SAMPLE QUESTION PAPER 750

Subject: Transportation Systems and Logistic Management
Paper: Logistics Operations and Supply Chain Management – I
Year: 2013 – 14
Time: 2 Hrs
Marks: 60

1. Weightage to Objectives:
   Objectives K U A S Total Percentage of Marks 30% 30% 30% 10% 100%
   Marks 18 18 18 6 60

2. Weightage to form Questions:
   Type of Questions EA SA VSA O Total
   Number of Questions 2 (each 7) 5 (each 4) 8 (each 2) 10 (each 1)
   Marks Allotted 14 20 16 10 60
   Estimated Time 30 40 30 10 120* 10 minutes for paper reading

3. Weightage to Content
   Marks
   Half-yearly Examination
   1. Unit – 1 23
   2. Unit – 2 23
   3. Unit – 3 up to Freight Management Costs 14

4. Scheme of Sections:
   Section Type of Questions Choice Number of questions
   A EQ Internal Choice (Either or Type) 4
   B SQ 5 out of 8 8
   C VSQ 8 out of 11 11
   D OQ 10 (no choice) 10

1. Difficulty Level:
   Difficult 10% of Marks
   Average 50% of Marks
   Easy 40% of Marks

Abbreviations Used:
K – Knowledge  U – Understanding  A – Application  S – Skill
EA/EQ – Essay Answer/Question  SA/SQ – Short Answer/Question
LOGISTICS OPERATIONS AND SUPPLY CHAIN MANAGEMENT – I

Blue Print – Half yearly Examination

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* including choice questions

MODEL QUESTION PAPER

Half- Yearly Examination : : Class – XI

LOGISTICS OPERATIONS AND SUPPLY CHAIN MANAGEMENT – I

Time: 2 Hrs Answer All Sections Max. Marks: 60

SECTION – A (Essay Questions) – 2 x 7 = 14 marks

Answer the following Questions in 40 lines

1. What is logistics? State with examples from real life and explain the functions of logistics with the help of those examples.
   (OR)
2. Explain concept of warehouse and examine its functions.
3. What is a multimodal transport system? Explain its advantages.

(OR)

4. Describe the intermodal relationships in multimodal transport system.

SECTION – B (Short Questions) – 5 x 4 = 20 marks

Answer any Five Questions in 20 lines

5. Explain various types of Warehouses.
6. Distinguish between Inbound and Outbound Logistics.
7. Raw teakwood is to be exported from Malaysia to India in bulk. Which mode of transport would you recommend? What are the advantages and disadvantages of such a mode?
8. Discuss the importance of International movements in Indian economy.
9. Develop a net work route connecting at least 8 nodes with hypothetical time between various nodes and find out the shortest route.
10. What is the need for route management in transportation?
11. What are the basic costs in transportation? Explain.
12. Consider any mode of transportation of your choice and apply hub-spoke model.

SECTION – C (Very Short Questions) – 8 x 2 = 16 marks

Answer any Eight Questions in 6 lines

13. Develop a supply chain considering any product of your choice.
14. Explain any three principles of good routing system.
15. Examine the features of multimodal transport system.
16. Discuss about any two types of intermodal movements.
17. What are the market related factors that influence transport costs?
18. Distinguish between private and public warehouses.
19. The following are monthly costs incurred by Transport Company. Identify the basic costs of transportation.
   
   Rent of container Rs. 1,20,00,000, Rent of office Rs. 27,500, Diesel cost Rs. 80,000, Driver salary Rs. 15,000, Cleaner salary 5,000, Vehicle repairs Rs. 45,000, Loading and unloading costs Rs. 25,000

   20. Indian Oil Company wish supply LP gas to its customers for cooking purpose at cheaper rate by minimizing its transport costs? What is best means of transport?

21. Examine the need for inventory management.
22. Describe the components of supply chain management.
23. Explain the impact of cold chain, considering geographical perspective.

SECTION – D (Objective Questions) – 10 x 1 = 10 marks

Identify the TRUE/FALSE from the following statements and put T if it is true and F if it is False in the braces.
24. Raw material inventories are indirect inventories. (  )
25. Airlines are variable cost carriers. (  )
26. Pipe-lines are variable cost carriers. (  )
27. Intermodal transport system maximises costs and minimises revenue. (  )
28. Alliance of international industries increase in working costs. (  )
29. Balancing inventory reconciles supply availability with demand. (  )

Match the following left hand side words with appropriate words from right hand side and appropriate alphabet in the braces

30. Stow away (a) Incorporates weight and space considerations (  )
31. Density (b) Cost which does not change with the services or volume (  )
32. Variable cost (c) product dimensions and impact of the same on vehicle space utilization (  )
33. Fixed cost (d) cost which changes with the services or volume (  )

Answers:

Section – A

Q.1 Logistics was defined by Greeks as the “Science of correct measures by mathematics”. Logistics is the management of the flow of resources between the point of origin and the point of destination in order to meet some requirements, for example, customers or corporations. The resources managed in logistics can include physical items such as food, materials, equipment, liquids, and staff, as well as abstract items such as information, particles and energy. The term logistics comes from the late 19th century: from French logistique, from loger ‘to lodge’. Logistics is considered to have originated in the military's need to supply itself with arms, ammunition, and rations as it moved from a base to a forward position. In the ancient Greek, Roman, and Byzantine Empires, military officers with the title Logistikas were responsible for financial and supply distribution matters.

Logistic Functions:

Business logistics is a series of separate activities or functions which all fall under a business firm's logistics umbrella they are as follows:

i. Supply:
Consider the supply of materials that you have as this would help meet your self-imposed quota for the company to profit.

ii. Transportation:
This is where logistics management applies. A company should have the transportation services needed to move the products and deliver them in a timely and efficient manner to the customers.
iii. Facilities:
Different companies employ different services according to their needs. Each of them has a different facility which helps produce the products and services which they eventually offer to customers. These facilities should be tailor-made and fit the client's and customer's specifications.

iv. Services:
From customer service to delivering an order on time, to resolving order-related problems, a company should employ a logistics management service provider which will provide all of these services.

iv. Management and Administration:
This is an aspect of logistics management which is common to all organizations. A well balanced and knowledgeable staff and leaders make for a better service-oriented company. In relation to this, here are the important factors that you should consider when employing a logistics management service provider that will best benefit your company.

vi. Inbound Transportation:
You should choose a logistics management service provider who will give out quotes for the inbound transportation costs of components. This might include the delivery of individual components to your production line. For a better price comparison, you may also ask if they can deal with clients who buy some or all of their components from a particular supplier. You can look for cost and time frame quotations that you can use to consider the service provider that is most cost-effective.

vii. Outbound Transportation:
Outbound transportation refers to the carriers which meet the customer's needs. Different clients need various freight and carrier services and a logistics management service provider should be able to provide these individual needs. The deal can either be on an over-all operational basis, or on a per-shipment basis. This provides a comprehensive solution for a company's primary need for logistics. Choose a logistics management service provider, who will provide rate comparisons from different couriers to meet and handle the customer's goals. The main point here is that you need to have somebody to handle and ship out your main products in a safe and timely manner.

viii. Troubleshooting Capabilities:
A logistics management service provider should know how to handle unusual and
day-to-day complications and problems. If a customer has a specific shipping need,
would they be able to deliver and solve the problem? Should a serious delivery or
shipping problem arise, they should be able to troubleshoot and come up with the
perfect solution and at the same time soothe a customer's ruffled feathers.

