092
2	0.238
3	0.433

| 4 | 0.629 |
| 5 | 0.785 |

Question 05

(a) End item P is composed of three subassemblies: K, L, and W. K is assembled using 3 Gs and 4 Hs; L is made of 2 Ms and 2 Ns; and W is made of 3 Zs. On-hand inventories are 20 Ls, 40 Gs, and 200Hs. Scheduled receipts are 10 Ks at the start of week 3, 30 Ks at the start of week 6, and 200 Ws at the start of week 3.

One hundred Ps will be shipped at the start of week 6, and another 100 at the start of week 7. Load times are two weeks for subassemblies and one week for components G, H, and M. Final assembly of P requires one week. Include an extra 10 percent scrap allowance in each planned order of G. The minimum order size for H is 200 units. Develop each of the following:

    i.   A product structure tree.   (04 Marks)

    ii.   A master schedule for P.   (04 Marks)

    iii.   Material requirements plan for K, G, and H using lot-for-lot ordering.

    (12 Marks)

Question 06

(a) Benefits of strategic warehousing can be categorized into two major groups as cost based and service based. Explain in detail, the cost-based benefits of warehousing.

(10 Marks)

(b) Differentiate between assembly and production support benefits in warehousing.

(05 Marks)

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(c) "One of the major objectives of warehousing is providing communication links

with the customers". Explain. (05 Marks)

Question 07

a) Explain in detail, the two basic systems of assigning locations for inventory in the

warehouse. (06 Marks)

b) It's often said that, long haul transportation involved in a supply chain can be avoided

through warehousing. Explain this statement in your own words. (06 Marks)

c) There're several factors which are considered when designing a warehouse. However,

product flow is a crucial designing criterion to be considered when designing a

warehouse. Elaborate why in your own words. (08 Marks)
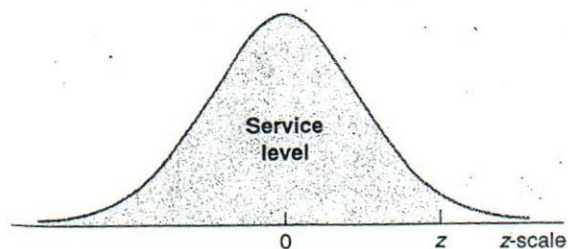
Question 08

Write short notes on below topics (4*5 Marks)

a) Single story facility in warehousing

b) Cross Docking.

c) Types of Packaging.

d) Warehousing process.
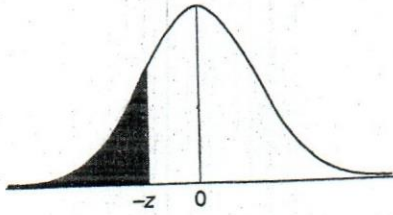
-------------END OF THE QUESTION PAPER-------------

