K.S.R. COLLEGE OF ENGINEERING (Autonomous) R 2018

SEMESTER - II

BA18211	OPERATIONS MANAGEMENT	L	T	P	C
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Objective(s):

1. *To gain the knowledge of fundamental terminologies in production process*
2. *To know the uses of forecasting and aggregate planning*
3. *To Illustrate the suitable techniques of project management to the organization*
4. *To Discuss the product, services and work system to improve productivity*
5. *To Acquire Knowledge in material management and its uses in production process.*

UNIT - I INTRODUCTION TO PRODUCTION AND OPERATIONS MANAGEMENT [09 Hrs]

Production Systems: nature, importance, characteristics of modern production, Recent trends in Production Management – Strategic Operations Management: meaning, process, elements of operation strategy, role of operations in strategic management, Operation Strategy on Competitive Priorities – Comparison of International and Domestic Operations Management.

UNIT - II FORECASTING, CAPACITY AND AGGREGATE PLANNING [09 Hrs]

Demand Forecasting – need, types, objectives, process, Qualitative and Quantitative Methods – Capacity planning: definitions, types, long range capacity factors,– Aggregate planning: concept, need and steps – Master Production Schedule: function, Rough Cut Capacity – Capacity Requirement Planning(CRP): concept and process – Introduction to MRP I,II and ERP.

UNIT - III PROJECT AND FACILITY PLANNING [09 Hrs]

Project Management: scheduling techniques, PERT, CPM, Crashing CPM Network (Simple Problem), Facility Location: meaning, steps in selection and Location Models – Facility Layout: objectives, types, planning tools and techniques.

UNIT - IV DESIGN OF PRODUCT, SERVICE AND WORK SYSTEMS [09 Hrs]

Product Design: factors and characteristics. – Process: planning, selection, strategy, Major Decisions – Service Operations: Types, Strategies and Scheduling (Multiple Resources and Cyclical Scheduling) – Work Study: objectives, benefits and steps – Method Study: Procedure, Motion Study and Motion Economy. – Work Measurement: concepts and steps – Productivity: measuring and methods to improve productivity.

UNIT - V MATERIALS MANAGEMENT [09 Hrs]

Materials Management: objectives, planning, budgeting and control – Materials Management Information System (MMIS) – Purchasing: objectives, functions, policies, vendor rating and value analysis – Stores Management: nature, layout, classification and coding – Inventory: objectives, costs and control techniques – Concepts of JIT,KANBAN.

Total (L: 45 T: 0) = 45 Periods

Course Outcomes: **On completion of this course, the student will be able to:**

1. *Acquire the fundamental knowledge in operation management*
2. *Apply forecasting techniques to improve the production process*
3. *Provide quality work by analyzing the complex problem in the supply chain system*
4. *Familiarize with the product, services and work system to improve production*
5. *Understand the role and importance of material management and its techniques to effective handling*

Reference Books :

1. Aswathappa K and Shridhara Bhat K, Production and Operations Management, Revised Fourth Edition, Himalaya Publishing House, 2015.
2. Norman Gaither and Gregory Frazier, Operations Management, South Western Cengage Learning, 2014.
3. Pannerselvam R, Production and Operations Management, Fifth Edition, Prentice Hall India, 2015
4. Kanishka Bedi, Production and Operations Management, Oxford University Press,2012.
5. Chary S. N, Production and Operations Management, 3rd edition Tata McGraw Hill, , 2008

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DEPARTMENT OF BUSINESS ADMINISTRATION (MBA)