ix. Keeping Customers Informed:
The customers have the right to know the details about a particular order shipment.
They should be informed of when the products were shipped, how it was shipped and
who shipped it. Some logistics management service provider gives out their contact
numbers directly to their client's customers. This would avoid a pointing of fingers
should problems arise. Also, there is online tracking information available for most
couriers and carriers. All in all, you have to choose a logistics management service
provider that would fit your company's needs so that both of you will reap the benefits
in the end. Logistics has developed from a series of separate activities largely based
on transport, warehousing and procurement, where decisions were seen as largely
operational or tactical. As it evolved into a single function, the strategic impact of
logistics has become more evident.

x. Customer Satisfaction:
Logistics plays an extremely important role in ensuring that customers get the right
products at the right place at the right time. Transportation, warehousing, forecasting,
inventory control and production planning all have a direct impact on customer
satisfaction.
1. Figure: 1.2 Functions of logistics

Q. 2. Concept of Warehouse:

We need different types of goods in our day-to-day life. We may buy some of these items in bulk and store them in our house. Similarly, businessmen also need a variety of goods for their use. Some of them may not be available all the time. But, they need those items throughout the year without any break. Take the example of a sugar factory. It needs sugarcane as raw material for production of sugar. We know that sugarcane is produced during a particular period of the year. Since, sugar production takes place throughout the year, there is a need to supply sugarcane continuously. But how is it possible? Here storage of sugarcane in sufficient quantity is required. Again, after production of sugar it requires some time for sale or distribution. Thus, the need for storage arises both for raw material as well as for finished products. Storage involves proper arrangement for preserving goods from the time of their production or purchase till the actual use. When this storage is done on a large scale and in a specified manner it is called ‘warehousing’. The place where goods are kept is called ‘warehouse’. The person in-charge of warehouse is called ‘warehouse-keeper’.

Warehousing is defined as the storage of goods: raw materials, semi-finished goods, or finished goods. This includes a wide spectrum of facilities and locations that provide warehousing. Since, this is a point in the logistics system where goods are held for varying amounts of time, the flow is interrupted or stopped, thereby creating additional costs to the product.

In a macroeconomic sense, warehousing creates time utility for raw materials, industrial goods and finished products. It also increases the utility of goods by broadening their time availability to prospective customers.

Warehousing refers to the activities involving storage of goods on a large-scale in a systematic and orderly manner and making them available conveniently when needed. In other words, warehousing means holding or preserving goods in huge quantities from the time of their purchase or production till their actual use or sale. Warehousing is one of the important auxiliaries to trade. It creates time utility by bridging the time gap between production and consumption of goods.

Functions of warehouse:
The functions of the warehouse are (i) Receiving (ii) Inspection (iii) Repacking (iv) Put away (v) Storage (vi) Order Picking/Selection (vii) Sortation (viii) Packing and shipping (ix) Cross-docking (x) Replenishing

i. **Receiving**: This includes the physical unloading of incoming transport, checking, recording of receipts and deciding where the received goods are to be put away in the warehouse. It can also include such activities as unpacking and repackaging, quality control checks and temporary quarantine storage for goods awaiting clearance by quality control.

ii. **Inspection**: Quality and quantity check of the incoming goods for their required characteristics.

iii. **Repackaging**: Incoming lot may be having non-standard packaging, which may not be stored as it is in the respective location. In those cases these materials have to be pre packed in unit loads/pallet loads suitable for storage.

iv. **Put away**: Binning and storing the goods in their respective locations including the temporary locations from the receiving docking area.

v. **Storage**: Binning the approved material in their respective locations.

vi. **Order Picking/Selection**: Goods are selected from order picking stock in the required quantities and at the required time to meet customer orders. Picking often involves break bulk operations when goods are received from suppliers say whole pallet quantities, but ordered by customers in less than pallet quantity. Order picking is important for achieving high levels of customer service; it traditionally also takes a high proportion of the total warehouse staff complement and is expensive. The good design and management of picking systems and operations are consequently vital to effective warehouse performance.

vii. **Sortation**: This enables goods coming into a warehouse to be sorted into specific customer orders immediately on arrival. The goods then go directly to order collation.

vii. **Packing and shipping**: Picked goods as per the customer order are consolidated and packed according to customer order requirement. It is shipped according to customer orders and respective destinations.

viii. **Cross-docking**: Move products directly from receiving to the shipping dock – these products are not at all stored in the specific locations.

ix. **Replenishing**: This is the movement of goods in larger order quantities, for example a whole pallet at a time, from reserve storage to order picking to ensure that
order picking locations do not become empty. Maintaining stock availability for order picking is important for achieving high levels of order fill.

Q.3 Multimodal Transport system:

Multimodal transport system is an international through-transport combination with various combinations of modes. The modes may be related to transport vehicles or service operators. The modes of transport may be such as ship, rail, truck, aero plane, car, tram etc. The service modes may be such as public/private operating agencies. Thus, multimodal transport system relates to a single trip consisting of combination of modes between which the consignment has to make a transfer. The transportation of consignment from the origin i.e., shipper’s door to the destination i.e., consignee’s door will be taken up by a single contract. The Contractor manages and co-ordinates the total task and ensures responsibility for safe custody of consignment. The system also ensures continuous movement of the goods along the best route by the most efficient and cost-effective means. The system also involves simplified documentation. Further, the term ‘Intermodal transport’ is also used synonymously with ‘multimodal transport’ and thus, used in the context of movement of goods from origin to destination. These two terms have very similar meanings, i.e. the transportation of goods by more than one mode of transport and a through freight rate.

Figure display multimodal transport system with several modes of transport.

Thus, a consignment stocked at warehouse say H carried manually by walk to truck located at A. The same is loaded on a truck and reaches airport say B. The consignment will be shifted in to flight at B and reaches airport C. On arrival at C, it will be transferred in to truck and reaches railway station D. Thereafter, the consignment will be moved to E by train. Having unloaded at E, it reaches the destination F through manual carrying.

The following Figure display multimodal transport with different agencies. Thus, the consignment is booked through private truck from A to B, thereafter moved through...
flight from B to C. At C, the consignment is moved on private truck to D and finally, it travelled through D to E on train.

Advantages of Multimodal Transport System: The following are advantages of multimodal transport system.

1. Minimizes Time Loss:
   As multimodal transport system is planned and coordinated as a single operation, it minimises the loss of time and the risk of loss and damage to consignment or goods at trans-shipment points.

2. Ensures Smooth and Safe Transport:
   Multimodal transport operator not only maintains his own communication links, but also coordinates interchange and onward carriage smoothly at different trans-shipment points.

3. Provides Faster Transport Service:
   Multimodal transport system provides faster transport of goods. It reduces the disadvantages of distance from markets and the tying-up of capital.

4. Saves Transport Costs:
   Multimodal transport system helps in the reduction of transport costs as single operator completes the entire job of transhipment of goods. Further, the system also helps in the reduction of cargo insurance costs.

5. Improves International Price Competitiveness:
   As multimodal transport system helps in the reduction of transport costs, it will in turn result in reduced export costs and thereby improves international price competitiveness.

6. Reduces Burden of Documentation and Formalities:
   In case of traditional transport system i.e., segmented transport system there arises multiple documentation and other formalities at various stages. However, multimodal transport system reduces the burden of multiple documentation and other formalities as single operator completes the entire job of transshipment of goods.

7. Establishes Unique Agency to deal with:
Unlike segmented transport system, multimodal transport system establishes unique agency to deal with the entire job of transportation. Thus, the consigner deals with only one operator relating to transport, insurance, loss and damage of goods.