TABLE 12.3 Normal distribution service levels and unit normal loss function

z	Lead Time Service Level	E(z)	z	Lead Time Service Level	E(z)	z	Lead Time Service Level	E(z)	z	Lead Time Service Level	E(z)
-2.40	.0082	2.403	-.80	.2119	.920	0.80	.7881	.120	2.40	.9918	.0030
-2.36	.0091	2.363	-.76	.2236	.889	0.84	.7995	.112	2.44	.9927	.0020
-2.32	.0102	2.323	-.72	.2358	.858	0.88	.8106	.104	2.48	.9934	.0020
-2.28	.0113	2.284	-.68	.2483	.828	0.92	.8212	.097	2.52	.9941	.0020
-2.24	.0125	2.244	-.64	.2611	.798	0.96	.8315	.089	2.56	.9948	.0020
-2.20	.0139	2.205	-.60	.2743	.769	1.00	.8413	.083	2.60	.9953	.0010
-2.16	.0154	2.165	-.56	.2877	.740	1.04	.8508	.077	2.64	.9959	.0010
-2.12	.0170	2.126	-.52	.3015	.712	1.08	.8599	.071	2.68	.9963	.0010
-2.08	.0188	2.087	-.48	.3156	.684	1.12	.8686	.066	2.72	.9967	.0010
-2.04	.0207	2.048	-.44	.3300	.657	1.16	.8770	.061	2.76	.9971	.0010
-2.00	.0228	2.008	-.40	.3446	.630	1.20	.8849	.056	2.80	.9974	.0008
-1.96	.0250	1.969	-.36	.3594	.597	1.24	.8925	.052	2.84	.9977	.0007
-1.92	.0274	1.930	-.32	.3745	.576	1.28	.8997	.048	2.88	.9980	.0006
-1.88	.0301	1.892	-.28	.3897	.555	1.32	.9066	.044	2.92	.9982	.0005
-1.84	.0329	1.853	-.24	.4052	.530	1.36	.9131	.040	2.96	.9985	.0004
-1.80	.0359	1.814	-.20	.4207	.507	1.40	.9192	.037	3.00	.9987	.0004
-1.76	.0392	1.776	-.16	.4364	.484	1.44	.9251	.034	3.04	.9988	.0003
-1.72	.0427	1.737	-.12	.4522	.462	1.48	.9306	.031	3.08	.9990	.0003
-1.68	.0465	1.699	-.08	.4681	.440	1.52	.9357	.028	3.12	.9991	.0002
-1.64	.0505	1.661	-.04	.4840	.419	1.56	.9406	.026	3.16	.9992	.0002
-1.60	.0548	1.623	.00	.5000	.399	1.60	.9452	.023	3.20	.9993	.0002
-1.56	.0594	1.586	.04	.5160	.379	1.64	.9495	.021	3.24	.9994	.0001
-1.52	.0643	1.548	.08	.5319	.360	1.68	.9535	.019	3.28	.9995	.0001
-1.48	.0694	1.511	.12	.5478	.342	1.72	.9573	.017	3.32	.9995	.0001
-1.44	.0749	1.474	.16	.5636	.324	1.76	.9608	.016	3.36	.9996	.0001
-1.40	.0808	1.437	.20	.5793	.307	1.80	.9641	.014	3.40	.9997	.0001
-1.36	.0869	1.400	.24	.5948	.290	1.84	.9671	.013			
-1.32	.0934	1.364	.28	.6103	.275	1.88	.9699	.012			
-1.28	.1003	1.328	.32	.6255	.256	1.92	.9726	.010			
-1.24	.1075	1.292	.36	.6406	.237	1.96	.9750	.009			
-1.20	.1151	1.256	.40	.6554	.230	2.00	.9772	.008			
-1.16	.1230	1.221	.44	.6700	.217	2.04	.9793	.008			
-1.12	.1314	1.186	.48	.6844	.204	2.08	.9812	.007			
-1.08	.1401	1.151	.52	.6985	.192	2.12	.9830	.006			
-1.04	.1492	1.117	.56	.7123	.180	2.16	.9846	.005			
-1.00	.1587	1.083	.60	.7257	.169	2.20	.9861	.005			
-.96	.1685	1.049	.64	.7389	.158	2.24	.9875	.004			
-.92	.1788	1.017	.68	.7517	.148	2.28	.9887	.004			
-.88	.1894	0.984	.72	.7642	.138	2.32	.9898	.003			
-.84	.2005	0.952	.76	.7764	.129	2.36	.9909	.003			

Service level

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7703	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

Appendix B Tables

Table B

1. Areas under the standardized normal curve, from $-\infty$ to $-z$

.09	.08	.07	.06	.05	.04	.03	.02	.01	.00	z
.0002	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	−3.4
.0003	.0004	.0004	.0004	.0004	.0004	.0004	.0005	.0005	.0005	−3.3
.0005	.0005	.0005	.0006	.0006	.0006	.0006	.0006	.0007	.0007	−3.2
.0007	.0007	.0008	.0008	.0008	.0008	.0009	.0009	.0009	.0010	−3.1
.0010	.0010	.0011	.0011	.0011	.0012	.0012	.0013	.0013	.0013	−3.0
.0014	.0014	.0015	.0015	.0016	.0016	.0017	.0018	.0018	.0019	−2.9
.0019	.0020	.0021	.0021	.0022	.0023	.0023	.0024	.0025	.0026	−2.8
.0026	.0027	.0028	.0029	.0030	.0031	.0032	.0033	.0034	.0035	−2.7
.0036	.0037	.0038	.0039	.0040	.0041	.0043	.0044	.0045	.0047	−2.6
.0048	.0049	.0051	.0052	.0054	.0055	.0057	.0059	.0060	.0062	−2.5
.0064	.0066	.0068	.0069	.0071	.0073	.0075	.0078	.0080	.0082	−2.4
.0084	.0087	.0089	.0091	.0094	.0096	.0099	.0102	.0104	.0107	−2.3
.0110	.0113	.0116	.0119	.0122	.0125	.0129	.0132	.0136	.0139	−2.2
.0143	.0146	.0150	.0154	.0158	.0162	.0166	.0170	.0174	.0179	−2.1
.0183	.0188	.0192	.0197	.0202	.0207	.0212	.0217	.0222	.0228	−2.0
.0233	.0239	.0244	.0250	.0256	.0262	.0268	.0274	.0281	.0287	−1.9
.0294	.0301	.0307	.0314	.0322	.0329	.0336	.0344	.0351	.0359	−1.8
.0367	.0375	.0384	.0392	.0401	.0409	.0418	.0427	.0436	.0446	−1.7
.0455	.0465	.0475	.0485	.0495	.0505	.0516	.0526	.0537	.0548	−1.6
.0559	.0571	.0582	.0594	.0606	.0618	.0630	.0643	.0655	.0668	−1.5
.0681	.0694	.0708	.0721	.0735	.0749	.0764	.0778	.0793	.0808	−1.4
.0823	.0838	.0853	.0869	.0885	.0901	.0918	.0934	.0951	.0968	−1.3
.0985	.1003	.1020	.1038	.1056	.1075	.1093	.1112	.1131	.1151	−1.2
.1170	.1190	.1210	.1230	.1251	.1271	.1292	.1314	.1335	.1357	−1.1
.1379	.1401	.1423	.1446	.1469	.1492	.1515	.1539	.1562	.1587	−1.0
.1611	.1635	.1660	.1685	.1711	.1736	.1762	.1788	.1814	.1841	−0.9
.1867	.1894	.1922	.1949	.1977	.2005	.2033	.2061	.2090	.2119	−0.8
.2148	.2177	.2206	.2236	.2266	.2296	.2327	.2358	.2389	.2420	−0.7
.2451	.2483	.2514	.2546	.2578	.2611	.2643	.2676	.2709	.2743	−0.6
.2776	.2810	.2843	.2877	.2912	.2946	.2981	.3015	.3050	.3085	−0.5
.3121	.3156	.3192	.3228	.3264	.3300	.3336	.3372	.3409	.3446	−0.4
.3483	.3520	.3557	.3594	.3632	.3669	.3707	.3745	.3783	.3821	−0.3
.3859	.3897	.3936	.3974	.4013	.4052	.4090	.4129	.4168	.4207	−0.2
.4247	.4286	.4325	.4364	.4404	.4443	.4483	.4522	.4562	.4602	−0.1
.4641	.4681	.4721	.4761	.4801	.4840	.4880	.4920	.4960	.5000	−0.0