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CLASS : I MBA
SUBJECT : BA18211 - OPERATIONS MANAGEMENT

UNIT – I

2 Mark Questions:

1. **What is production?**
   It is the process by which raw materials and other inputs are converted into Finished product, both tangible goods and intangible services, through resources like man, machine Whereas manufacturing refer to the process of producing only tangible goods.
2. **What is production management**?
   Application of management principles like planning, organizing, directing, controlling etc to production function. Production management is used for a system where tangible goods are produced. Production management precedes operation management in the historical growth of the subject.
3. **What is Operation management?**
   It is the process in which resources/inputs are converted in to more useful products. Activities like scheduling, assigning resources including people, equipments, , managing inventories, product mix decisions etc. Further operation management is used where various inputs are converted into intangible services like banking, insurance, travel etc.
4. **What is the importance of production management**?
   Production contributes significantly to society's well being. The standard of living of people depends on production of goods and services. The application of management to production is due to 3 reasons.(i) Development of factory system of production from the single man system of making goods. (ii) Development of large companies with many owners and the necessity to hire people to operate the business.(iii) The development of scientific techniques which were proved to be useful to improve performance and profit of the organisation
5. **What are the components of production system model?**
   (i) Production system- A system which coordinates and involves all elements of Input that help to achieve the desired output.. (ii) Conversion subsystem – A sub system of the larger production system where inputs are converted in to output. (iii) Control subsystem – A subsystem of the larger production system where a portion of the output is monitored for feedback signals to provide corrective action if required.
6. **Mention the Categories/type of decisions made by a Production manager.**
   The decisions fall in to three broad categories. (i) Strategic decisions – this relates to products, process, and manufacturing facilities. They are of strategic importance and have long term significance to the organization.Ex- production process, production technology, facility layout, long range capacity planning, allocating resources to strategic

alternatives.(ii) Operating decisions – Shop floor planning and control is an operating decision. This is to have smooth production of goods to meet market demand and provides required profit to the organization.Ex-Aggregate planning, MPS, CRP, Inventory control, MRP, Production mix.. (iii) Control decisions – These are controlling activities related to performance and effective utilisatiion of workers/human resources, quality of product, production quantity, overhead cost and maintenance of the machine.

7. **What is strategic management?**
   Strategic management is the process of formulating, implementing and evaluating strategies to achieve organisational goals. The roles – (i) Select the corporate mission and major corporate goals. (ii) Analyse the opportunities and threats or constraints that exist in the external environment. Also analyse the strengths and weaknesses that exist in internal environment. (iii). Formulate strategies that will match the organisation's strengths and weaknesses with the environment's threats and opportunities. (iv). Implement the strategies. (v).Evaluate and control activities to ensure that the organisation's objectives are achieved.
8. **Mention the elements of competitive priorities.**
   (i)More inventory turns, (ii) Shorter manufacturing lead time, (iii)Higher quality,(iv)Greater flexibility, (v)Better customer service. (vi)Reduced wastage.
9. **List the nature of International operations management.**
   Companies in international operation, called MNCs are (i) Financially sound and hence spend money on R&D to gain competitive advantage. (ii) They take advantage of locational economies globally.

12 Mark Questions:

1. Discuss the duties and responsibilities of Operation manager.
2. Describe the role of operation management in strategic management.
3. Elaborate the elements of production strategy.
4. Bring out in detail the recent trends in operation management.
5. Discuss the steps involved in production function.

UNIT – II

2 Mark Questions:

1. **What is Demand forecasting**?
   It is the first step in planning. It is defined as estimating the future demand for products and services and the resources necessary to produce these outputs. Mangers need to make decisions for purchase of machinery, etc. If future is not known or uncertain, managers can not plan effectively for the future. Forecasting is an art and science of predicting future events. It may involve historical data and projecting them into future. Sometime it may include a managers good judgment or a subjective or intuitive prediction of the future.
2. **What is the need for (uses of) demand forecasting?**
   (i).New facility planning – Designing and building a new factory may take as long as five years or more. This long range planning gives the needed lead time for production managers to make plant location, plant layout, installation of machinery etc.

(ii)Production planning;- Production also takes some time and further production has to match the quantity required by market. Medium term demand forecast helps production managers to adjust production capacity.

(iii) Workforce scheduling:-Short range forecast needed to adjust workforce. The forecast of monthly demand is broken down to weekly demand and this helps in work force planning. Reassignment of jobs, allowing over time, layoffs, temporary hiring,etc.

(iv)Financial planning:-Based on sales forecast, cash inflow(sales revenue) is arrived which in turn form a basis for expenditure planning like salary etc.

3. **Bring out the different type of forecasts.**

(A) technological forecast :- related to rate of technological growth or progress in future. Technological changes provides new opportunities like new products or new process for the same product which enhances quality.(B) Economic forecast:- This is expected future business conditions published by govt agencies. Inflation rate, money supply, tax revenue, GDP/GNP, level of employment. These data gives idea for industries long range and medium range business potential. (C) Demand forecast:- This forecast also called sales forecast gives the expected level of demand for a company's goods or services. for some future period. This provides the basis for capital expenditure planning, production planning, financial planning, human resources planning.