Q.4 Intermodal relationships:

Intermodal transport system considers not only various modes of transport, but also involves different operators. All this has become essential, so as to gain competitiveness and to fulfil consignees requirements on costs and quality of the transports. Moreover, the intermodal transport system also calls for sharing of information systems. Thus, intermodal transport system is said to be an integrated system of transport operations, so as to create an efficient and responsive transport service throughout the international transport chain. There exists interrelationship between five parties which affect the transportation system. They are

1. The Shipper (Sending party or originating party)
2. The Consignee (Receiving party or Destination party)
3. The Carrier
4. The Government
5. The Public

There exists interrelationship among the above parties based on their role, perspectives and ownership aspects. The role and perspectives of each party can be outlined as follows:

**Shippers and Consignees:**

The main objective is to transport the goods from origin to desired destination at least possible cost in a specified time limit.

The transportation service is expected to fulfil the characteristics such as (a) No loss or damage of goods, (b) Correct invoicing, (c) Predictable transit time, (d) Specified pickup and delivery times and (e) Accurate transit information.

**Carriers:**

The important objective is to maximise revenue by minimising costs. The carrier tries to charge the maximum possible rate acceptable to shipper or consignee by minimising the operational costs such as labour, fuel and other incidental charges.

In order to achieve the said objectives, the carrier requires flexibility in pickup and delivery time, so as to consolidate the individual transport needs into bulk economic transport means.
**Government:**

The government contemplates to have a stable and efficient transport system, so as to achieve rapid economic growth.

The government desires to have an efficient transport system, so as to ensure the availability of various goods at reasonable price.

The government affects the transport sector through regulation and promotion. Regulation can be done through controls, while promotion is possible through incentives.

**Public:**

Public are more concerned with transport accessibility, efficiency, costs, pollution and safety measures.

Development of transport system to a large extent depends on demand for goods arising from public.

Though minimizing transport cost is important goal to consumers, yet trade-off associated with environmental and safety standards also require due consideration.

The above interrelationships can be shown diagrammatically (Figure 2.8)

The intermodal relationships are said to be complex, in view of interaction between the parties. It leads to often conflicts between parties with micro interests namely shippers, consignees and carriers as well as with a macro interest parties namely government and the public. Finally, conflicts have led to duplication, regulation and restriction of transport services.

![Intermodal Relationships Diagram](image-url)

**SECTION – B (Short Questions)**
Q. 5 Types of Warehouses:

After getting an idea about the need for warehousing, let us identify the different types of warehouses. In order to meet their requirement various types of warehouses came into existence and may be classified as follows:

i. Private Warehouses

ii. Public Warehouses

iii. Government Warehouses

iv. Bonded Warehouses

v. Co-operative Warehouses

i. Private Warehouses: The warehouses, which are owned and managed by the manufacturers or traders to store, exclusively, their own stock of goods are known as private warehouses. Generally, these warehouses are constructed by the farmers’ near their fields, by wholesalers and retailers near their business centers and by manufacturers near their factories. The design and the facilities provided therein are according to the nature of products to be stored.

ii. Public Warehouses: The warehouses which are run to store goods of the general public are known as public warehouses. Anyone can store his goods in these warehouses on payment of rent. An individual, a partnership firm or a company may own these warehouses. To start such warehouses a license from the government is required. The government also regulates the functions and operations of these warehouses. Mostly, these warehouses are used by manufacturers, wholesalers, exporters, importers, government agencies, etc.

iii. Government Warehouses: These warehouses are owned, managed and controlled by central or state governments or public corporations or local authorities. Both government and private enterprises may use these warehouses to store their goods. The Central Warehousing Corporation of India, State Warehousing Corporation and Food Corporation of India are examples of agencies maintaining government warehouses.

iv. Bonded Warehouses: These warehouses are owned, managed and controlled by government as well as private agencies. Private bonded warehouses have to obtain license from the government. Bonded warehouses are used to store imported goods for which import duty is to be paid. Incase of imported goods the importers are not
allowed to take away the goods from the ports till such duty is paid. These warehouses are generally owned by dock authorities and found near the ports.

v. Co-operative Warehouses: These warehouses are owned, managed and controlled by co-operative societies. They provide warehousing facilities at the most economical rates to the members of their society.

Q.6 Inbound Logistics and Outbound Logistics (IBL and OBL):

Logistics manages the flow of inputs from suppliers, the movement of materials through different operations within the organization and the flow of materials out to customers. Moving materials into the organisation from suppliers is called inbound or inward logistics; moving materials out to customers is outbound or outward logistics; moving materials within the organisation (often described as collecting from internal suppliers and delivering to internal customers) is materials management.

IBL: Inbound or inward logistics move materials into an organisation from suppliers

OBL: Outbound or outward logistics move materials from an organisation out to customers

![Logistics Operation Diagram]

Figure: 1.3 Logistics Operation

The original and most elementary notion of logistics is that of a set of three operational activities - movement, storage and rearrangement - that add value to goods. The value added inherent in these activities is based on the following:

Place - Adding place value to items by moving them from locations of lower value for the customer to locations of higher value to the customer.
**Period & Pace** - Adding time value to items by storing them and thereby (i) moving items from periods when they are available (following extraction, harvest, or manufacturing) to periods when customers require them, and (ii) Making all processes more effective - inventory allows for de-coupling the processes along the value chain from each other, so they can each run at their optimal pace according to their own economics.

**Pattern** - Adding order value to items by arranging them in desired quantities and patterns. Example includes consolidation, break-bulk, sequencing and picking/packing, etc.

**Figure: 1.4 Series of logistics activities**

This figure depicts the series of logistics activities associated with the three P-s of logistics. This series presents the activities from the point of view of a single player in the channel - a manufacturer. The left most outbound inventory management activity in the figure however is typically conducted by the vendor of this manufacturer, managing its inventory of outbound goods, which are inbound material for the manufacturer under study. Finally, operational logistics includes a set of specialty activities which support the primary "PPP" activities. These include audit and payment, customs brokerage, order processing, international documentation, etc.

Q.7 Raw wood which is to be transported in bulk may be transported cheaply through water carriers as it is the cheap means of transport compared to other modes. Water transport is the oldest mode of transport. Water transport is generally classified into three types namely inland water ways (rivers, canals, big lakes), domestic coast ways and sea ways. Water transport is more suitable for mass movement of bulk shipments and low value commodities. It is because, water transport cost per tonne per kilometre is very much low. Thus, water transport is preferred to reduce the costs when speed of delivery is not important. Water transport is used to transport bulk wood, iron ore, coal, chemicals, petroleum products etc. Fixed costs relating to water transport are relatively less compared to rail network, but relatively when compared to motor carriers.

**Advantages:**
1. Suitable for mass movement of bulk shipments.
2. Transport cost per tonne per kilometre is very much low.

Disadvantages:
1. Not suitable for quick transport of goods.
2. If the origin and destination of movement are away from water way, it needs more handing charges and also requires supplementing with rail or motor trucks.

Q.8 International Movements:

The ability to transport goods safely, quickly and cost-efficiently to markets is important for international trade, national distributive trades, and economic development. Needless to emphasize that increased volume of domestic as well as foreign trade improves the industry, national income and employment opportunities. Increased incomes and improved employment opportunities in turn not only promote savings and thereby investment, but also pushup the aggregate demand for goods. Thus, trade is identified as engine of economic growth. Hence, transportation sector plays an important role in the promotion of domestic as well as international trade. As per the available statistics, in 2009, world GDP fell by 2.3%, while in the European Union GDP fell by 4.2%, and in the United States and Russia GDP dropped by 2.4% and 7.9% respectively. As a result, world trade volume dropped by 12%. Thus, the global economic crisis and the collapse of world trade in 2009 had major impact on the transport sector. As a result, world container traffic dropped by 26%, while air freight ton-km fell by 10%. The data also indicate that a 23% reduction in rail T-km and over 21% fall in road T-km in the EU. At the same time, rail data for the United States and Russia reports a decline of nearly 14% and 12% respectively.