Model	Formula	Symbols
1. Basic EOQ	$Q_0 = \sqrt{\dfrac{2DS}{H}}$ (12–2) $TC = \dfrac{Q}{2}H + \dfrac{D}{Q}S$ (12–1) Length of order cycle $= \dfrac{Q}{D}$ (12–3)	Q_0 = Economic order quantity D = Annual demand S = Order cost H = Annual carrying cost per unit Q = Order quantity
2. Economic production quantity	$Q_0 = \sqrt{\dfrac{2DS}{H}}\sqrt{\dfrac{p}{p-u}}$ (12–5) $TC = \dfrac{I_{max}}{2}H + \dfrac{D}{Q}S$ (12–4) Cycle time $= \dfrac{Q}{u}$ (12–6) Run time $= \dfrac{Q}{p}$ (12–7) $I_{max} = \dfrac{Q_0}{p}(p-u)$ (12–8)	Q_0 = Optimal run or order size p = Production or delivery rate u = Usage rate I_{MAX} = Maximum inventory level
3. Quantity discounts	$TC = \dfrac{Q}{2}H + \dfrac{D}{Q}S + PD$ (12–9)	P = Unit price
4. Reorder point under: a. Constant demand and lead time b. Variable demand rate c. Variable lead time d. Variable lead time and demand	$ROP = d(LT)$ (12–10) $ROP = \bar{d}\,LT + z(\sigma_d)\sqrt{LT}$ (12–13) $ROP = d\overline{LT} + z(\sigma_{LT})d$ (12–14) $ROP = \bar{d}\,\overline{LT} + z\sqrt{\overline{LT}\sigma_d^2 + \bar{d}^2\sigma_{LT}^2}$ (12–15)	ROP = Quantity on hand at reorder point d = Demand rate LT = Lead time $\bar{d}$ = Average demand rate σ_d = Standard deviation of demand rate z = Standard normal deviation $\overline{LT}$ = Average lead time σ_{LT} = Standard deviation of lead time
5. ROP shortages a. Units short per cycle b. Units short per year c. Annual service level	$E(n) = E(z)\sigma_{dLT}$ (12–16) $E(N) = E(n)\dfrac{D}{Q}$ (12–17) $SL_{annual} = 1 - \dfrac{E(z)\sigma_{dLT}}{Q}$ (12–19)	$E(n)$ = Expected number short per cycle $E(z)$ = Standardized number short σ_{dLT} = Standard deviation of lead time demand $E(N)$ = Expected number short per year SL_{annual} = Annual service level
6. Fixed interval	$Q = \bar{d}(OI + LT)$ $\quad + z\sigma_d\sqrt{OI + LT} - A$ (12–20)	OI = Time between orders A = Amount on hand at order time
7. Single period	$SL = \dfrac{C_s}{C_s + C_e}$ (12–21)	SL = Service level C_s = Shortage cost per unit C_e = Excess cost per unit