4. **Mention the time horizons of forecasting.**

(i) short range – up to one year. Even it can be for monthly or weekly. It helps in workforce scheduling, planning inventory purchase etc. (ii) Medium range – forecast from 3 months to 3 years. It is helpful in sales planning, production planning, cash budgeting. (iii) Long range - 3 years or more in time span. Useful in New product planning, capital expenditure planning, planning for facility location or expansion, etc.

5. **What are the steps in forecasting?**

(i).Determine the purpose – We should know the objectives of forecast, when forecast is required. This details needed to determine the amount of resources needed like manpower, money etc to match the level of details required. (ii) select the items for which forecasts are needed – forecast is needed for single product or group of products. (iii)Determine the time horizon for the product – short term, medium term, long term etc. (iv)Select the forecasting model – quantitative , qualitative .(v)Gather and analyse the data needed for forecast. (vi) prepare the forecast (vii) monitor the forecast- to determine whether actual matches forecast. If not review methods, assumptions, etc and prepare new forecast if needed.

6. **Write a brief note on Forecasting methods/Approaches.**

The two general approaches to forecasting are : *(i)* Qualitative and *(ii)* Quantitative. Qualitative methods consist mainly of subjective inputs, often of non-numerical description. Quantitative methods involve either projection of historical data or the development of association models which attempt to use causal variables to arrive at the forecasts.

7. **Bring out in brief the various qualitative method of forecasting.**

(i).Jury of executive opinion method involves taking opinion of a small group of high-level managers and results in a group estimate of demand.

(ii).Salesforce composite method is based on estimate of expected sales by sales persons in their territory and they are combined at district /state level. The estimates are reviewed to ensure they are realistic

(iii)Market research method or consumer survey method determines consumer interest in a product or service by means of a consumer survey.

(iv)Delphi method is a judgmental method which uses a group process that allows 5 to 10 experts to make forecasts. The staff assist them by preparing, collecting, summarizing series of questionnaire and survey results. The responses are kept anonymous and circulated to other experts to get a consensus.

8. **Bring out the advantages and disadvantages of various qualitative method of forecasting.**

(A).Jury of executive opinion method Advantages:- (i)uses the knowledge and experience of company top executives (ii)Helpful in technological forecasting (iii)can be used for forecasting the demand for new products.(iv)can be used to modify an existing forecast to account for changed conditions. Disadvantages- (i)It is costly as it uses valuable executive time (ii)It sometime gets out of control and get delayed.(iii) sometime difficult to obtain consensus.

(B)Salesforce composite method- Advantages – (i)the sales force is closest to customer and they know the what the customer will be buying in near future.(ii) as the estimate is done for town/district level, it is easy for distribution of inventory, sales force staffing. Disadvantages-(i)Individual bias will affect the forecast(optimistic/pessimistic) (ii)some staff may not able to decide between what the customer say and do (iii)some may deliberately give low forecast to show better results or easy working.

(C) Market research method or consumer survey method – advantages-(i)It is better than other two methods as the information is collected directly form customers. (ii) Disadvantages – It is based on sampling methods and it may go wrong.(ii)It requires considerable knowledge and skill to handle correctly.(iii)survey can be expensive and time consuming(iv) the response rate of mailed questionnaire may be poor.

(D) Delphi method- advantages (i) used for sales projection of new products and long range forecast of product demand. Disadvantages – (i) the process can take a long time.(ii)May not be accurate as it is anonymous and also they are not accountable.(iii)Poorly designed questionnaire may result in false conclusion.

9. **What are the various quantitative methods?**

(i)Time series models – It is on the assumption that the future is a projection of the past. Series of past data is used to make a forecast of future. Types – (a) Naïve approach (b) Moving averages (c) Exponential smoothing method.

(ii)causal models- Incorporate variables or factors that influences quantity being forecast. The sales forecast is dependent variable and other factors like salary, consumer price index etc that affect the sales are independent variables. Types – (a) Trend projection. (b) Linear regression analysis.