Q.9 Net work route connecting at least 8 nodes with single origin and destination hypothetical time.
Shortest route is 1 → 3 → and it consumes 27 hrs.

Q.10 **Route Management:**
The transportation cost range between one-third and two-third of total logistics costs. Hence, improving efficiency through the maximum utilization of transportation equipment and personnel is a major concern. To reduce transportation costs and to improve customer service, finding the best paths that a vehicle should follow through a network of roads, rail lines, shipping lanes, or air navigational routes that will minimize time or distance is a frequent decision problem. In this context, Route Management concerns the selection of route between origins and destinations in transportation network. Routes indicate paths taken by trucks, rail, cars, buses, or individuals travelling from place to place. In route management the basic problem is due to variations in origin and destination points such as (1) separate and single origin and destination points (2) multiple origin and destination points.

Q.11 **Four Basic Costs in Transportation**

**Fixed Cost:**
Fixed cost is that cost which does not change with the services or volume. Fixed expenses include administrative cost of taking the transportation order, time to position the vehicle for loading or unloading, invoicing and equipment cost. These costs do not vary with the volume of shipment. In transport pricing, the costs that are constant over the normal operating volume of the carrier are fixed cost. However, in the long run all costs are variable costs.

**Variable Cost:**
Variable cost is that cost which changes with the services or volume. If a truck is driven more miles certain costs increase proportionately. Fuel costs, wages, maintenance costs, and tire replacement depend on output. Variable costs include line-haul costs such as fuel and labour, equipment maintenance, handling and pick-up and delivery. Line-haul transportation rates are based on two important dimensions such as distance and shipper volume.
**Joint costs:**
A joint cost occurs when the production of one product or service requires or offers the production of another product or service. For example, a railroad moves goods from New York to Los Angeles (LA). It now has engines available in Los Angeles to provide back-haul service to New York or additional transportation from Los Angeles. The cost of placing the train in Los Angeles is a joint cost with the New York to LA run and whatever runs follow it. Fixed and variable costs can also be joint costs. All modes incur joint costs to some extent.

**Common Costs:**
Common costs cannot be directly associated with a product or activity. Since this creates confusion, we normally assign activities percentages of these common costs. For example, a tractor/trailer traveling from Dallas to Chicago with three shipments breaks down and requires $5000 in repairs. How much of this repair cost should be allocated to the three different shipments? Is it based on space used, weight or both? That’s the problem with common costs! In transportation, common costs are significant and are found in all modes.

Q.12 **Hub and Spoke System:**
The Hub and Spoke model is a system which makes transportation much more efficient by greatly simplifying a network of routes. It is extensively used in commercial aviation for both passengers and freight and model has also been adopted in the technology sector.

The Hub-Spoke distribution paradigm is a system of connections arranged like a chariot wheel, in which all traffic moves along spokes connected to the hub at the center. This model is commonly used in industry particularly in transport, telecommunications and freight as well as in distributed computing. Thus, the principle of the modern intermodal transportation system is a network of intermodal terminals (including ports) that are mutually interlinked by high capacity double stack train routes and that serve as points of transfer between rail and truck modes. The principle of intermodal terminals is also called “the hub and spoke system” – terminal is the hub and highway routes to customer facilities are spokes. The Hub-Spoke system is as shown in the following Diagram.
Delta Airlines pioneered the method in 1955. But, it was made popular by Fed Ex Express Company in 1970 by using this method to run the airlines. The model is
named after a bicycle wheel, which has a strong central hub with a series of connecting spokes. Routing all the traffic through the Hub actually makes the overall system more efficient.

SECTION – C (Very Short Questions)

Q. 13
Q. 14

1. Truck routes should be formed around clusters of stops that are nearest to each other in order to minimize the inter-stop travel between them.

2. When stops are to be served during different days of the week, the stops should be segmented into separate routing and scheduling problems for each day of the week.

3. Efficient routes can be developed through building stop clusters around the farthest stop from the depot and then working back toward the depot.

Q. 15

1. Consignment or goods pass through more than one transport system.

2. Consignment or goods in international trade pass through more than one carrier.

3. Single operator or contractor completes the entire transportation of consignment.

4. Ensures responsibility for safe custody of consignment.

5. It involves simple documentation.

Q. 16
1. **Sea-Truck:** This intermodal involves the shipment of goods in containers, which are transported on trucks to (from) seaports from (to) their points of origin (destination) for international exports (imports).

![Figure: 2.3 Sea – Truck/Truck – Sea Intermodal](image)

2. **Sea-Rail:** It involves the shipment of goods in containers on oceangoing vessels which are transported by rail on the surface leg line-haul movement. The modal transfer process for the exchange of containers between containerships and railroad flat cars depends on the location of intermodal rail yards.

![Figure: 2.4 Sea – Rail/Rail – Sea Intermodal](image)

**Q. 17**

The degree of intra-mode and inter-mode competitions
2. The location of markets, i.e. distance to which the goods must be transported
3. The nature and extent of government regulation
4. The balance and imbalance of freight traffic in a market
5. Seasonality of product movement
6. Whether the product is being transported domestically or internationally etc.

**Q. 18**

**Private Warehouses:** The warehouses, which are owned and managed by the manufacturers or traders to store, exclusively, their own stock of goods are known as private warehouses. Generally, these warehouses are constructed by the farmers’ near their fields, by wholesalers
and retailers near their business centers and by manufacturers near their factories. The design and the facilities provided therein are according to the nature of products to be stored.

**ii. Public Warehouses:** The warehouses which are run to store goods of the general public are known as public warehouses. Anyone can store his goods in these warehouses on payment of rent. An individual, a partnership firm or a company may own these warehouses. To start such warehouses a license from the government is required. The government also regulates the functions and operations of these warehouses. Mostly, these warehouses are used by manufacturers, wholesalers, exporters, importers, government agencies, etc.

Q. 19 Fixed Costs are: Rent of Container, Rent of Office,  
Variable Costs are: Diesel cost, Driver Salary, Cleaner salary, Vehicle repairs, loading and unloading costs

Q. 20  
LP gas can be transported through pipeline by minimizing transport costs. Pipelines can be operated throughout the 24 hours and seven days per week without any interruption. The basic advantage of pipeline transport is, there arises no need of returning the empty carrier/vehicle. Pipeline incurs higher fixed costs for the purpose of right – of way, construction, requirements of control stations and pumping capacity. However, variable operating costs are extremely low on account of low amount of labour requirement.

Q. 21  
Inventory management involves a retailer seeking to acquire and maintain a proper merchandise assortment while ordering, shipping, handling and related costs are kept in check. It also involves systems and processes that identify inventory requirements, set targets, provide replenishment techniques, report actual and projected inventory status and handle all functions related to the tracking and management of material. Thus, Inventory management is primarily about specifying the shape and percentage of stocked goods. It is required at different locations within a facility or within many locations of a supply network to precede the regular and planned course of production and stock of materials.

Q. 22  
In its simplest form, a supply chain is composed of a company and the suppliers and customers of that company. This is the basic group of participants that creates a simple supply chain. Extended supply chains contain three additional types of participants. First there is the supplier’s supplier or the ultimate supplier at the beginning of an extended supply
chain. Then there is the customer’s customer or ultimate customer at the end of an extended supply chain. Finally, there is a whole category of companies who are service providers to other companies in the supply chain. These are companies who supply services in logistics, finance, marketing and information technology.