10. **What is capacity?**

This is the amount of output a system is capable of achieving over a specific period of time. This is also defined as the amount of resource inputs available relative to output requirements over a particular period of time

11. What is capacity planning?

Capacity planning is central to the long-term success of an organisation. This is a long term strategic decision that establishes a firm's overall level of resources. Capacity plans are made at two levels: (i) **Long-term capacity plans** which deal with investments in new facilities and equipments covering the requirements for at least two years into the future and (ii) **Short-term capacity plans** which focus on work-force size, overtime budgets, inventories etc.

12. Write a note on Long range capacity planning.

Three major capacity decisions in long range capacity planning are (i)How much capacity to be installed, (ii) When to increase capacity, (iii)How much to increase. This three decisions usually involve the following activity-(i)Estimating the capacity of current(existing) facility (ii)Forecasting the long range capacity needs (iii)Identifying and analyzing source of capacity to meet future capacity needs (iv)Developing capacity alternatives (v)Selecting from among the alternative source of capacity

13. Write a note on capacity alternatives.

To enhance capacity management the following aspects are to be considered.

(i)designing flexibility in to the system – Provide scope for expansion as it is easy and cheaper for development i.s.o fully remodeling an existing structure. This also takes care of the inherent risk in long term forecasting. This flexibility is to be considered not only in building but also in layout, location, equipment selection etc. (ii) differentiating between new and mature products – mature products will have lesser life span and we should find an alternative use for resulting excess capacity at the end of life span.(iii) Taking a big picture approach – A firm must consider how diff parts of the system interrelate. for example if we plan to increase no of Beds in a hospital, we should also increase parking, lobby, canteen etc. (iv) preparing to deal with chunk of capacity – machines may not be available in small capacity and hence any increase has to be done in big chunk. This will lead to excess capacity. (v) Attempting to smooth out capacity requirements – Seasonal variation in sales will overload or under load production system. Company planning for air-conditioning manufacturing will have lean season in production. They can thing of manufacturing Heating equipment also to overcome this problem

14. Define Aggregate planning.

Aggregate planning is a process that follows capacity planning and it uses medium range forecast. The plan does not include day today planning. This is a plan for product lines or product families rather than individual products. Given the sales forecast, factory capacity, size of work force, resource availability etc the manager must decide intermediate range planning to manufacture the given set of products with least manufacturing cost.For example how many Television sets to be produced without mentioning model, size etc

15. Mention the steps in Aggregate capacity planning.

(i).Determine the demand for each product over the planning horizon.;(ii)Determine the aggregate demand by summing the individual estimate.;(iii).Transform the aggregate demand to No of workers, materials, and machines.;(iv). Identify company policy like safety stock, stable work force etc.;(v).Determent unit cost for regular time, OT

,subcontracting etc.;(vi) develop alternate resource plan.;(vii). Select the best resource plan that meet the objective of the firm.

16. Write a note on Master production schedule(MPS).

MPS sets the quantity of each end items(finished products)to be completed in each time period(week or month) of the short range planning horizon. It is an important link between marketing and production.

17. What are the objective and functions of MPS?

Objective:- 1.To schedule end items to be completed promptly; 2. To avoid overloading ,under loading of production facility so that production capacity is fully utilized at low cost.

Function of MPS:- 1. Transform aggregate plan to weekly/monthly plan.;2.Evaluate alternate master schedule by RCCP.;3. Generate material requirement.;4.Facilitate information passing to other department like sales,finance,personnel.;5. Effectively utilizing capacity.

18. What is rough cut capacity planning (RCCP)?

To check the feasibility of MPS, that is tentatively created. This helps to ensure MPS does not inadvertently overload any dept , work centre or machine. Normally It is not checked for all work centres and RCCP is done only for Critical Work centres, which may be a bottle neck

19. What is capacity requirement planning(CRP)?

It is a short term detailed planning of what labour, equipment capacity , required to match the MPS and aggregate plan. This is done for daily and hourly basis. The CRP converts existing orders in to labour allotment to machines, no. of hour every machine will be working and the production expected from every machine on an hourly basis.

20. What is Material requirement planning(MRP)?

This is to ensure the right quantity of material, component that makes the end product ,is available at the right time, as programmed in MPS . This is done without overstocking the material or component. This is a computer based system in which the given MPS is exploded in to the required amounts of raw material, parts, sub assemblies, needed to produce end items in each time period of the planning horizon. The gross requirements of these material is reduced to net requirements by taking in to account that material that are in inventory or on order.