Q. 23

From a geographical perspective, the cold chain has the following impacts:

- **Global.** Specialization of agricultural functions permitting the transport of temperature sensitive food products to distant markets. Enables the distribution of vaccines and other pharmaceutical or biological products from single large facilities.

- **Regional.** Can support the specialization of production and economies of scale in distribution. This could involve specialized laboratories exchanging temperature sensitive components or large cold storage facilities servicing regional grocery markets.

- **Local.** Timely distribution to the final consumer of perishables, namely grocery stores and restaurants.

**SECTION – D (Objective Questions)**

Q. 24  F  
Q. 25  T  
Q. 26  F  
Q. 27  F  
Q. 28  F  
Q. 29  T  
Q. 30 (b)  
Q. 31 (a)  
Q. 32 (d)  
Q. 33 (c)

**SAMPLE QUESTION PAPER**

**ANNUAL EXAMINATION**

**Subject: Transportation Systems and Logistic Management**  
**Paper: Logistics Operations and Supply Chain Management – I**
Year: 2013 – 14
Time: 2 Hrs
Marks: 60

4. Weightage to Objectives:

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* 10 minutes for paper reading

6. Weightage to Content

Annual Examination

1. Unit – 1  11
2. Unit – 2  12
3. Unit – 3  13
4. Unit – 4  13
5. Unit – 5  11

5. Scheme of Sections:

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6. Difficulty Level:

- Difficult 10% of Marks
- Average 50% of Marks
- Easy 40% of Marks

Abbreviations Used:

- K – Knowledge
- U – Understanding
- A – Application
- S – Skill
- EA/EQ – Essay Answer/Question
- SA/SQ – Short Answer/Question
LOGISTICS OPERATIONS AND SUPPLY CHAIN MANAGEMENT – I

Class XI (Theory)

Time Allowed: 2 Hours
Max Marks: 60

Blue Print - Annual Examination

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*including choice questions

MODEL QUESTION PAPER

Annual Examination: Class – XI

LOGISTICS OPERATIONS AND SUPPLY CHAIN MANAGEMENT – I

Time: 2 Hrs
Answer All Sections
Max. Marks: 60

SECTION – A (Essay Questions) – 2 x 7 = 14 marks

Answer the following Questions in 40 lines
1. What is supply chain management? Explain the supply chain principles.  
   (OR)
2. Explain various types of intermodal freight movements.
3. Discuss the Hub and Spoke system with suitable example showing diagrammatically the system  
   (OR)
4. Explain various types of railway accidents.

SECTION – B (Short Questions) – 5 x 4 = 20 marks
Answer any Five Questions in 20 lines

5. Examine any five functions of Warehouses with your own suitable examples?
6. Examine the intermodal relationships in transport.
7. Discuss the advantages of multimodal transport system.
8. Discuss the safety measures to be followed by big shopping malls dealing with a large variety of goods.
9. Explain the functions of storage system with your own suitable examples.
10. What are the objectives of material handling?
11. Explain about disaster management in railways.
12. What type of hazards do you come across in a Pharma Company?

SECTION – C (Very Short Questions) – 8 x 2 = 16 marks
Answer any Eight Questions in 6 lines

13. Define the term logistics and explain it with your own examples.
14. Distinguish between fluctuation and anticipation inventories with your own examples.
15. Explain the global and local impact of cold chain.
16. Discuss the advantages and disadvantages of rail network.
17. Examine the need for stacking.
18. Mention any three principles of material handling suitable in a four wheeler manufacturing Company.
19. Explain any three reasons for road accidents?
20. Point out any two precautions to be taken in the transportation of petroleum products.
21. Examine the need of ISO in logistics.
22. Distinguish between quality control and quality assurance with your own suitable examples.
23. How do you protect workers against hazards in Iron and steel industry?

SECTION – D (Objective Questions) – 10 x 1 = 10 marks
Identify the TRUE/FALSE from the following statements and put T if it is true and F if it is False in the braces.

24. Stacks in pyramid or stepped form on two is a stepped stack ( )
25. Balancing inventory reconciles supply availability with demand. ( )
26. Intermodal transport system involves only single operator. ( )
27. Multimodal transportation system involves multiple documentation. ( )
28. Securing cargo in transit from theft or pilferage is a challenge. ( )

Match the following left hand side words with appropriate words from right hand side and appropriate alphabet in the braces

29. Chemical hazards (a) Wear ear plugs or ear muffs ( )
30. Noise hazards (b) Corrosive, irritating, toxic, flammable or carcinogenic ( )
31. Vibration hazard (c) occur most commonly in warehouse ( )
32. Thermal stress (d) sufficient cushioning or vibration absorbers on the seats ( )
33. Manual Handling hazards (e) Avoid thick clothing ( )

Answers:

SECTION – A (Essay Questions)

Q.1 Supply Chain Management:

The Supply Chain Management Program integrates topics from manufacturing operations, purchasing, transportation, and physical distribution into a unified program. Successful supply chain management, then, coordinates and integrates all of these activities into a seamless process. It embraces and links all of the partners in the chain. In addition to the departments within the organization, these partners include vendors, carriers, third party companies, and information systems providers.

Supply chains encompass the companies and the business activities needed to design, make, deliver, and use a product or service. Businesses depend on their supply chains to provide them with what they need to survive and thrive. Every business fits into one or more supply chains and has a role to play in each of them. The pace of change and the uncertainty about how markets will evolve has made it increasingly important for companies to be aware of the supply chains, they participate in and to understand the roles that they play. Those companies that learn how to build and participate in strong supply chains will have a substantial competitive advantage in their markets.

For instance, a wholesaler acts as a customer, when buying goods from manufacturers and then as a supplier when selling goods to retailers. A manufacturer buys raw materials from suppliers, assembles these into finished products and sells them to wholesalers. As a
result, most products move through a series of organisations as they travel between original suppliers and final customers. Milk moves through a farm, tanker collection, dairy, bottling plant, distributor and supermarket before we buy it. A tooth brush starts its journey with a company extracting crude oil and then it passes through pipelines, refineries, chemical works, plastics companies, manufacturers, importers, wholesalers and retailers before finishing in your bathroom. A sheet of paper moves through a string of organisations before it reaches your desk. People use different names for these chains of activities and organisations. When they emphasise the operations, they refer to the process; when they emphasise marketing, they call it a logistics channel; when they look at the value added, they call it a value chain; when they see how customer demands are satisfied, they call it a demand chain. Here we are emphasising the movement of materials and use the most common term of supply chain.

Supply-Chain Principles:

There are seven principles as articulated by Andersen Consulting are as follows:

1. **Segment customers based on service needs**: Companies traditionally have grouped customers by industry, product, or trade channel and then provided the same level of service to everyone within a segment. Effective supply-chain management, by contrast, groups customers by distinct service needs--regardless of industry--and then tailors services to those particular segments.

2. **Customise the Supply Chain Management network**: In designing their Supply Chain Management network, companies need to focus intensely on the service requirements and profitability of the customer segments identified. The conventional approach of creating a "monolithic" Supply Chain Management network runs counter to successful supply-chain management.

3. **Listen to signals of market demand and plan accordingly**: Sales and operations planning must span the entire chain to detect early warning signals of changing demand in ordering patterns, customer promotions, and so forth. This demand-intensive approach leads to more consistent forecasts and optimal resource allocation.

4. **Differentiate product closer to the customer**: Companies today no longer can afford to stock pile inventory to compensate for possible forecasting errors. Instead, they need to postpone product differentiation in the manufacturing process closer to actual consumer demand.