21. What are the objectives of MRP?

(i) To improve the delivery schedule of end product and shorten the delivery lead time.
(ii)To identify the stock available and reduce inventory cost by reducing inventory level
(iii)To improve plant operating efficiency by better use of productive resources.

22. List the terminologies involved in MRP calculation.

MSP, Project requirement, Lead time in procuring, Safety stock required, Available inventory

23. What is Manufacturing Resource Planning (MRP II)?

When the capabilities of MRP are extended to integrate financial, accounting, personnel, engineering and marketing information along with production planning and control activities of basic MRP system, the resultant broad based resource coordination system is known as MRP II. It encompasses logically correct planning and control activities related

to material, finance, engineering sales and marketing. The business plan is broken down to specific, detailed tasks to every dept. Engg dept must maintain bill of material, sales and marketing dept must keep sales plan up to date, purchasing dept must meet due dates for bought out items and manufacturing dept must meet due date for in-house mfg items.

24. What is Enterprise Resource Planning (ERP)?

ERP is a software package developed for optimum use of resources of an enterprise in a planned manner.ERP integrates from supplier to the customer, covering logistics, financial and human resources. Suppose an order is placed by the dealer, then the ERP checks for the stock, reserves the inventory for dispatch, opens the dealer account to verify the credit limit of the dealer and process the order. If the credit limit exceeds, then it places the order on hold.MPS is the starting point for MRP,MRPII, whereas customer order is the starting point for ERP

12 Mark Questions:

1. Discuss the various types of forecasting.
2. Write a detailed note on Quantitative and Qualitative forecasting methods.
3. Discuss in detail capacity planning.
4. Analyse the ways of increasing effective capacity.
5. Explain aggregate production planning.
6. Discuss MPS and CRP.
7. Discuss the inputs for MRP and bring out the benefits of MRP.
8. Explain ERP with a neat sketch.

UNIT - III

2 Mark Questions:

1. **What is project management?**

   A project is an organized endeavour to accomplish a specified non-routine or low volume task. Though the projects are not repetitive ,they take significant amt of time to complete. The objective of the project team is to accomplish the assigned mission and disband.

2. **What are the responsibilities of project manager?**

   Project Manager bears the ultimate responsibility for the success or the failure of the project. He should ensure the (i)WORK is completed in the desired sequence and the performance objectives are met.He should understand the project well.(ii)HUMAN RESOURCES are employed on the project are properly directed and motivated. Getting correct personnel and making them comfortable during the project time are real challenge. (iii)Every one get the COMMUNICATION they need to do the work. Communication with outside suppliers and internal employees are to be done effectively and make the concerned people to understand.(iv) QUALITY objectives are met(v)The project is completed in Scheduled TIME. Time overrun will increase the project cost as expenditure increases and the income generation plan is postponed. This will make the project unviable. (vi)The project is completed within the Budgeted COST.

3. **Discuss the problems in managing a project.**

   (i)Managing a project may be a complex and challenging assignment, (ii)Since projects are one time efforts and not repeated in the same way there is No normal working

relationship or established procedures to guide, (iii)he may have to coordinate diverse efforts and activities, (iv)May have to work with people who are unknown and never worked together earlier, (v)Sub contractors who are unfamiliar with the organizations may be employed to execute the job, (vi)There will be large number of interrelated activities which are to be coordinated.

4. **What is scheduling?**

   scheduling establishes time and sequence of the various phases of the project. In project scheduling, the project manager considers various activities of the overall project and the tasks that must be accomplished and relates them to one another over the project time horizon..Techniques for project scheduling include Gantt chart and network techniques such as PERT and CPM.

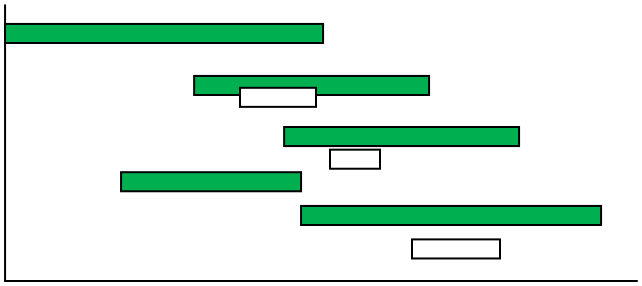
5. **What are the stages in project scheduling?**

   The stages in Project scheduling are:- (1) Develop a detailed Work Breakdown Structure(WBS). That is the whole project is divided in to different small functional units, which is called WBS ;(2) Estimate the time required for each task; (3)Sequencing the task in proper order; (4)Develop a start /finish time for each task;(5) Develop a detailed budget for each task;(6)assign people to task

6. **Write short note on Gantt chart.**

   Gantt chart*(*Horizontal bar chart):-This chart is normally used for small projects. The chart indicates – what must be done and when it must be done. As the project progress, the chart is updated to indicate the amount of accomplishment towards the plan. In this way the Project Managers can compare actual project work accomplishment with planned project progress.

   The horizontal bar shows the overall plan of the project. As the project progresses and the activities are completed, actual progress is recorded by shading in the horizontal bar. These charts are easy to understand and to modify. They are of low cost. Gantt charts do not adequately reflect the interrelationship among projects activity/resources.



1 2 3 4 5 6 7 8 9 10 (TIME)

7. **Briefly mention the terminologies used in Net work.**

   Terms used in NET work:-

   (i).activity - An effort that is required to complete a part of the project (

   (ii).Event – A beginning ,completion point within the project. All activity begins and ends with an event (O)

   (iii).Dummy activity:- An activity that consumes No time

(iv).Predecessor activity:- An activity that must occur before another activity

(v).Successor activity:- An activity that must occur after another activity

(vi).Earliest start/Earliest finish;- The earliest an activity can start /finish from the beginning of the project

(vii).Latest start/finish: The latest that an activity can start/finish from the beginning of the project, without causing a delay in the completion of the project.

(viii).Slack: The amount of time that an activity or group of activities can slip without causing a delay in the completion of the project. It is also known as Float.

(ix).Critical activity: An activity that has NO room for schedule slippage. If it slips the entire project completion will slip. An activity with Zero slack.

(x).Critical Path: The chain of critical activities for the project. The longest path through the Net work.

8. What is critical path method(CPM)?

It refers to a quantitative technique helpful in calculating the minimum time and the sequence of tasks needed to complete a project. This technique is mostly used for construction of projects such as bridges, building dams, canals etc., where the project is to be completed at the earliest to avoid rising cost.

Purpose :-(i)To ensure logical discipline in planning, scheduling, and controlling projects. (ii)To encourage more long range and detailed planning of projects, (iii)To provide management with periodic reports for the progress of the project. (iv)To identify the most critical element of the plan

9. Write note on program evaluation and review technique(PERT).

PERT is the name given to a networking approach to planning ,monitoring, controlling, and evaluation of complex projects. This is used for non-repetitive projects that will not be done again in the same manner. PERT is used in projects like developing missile, nuclear powered submarines etc. In CPM activity duration are expected to be known whereas in PERT the activity duration are given be probability distribution In PERT optimistic time, pessimistic time and the most likely time are arrived. Then estimated time is calculated by a formula.

10. What is crashing CPM network?

Project duration is calculated by summing the duration of individual activities in critical path. If the project time is to be reduced, the duration of some of the activities is to be reduced(crashed) by employing additional workforce, additional shift, etc which will involve additional cost. Here, cost verses time trade off is to be done. This is called crashing CPM networks

11. What is facility location?

Facility/Plant location may be understood as the function of determining where the plant should be located for maximum operating economy and effectiveness. Location selection on purely economic consideration will ensure an easy and regular supply of rawmaterial, labour, efficient plant layout, and ultimately will lead to reduced cost of production. Location of a plant in a wrong place will lead to losses for the company and even closure of the company.

12. List out the circumstances/reasons for locational search.

The need for facility location may arise under the following conditions – (i)when the business newly started, (ii)The existing business has grown very big and existing place is not enough to accommodate the expanded requirement, (iii)The lease expires and land lord does not renew the lease, (iv)The existing location is not economically good, (v) other social reasons.

13. What are the errors/problems in facility location?

(i)Lack of knowledge for thorough investigation and inadvertently overlooking some important considerations, (ii)Personal likes and prejudices of key executives towards a location, (iii)Giving importance for well bargained land and building(cheap price)in deciding overlooking other aspects.