5. **Strategically manage the sources of supply**: By working closely with their key suppliers to reduce the overall costs of owning materials and services, supply-chain management
leaders enhance margins both for themselves and their suppliers. Beating multiple suppliers over the head for the lowest price is out, Andersen advises "Gain sharing" is in.

6. **Develop a supply-chain-wide technology strategy:** As one of the cornerstones of successful supply-chain management, information technology must support multiple levels of decision making. It also should afford a clear view of the flow of products, services, and information.

7. **Adopt channel-spanning performance measures:** Excellent supply-chain measurement systems do more than just monitor internal functions. They adopt measures that apply to every link in the supply chain. Importantly, these measurement systems embrace both service and financial metrics such as each account's true profitability.

   These principles are not easy to implement, because they run counter to ingrained functionally oriented thinking about how companies organise, operate, and serve customers. The organisations that do persevere and build a successful supply chain have proved convincingly that you can please customers and enjoy growth by doing so.

**Q.2 Types of Intermodal Movements:**

Intermodal movement of goods or consignments involves the use of two or more modes of transportation in a closely linked network for the continuous movement of goods. The following are different types of intermodal freight movements.

1. **Sea-Truck:** This intermodal involves the shipment of goods in containers, which are transported on trucks to (from) seaports from (to) their points of origin (destination) for international exports (imports).

2. **Sea-Rail:** It involves the shipment of goods in containers on oceangoing vessels which are transported by rail on the surface leg line-haul movement. The modal transfer process for the exchange of containers between containerships and railroad flat cars depends on the location of intermodal rail yards.
3. **Truck-Rail:** This intermodal involves the shipment of trailers on railroad flatcars, the trailers being transported by trucks between points of origin and destination and intermodal ramps.

4. **Air-Truck:** This intermodal involves the movement of goods in air freight containers, which are carried on trucks to/from air cargo terminals from/to their points of origin and destination.

5. **Barge-Truck:** This intermodal involves the movement of goods in containers or trailers on barges that are transported on trucks for the surface leg of the shipment. Roll-on/roll-off barge transport is an example of barge-truck intermodal movement, in which wheeled containers or trailers are transported on barges, which are loaded and unloaded by the means of ramps, without the use of cranes.
Q. 3 Hub and Spoke System:

The Hub and Spoke model is a system which makes transportation much more efficient by greatly simplifying a network of routes. It is extensively used in commercial aviation for both passengers and freight and model has also been adopted in the technology sector.

The Hub-Spoke distribution paradigm is a system of connections arranged like a chariot wheel, in which all traffic moves along spokes connected to the hub at the center. This model is commonly used in industry particularly in transport, telecommunications and freight as well as in distributed computing. Thus, the principle of the modern intermodal transportation system is a network of intermodal terminals (including ports) that are mutually interlinked by high capacity double stack train routes and that serve as points of transfer between rail and truck modes. The principle of intermodal terminals is also called “the hub and spoke system”—terminal is the hub and highway routes to customer facilities are spokes. The Hub-Spoke system is as shown in the following Diagram 3.6

Delta Airlines pioneered the method in 1955. But, it was made popular by Fed Ex Express Company in 1970 by using this method to run the airlines. The model is named after a bicycle wheel, which has a strong central hub with a series of connecting spokes. Routing all the traffic through the Hub actually makes the overall system more efficient.
This model is also applicable to other forms of transportation as follows:

1. Sea transport, where feeder ships transport shipping containers from different ports to a central container terminal to be loaded onto larger vessel.

2. Cargo airlines; for example most UPS Airlines flights travel through its World port at Louisville International Airport, and a significant portion of Fed Ex Express parcels are processed at its ‘Super hub’ at Memphis International Airport.

3. Freight rail transport, where cargo is hauled to a central exchange terminal. At the terminal, shipping containers are loaded from one freight car to another and classification yards are used to sort freight cars into trains and divide them according to varying destinations.

4. Public transit utilizes various transport hubs to allow passengers to transfer between different lines or transportation modes.

5. For passengers road transport, the spoke-hub model does not apply because drivers generally take the shortest or fastest route between two points.

Q. 4 Railway Accidents

Railway accidents are classified as shown here.

**Head on collision:** It is the collision on a single line railway. It clearly means that at least one of the trains has passed a signal at danger. Or the signal man has made a major error. Head on collisions may occur at major junction due to similar reason.
Rear end collision: A *rear-end collision* is a rail accident wherein a train crashes into another train in front of it. Usually it is caused by tailgating or sudden stops. This is usually caused by the errors of the signal man or the carelessness of the driver.

Collisions with buffer stops: A buffer stop or bumper is a device to prevent railway vehicles from going past the end of a physical section of track. The design of the buffer stop is dependent in part upon the kind of couplings that the railway uses.

Derailment: A derailment is an incident on a railway or tramway in which one or more rail vehicles leave the tracks on which it is, or they are, travelling.

Errors of the driver & Signal man: Negligence from the part of the engine driver and the signal man is another classification of accident

Causes of derailment: There are several causes of derailment: 1) broken or misaligned rails, 2) excessive speed (especially on curves), 3) faults in the train and its wheels, 4) faults in sets of points. 5) Derailment as a result of a collision.

Rail breakages

There are many reasons for rail break. Wheel burns occur when high temperatures are generated if a driven axle rotates with little forward movement. This changes the metallurgy of a rail, and will easily be broken.

Rail breaks at rail joints

In jointed track, rails are usually connected with bolted fishplates. The web of the rail experiences large shear forces and this is increased around the bolt hole. This leads to star...
cracking from the bolthole. This can lead to a triangular piece of rail at the joint becoming separated.

**Manufacturing defects in rail:** For durability manufacturers make harder rail steel. This has the effect of reducing the rate of surface wear. As a result micro-cracking develops. This leads to catastrophic fatigue cracking.

![Buffer stop](image1.png)  ![Derailment](image2.png)

**Wheel burn-related rail breaks**
Sometimes a locomotive wheel spins without moving the train forward (also known as slipping). The small section of rail directly under the wheel is heated by the forces of friction between the wheel and itself. The wheel rests on an area of rail about two centimetres long, so the heating effect is much localized and occurs very quickly. The heated spot is cooled down very quickly, resulting in undesirable changes to the steel metallurgy.

![Fishplate bolted joint](image3.png)  ![A rail break](image4.png)
Wheel flat-related rail breaks
If the brakes are dragging or the axle stops to move on a rail vehicle while the train is in motion, the wheel will be dragged along the head of the rail. This causes to develop a ‘flat spot’ on the wheel surface where it contacts the rail. When the brakes are subsequently released, the wheel will continue to roll around with the flat spot, causing a banging noise with each rotation. This condition is known as a wheel flat. This causes a rail break.

Safety Measures: Improve the railway traffic environment: To ensure safety of railway traffic, good quality railway tracks and operational safety facilities are needed.

SECTION – B (Short Questions)

Q. 5 Functions of warehouse:
The functions of the warehouse are (i) Receiving (ii) Inspection (iii) Repacking (iv) Put away (v) Storage

i. Receiving: This includes the physical unloading of incoming transport, checking, recording of receipts and deciding where the received goods are to be put away in the warehouse. It can also include such activities as unpacking and repackaging, quality control checks and temporary quarantine storage for goods awaiting clearance by quality control.

ii. Inspection: Quality and quantity check of the incoming goods for their required characteristics.

iii. Repackaging: Incoming lot may be having non-standard packaging, which may not be stored as it is in the respective location. In those cases these materials have to be pre packed in unit loads/pallet loads suitable for storage.

iv. Put away: Binning and storing the goods in their respective locations including the temporary locations from the receiving docking area.

v. Storage: Binning the approved material in their respective locations.

Q. 6 Intermodal relationships:
There exists interrelationship among the above parties based on their role, perspectives and ownership aspects. The role and perspectives of each party can be outlined as follows:

Shippers and Consignees:
The main objective is to transport the goods from origin to desired destination at least possible cost in a specified time limit.
The transportation service is expected to fulfil the characteristics such as (a) No loss or damage of goods, (b) Correct invoicing, (c) Predictable transit time, (d) Specified pickup and delivery times and (e) Accurate transit information.

Carriers:

The important objective is to maximise revenue by minimising costs. The carrier tries to charge the maximum possible rate acceptable to shipper or consignee by minimising the operational costs such as labour, fuel and other incidental charges.

In order to achieve the said objectives, the carrier requires flexibility in pickup and delivery time, so as to consolidate the individual transport needs into bulk economic transport means.

Government:

The government contemplates to have a stable and efficient transport system, so as to achieve rapid economic growth.

The government desires to have an efficient transport system, so as to ensure the availability of various goods at reasonable price.

The government affects the transport sector through regulation and promotion. Regulation can be done through controls, while promotion is possible through incentives.

Public:

Public are more concerned with transport accessibility, efficiency, costs, pollution and safety measures.

Development of transport system to a large extent depends on demand for goods arising from public.

Though minimizing transport cost is important goal to consumers, yet trade–off associated with environmental and safety standards also require due consideration.

The above interrelationships can be shown diagrammatically (Figure 2.8)

The intermodal relationships are said to be complex, in view of interaction between the parties. It leads to often conflicts between parties with micro interests namely shippers, consignees and carriers as well as with a macro interest parties namely government and the public. Finally, conflicts have led to duplication, regulation and restriction of transport services.
Q.7 Advantages of Multimodal Transport System

The following are advantages of multimodal transport system.

1. Minimizes Time Loss:
   As multimodal transport system is planned and coordinated as a single operation, it minimises the loss of time and the risk of loss and damage to consignment or goods at trans-shipment points.

2. Ensures Smooth and Safe Transport:
   Multimodal transport operator not only maintains his own communication links, but also coordinates interchange and onward carriage smoothly at different trans-shipment points.

3. Provides Faster Transport Service:
   Multimodal transport system provides faster transport of goods. It reduces the disadvantages of distance from markets and the tying-up of capital.

4. Saves Transport Costs:
   Multimodal transport system helps in the reduction of transport costs as single operator completes the entire job of transhipment of goods. Further, the system also helps in the reduction of cargo insurance costs.

5. Improves International Price Competitiveness:
   As multimodal transport system helps in the reduction of transport costs, it will in turn result in reduced export costs and thereby improves international price competitiveness.

6. Reduces Burden of Documentation and Formalities:
   In case of traditional transport system i.e., segmented transport system there arises multiple documentation and other formalities at various stages. However, multimodal transport system reduces the burden of multiple documentation
and other formalities as single operator completes the entire job of transshipment of goods.

7. Establishes Unique Agency to deal with:
Unlike segmented transport system, multimodal transport system establishes unique agency to deal with the entire job of transportation. Thus, the consigner deals with only one operator relating to transport, insurance, loss and damage of goods.

Q.8 The important safety measures to be taken at material storage place is as explained below:
1. Floors and supporting surfaces: Floors or surfaces required to support stocks, shelving, racks or other means of storage should be capable of sustaining the intended load together with shock loads.
2. Stock holding structures: Racks, shelving, bins, hoppers and other structures for the storage materials should be adequately designed to support and contain the materials for which they are used. Fire protective partitions should be used between stored items.
3. Positioning of stacks: Building of stacks within wall and gap between the stack and the wall should be maintained properly. Extra care should be taken, if the storage area is affected by vibration from rail or road traffic outside or inside the premises.
4. Storage racks and shelves should preferably be non-combustible and not prone to retain water.
5. Suitable means should be used to protect workers from injury due to sharp corners, projections or edges on structures and/or stored material.
6. Safe access, such as ladders, platform or walkways must be provided for workers required to climb or remove goods from stacks, shelves and fixtures.
7. Safety belts are useful aids when dealing with high stacks and awkward shapes.

Q.9 Functions of Storage System:
The storage system can be separated into two important functions; inventory holding (storage), and material handling.

Storage functions:
Storage facilities are designed around four primary functions such as (1) Holding, (2) Consolidation, (3) Break-bulk and (4) Mixing.
1. **Holding:**
The most use of storage facilities is to provide protection and the orderly holding of inventories. The facilities are different for different purposes such as long-term specialized storage (aging of liquor), general purpose merchandise storage (seasonal holding of goods), temporary holding of goods.

2. **Consolidation:**
Transportation rate structure influence the use of storage facilities. If goods originate from a number of sources, it may be economical to establish a collection point to consolidate the small shipments into larger ones and to reduce overall transportation costs.

1. **Break-Bulk:**
Using storage of break-bulk is the opposite of using them to consolidated shipments. For example, volume shipments having low transport rates are moved to the warehouse and then reshipped in smaller quantities. Break-bulk is common in distribution.

2. **Mixing:**
Firms that purchase from a number of manufacturers to fill a portion of their product line at each of number plants may find that establishing a warehouse as a product mixing point offers transportation economies. Without a mixing point, customer orders might be filled directly from producing points at high transportation rates on small volume shipments. A mixing point permits volume shipments of portions of the product line to be collected at a single point and then assembled into orders and reshipped to customers.

However, a company must pay storage system costs either through rates charged by an outside firm offering such services or through internal costs generated from the particular materials handling system in a company-controlled warehouse. There are four different systems such as public warehousing; leased warehousing, manual handling; private warehousing, pallet and forklift truck handling; and private warehousing, automated handling.

Q. 10 **Objectives of Material Handling:**

The following are objectives of material handling:

1. To increase the warehouse facility’s usable capacity because utilizing as much of this space as possible minimizes the warehouse’s operating cost. Many warehouses waste the vertical space by not storing goods as high as possible.

2. To reduce the number of times a company handles goods. Generally, a company moves products into a warehouse and places them in a storage area. Later moves them
to an order selection area to be picked and made up into orders. And finally moves the 
product again to ready them for shipment to customers. During this process, many 
unavoidable movements may possible. Therefore, the design of any materials-
handling system and its associated activities should minimize movement to, within, 
and from a warehouse.

3. The objective of effective working conditions has a number of significant dimensions 
in the logistics area, including safety. All materials-handling systems, whether in 
connection with logistics or manufacturing, should minimize danger to nearby 
workers while enhancing productivity.

4. To eliminate as much as possible short-distance warehouse movements, which are 
monotonous and involve heavy manual labour.

5. To improve efficiency by making the logistics system responds quickly and 
efficiently to plant and customer requirements.

6. To reduce cost with efficient material handling. By utilizing space more efficiently 
and misplacing items less frequently will lead to decreased cost.

Q. 11 Disaster Management in Railways

Railway has a Contingency Disaster Management plan under the Commercial 
Department. Commercial Control office in Head quarters is monitored by officers on round 
the clock basis. They collect information of the time and place of accident, number of people 
injured/dead, details of special trains to the accident site etc. Reservation chart or passenger 
reservation slips, telephone number or fax number of the control room, hospitals nearby etc 
will also be prepared.

(1) Divisional office will set up a Control office at the site with telephone, FAX and Public 
Announcement System (PAS). Announcement may be made for registering the names of 
injured passengers, and the list will be verified by doctors to be given to the Control offices at 
the divisions and head quarters, separately indicating the extent of injury - Trivial, simple & 
serious.

(2) The site Control office will maintain a log book. Flow of information both incoming and 
outgoing will be recorded. All necessary arrangements for refund as per rules will be made.

(3) A manual/ guide will be made available to train crew like; TTEs, AC Coach Attendants, 
AC Pantry Car Staff, which will include DOs & DONTs for them in case of accidents.
(4) Commercial Control will ensure that at stations where trains are Delayed, Diverted, or Terminated, additional alphabetical list of passengers on board with their current status must be available and displayed at enquiry counters for quicker dissemination of information. It will be ensured by CCM/IT, Divisional Control and Divisional Commercial Officers.

Duties of ticket checking staff on board will be:

(1) Collect Railway staff, Doctors and volunteers on the train or near the accident site for obtaining assistance. (ii) Provide assistance to Guard in making quick assessment of assistance required. (iii) To carry out the duties assigned to them by Guard/Senior official present at the site of the accident. (iv) Take action to save lives and render First Aid and organize relief operations with the available assistance.

Q. 12 Pharma Company uses vide variety of chemicals. Hazardous chemicals may be corrosive, irritating, toxic, flammable or carcinogenic. Direct skin contact with some chemicals may cause burns or skin rashes from irritation or allergy. Chemical spills and splashes may damage the eyes. Volatile chemicals such as solvents can be inhaled. High concentrations of vapor or gas can accumulate in poorly ventilated areas. It is therefore important that the workers, who work with chemicals aware of hazards, trained in handling chemicals and follow safe work practices to avoid chemical exposure.

Safe-work practices for handling hazardous chemicals:

a) Provide local exhaust ventilation where there is a risk of inhalation
b) Provide emergency showers and eye wash where corrosives are handled
c) Wear suitable personal protective equipment
d) Do not allow unauthorized access to hazardous chemicals
e) Inspecting chemical stores regularly to check for deterioration or leakage
f) Keep stored quantity to a minimum
g) Ensure that all chemical containers are properly labeled and warning signs are displayed in and around areas of chemical stores.
h) No smoking should be allowed at or near the storage area
i) Suitable fire-fighting equipment should be available
j) Highly toxic chemicals should be stored in double containment and kept under lock
k) Acids or alkalis should be stored in plastic or other suitable containers
l) Reactive chemicals should be stored in isolated, cool, dry areas and away from direct sunlight
SECTION – C (Very Short Questions)

Q. 13
Logistics was defined by Greeks as the “Science of correct measures by mathematics”. Logistics is the management of the flow of resources between the point of origin and the point of destination in order to meet some requirements, for example, customers or corporations. The resources managed in logistics can include physical items such as food, materials, equipment, liquids, and staff, as well as abstract items such as information, particles and energy. The term logistics comes from the late 19th century: from French logistique, from loger 'to lodge'. Logistics is considered to have originated in the military's need to supply itself with arms, ammunition, and rations as it moved from a base to a forward position.

Q. 14
Fluctuation inventories have to be carried because sales and production times for the product cannot always be predicted accurately. There are fluctuations in demand and lead-times required to manufacture items. These require reserve stocks or safety represent the fluctuation inventories.

2. Anticipation inventories are built up in advance for a big selling season, a promotion programme or a plant shut-down period. Basically anticipation inventories store men and machine hours for future need. It is frequently impossible and impracticable to manufacture or purchase items at the same rate at which they will be sold. The items are, therefore, obtained in larger quantities than are needed. This results in the lot-size inventory.

Q. 15

- **Global.** Specialization of agricultural functions permitting the transport of temperature sensitive food products to distant markets. Enables the distribution of vaccines and other pharmaceutical or biological products from single large facilities.

- **Local.** Timely distribution to the final consumer of perishables, namely grocery stores and restaurants.

Q. 16

Advantages:
The advantages of rail transport are (1) Economy, (2) Reliability (3) Efficiency of Energy
1. Railway freight charges are relatively low compared to other modes of transport, particularly for transportation of goods at bulk over long distances.

2. Rail transport is highly reliable as it is independent of weather conditions.

3. Rail transport is energy efficient compared to motor transport.

Disadvantages:

1. Rail transport is uneconomical in case of small shipments and for short distances.

2. Terminal handling costs are high and also such handling facilities may not be available at certain terminals.

3. Time schedules are not flexible.

Q. 17
In any business, it is likely to involve the stacking and storage of goods and materials. Every year accidents occur while goods are being stacked or destacked and put into or taken out of storage. Many of these accidents are serious—some are fatal. Racks, shelving bins, hoppers and other structures for the storage of materials should be adequately designed to support and contain the materials for which they are used. Proper care should be made for the possibility of stored materials becoming water logged and for shock loads from placing materials or from accidental contact by handling equipment. When partitions are used to increase storage capacity, or to separate stored materials, they should be adequately designed and be of sufficient strength to contain the stored material safely. Fire-protective partitions should be used between stored items of differing vulnerability to fire. The corners or ends of shelving and racks should be protected from damage by forklift trucks or mechanised equipment by steel posts, angle irons or other means.

Q. 18
Planning principle: All material handling should be the result of deliberate plan where the needs, performance objectives and functional specification of the proposed methods are completely defined at the outset.

Standardization Principle: Material handling methods, equipment, controls and software should be standardized within the limits of achieving overall performance objectives and without sacrificing needed flexibility, modularity and throughput.

Work principle: material handling work should be minimized without sacrificing productivity of the level of required of the operation

Q. 19

Over Speed
“Speed thrills, but kills”. The craze for a mad chase is the first and foremost reason for most of the accidents. While driving one must bear in mind that you are not the only driver on the road and you are not the only person who has busy schedules.

**Mobile phones:** A Mobile is a bane for a driver rather than a boon while driving. Many an accident takes place due to its use, while the vehicle is on the run. A common sight along the Indian roads is the use of mobile while driving. It is often alarming to see that the bikers use mobile phone and ride free hand.

**Drunk driving.** It continues to be the major cause for road accidents and fatalities. Driving under influence of alcohol took 10,553 lives in 2011.

**Q. 20**

Every goods carriage carrying Petroleum products shall display a distinct mark of the class label showing that it is carrying inflammables.

Every goods carriage carrying petroleum products shall be fitted with a techograph, an instrument to record the lapse of running time of the motor vehicle; time speed maintained, acceleration and declaration etc., and a spark arrester.

**Q. 21**

ISO is defined as International Organization for Standardization. A standard is a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services fit for the purpose.

In logistics the maintenance of certain standards is the need of today as the trade at international level has been increased and the freight movement also has been enhanced simultaneously. Hence, the setting up and implementation of certain minimum standards is very much needed. The ISO sets the quality maintenance standards as per the changing conditions.

**Q.22**

**Quality Control (QC):** Quality control entails the basic procedural and statistical management of quality:

- defect-free services;
- Management-driven.

**Quality Assurance (QA):** A greater emphasis on achieving user/user satisfaction through user/user-driven quality characterizes. This is the shift from QC to QA:

- 100% satisfied user/user
- user-driven
Q. 23

The workers in Iron and steel industry work under extreme temperature conditions like too hot and exposed to thermal stress. It may lead to the health problems like headaches, fatigue and heat disorders like heat strokes, heat cramps and heat exhaustion, hypothermia, frostbites etc.

Some of the solutions to prevent heat stress

- provide proper ventilation for air exchange in warehouses
- avoid thick clothing
- drinking plenty of water to prevent water loss

SECTION – D (Objective Questions)

Q. 24  F
Q.25  T
Q.26  T
Q.27  F
Q.28  T
Q.29  (b)
Q.30  (a)
Q.31  (d)
Q.32  (e)
Q.33  (c)