14. Mention the steps in facility location.

(i)Selection of country, (ii)selection of Region, (iii)selection of locality, (iv)Selection of the exact site.

15. List out the various location models.

(i)Factor rating method,(ii)Point rating method, (iii)Break even analysis, (iv)Qualitative factor analysis

16. What is facility layout?

A layout is defined as the arrangement of machinery, equipment and other industrial facility such as stores, tool room, maintenance room, employees amenities for the purpose of achieving the quickest, smoothest production at the least cost.

17. What are the objectives/advantages of good layout?

(i)Provide enough production capacity, (ii)Reduce material handling cost, (iii)Improves production by removing bottle necks, (iv)Utilisation of available space efficiently, (v)Utilise labour efficiently, (vi)Provide better supervision, (vii)Improve employee morale, (viii)Reduce accidents and improves safety and health.(ix)Provide for volume and product flexibility, (x)allows ease of maintenance, (xi)Reduces investment

18. Enumerate the various factors influencing layout.

(i)Material, (ii)Product, (iii)Worker, (iv)Type of Industry, (v)Location, (vi)Managerial policy

19. Mention the types of layout.

(i)Process layout, (ii)Product layout, (iii)Fixed position layout, (iv)Cellular layout, (v) Combined or Hybrid layout.

20. What are the features of service facility layout?

In contrast to manufacturing, service providers bring all the customers to their place to avail the services. Hence service facility should provide (i)easy entrance from freeways and busy thoroughfare, (ii)large, well organized and amply lighted parking areas, (iii)well designed walkways to and from parking area are some of the requirements for service facility layout.

21. What are the types of service layout?

There are 2 types of service facility layouts. (i)One is designed around the customer receiving and servicing functions(banks) and (ii)designed around the technologies, processing of physical material(Hospital)

22. List the tools used in layout designing.

(i)Two dimensional Templates- commonly used. (ii)Sequence analysis – for designing process layout, (iii)Line balancing – for designing product layout.

12 Mark Questions:

1. Bring out in detail the factors to be considered in selecting a location.
2. Discuss different types of layout with merits and demerits.
3. Discuss and differentiate in detail PERT and CPM.
4. Discuss the different location models in detail.
5. Discuss the objectives of good layout.

UNIT - IV

2 Mark Questions:

1. **What is product design?**
   Product design refers to the arrangement of elements that collectively form a good or service. Product design is concerned with the form design and functional design of a product. Form design involves the determination of what a product would look like, i.e., the shape and appearance and aesthetic condition of the product, which are secondary to the function of the product. Functional design is concerned with the performance of the product for which it was designed.
2. **What is process design?**
   Process design is concerned with the overall sequence of operations required to achieve the design specification of the product. It specifies the type of work stations, the machines, choice of process technology, etc that are to be used to produce the product.
3. **Mention the factors influencing product design.**
   (i)Customer requirement, (ii)Convenience of the operator, (iii)Trade of between form and function design, (iv)Type of material used, (v)Cost/price ratio, (vi)Product quality, (vii)Process capability, (viii)Effect on existing product, (ix)Packaging, (x)Environmental aspect.
4. **What is process?**
   A process is a sequence of activities that is intended to achieve the desired result. A process converts inputs into outputs in a production system. No product can be made without a process and no process can exist without a product or service.
5. **List the type of process.**
   (A)Based on method of processing, we have the following types
   (i)Conversion process- converting the raw material in to finished product. For ex- converting iron ore into iron and then to steel. The conversion process could be metallurgical or chemical.
   (ii)Forming process – includes foundry process and other process such as forging, stamping, embossing, etc. These process change the shape of the raw material into finished products without removing or adding material
   (iii)Machining process – metal removal operation such as turning, milling, drilling, grinding, planning, etc.
   (iv)Assembly process – Involves joining of parts or components to produce assemblies having specific functions. Examples are welding,soldering, riveting.

(v)Testing process – which involves inspection and testing.

6. **What is process selection?**

   Process selection refers to the way production of goods or services is organized. This involves decision regarding capacity planning, facility layout, equipments and design of work systems. Three primary questions to be addressed before deciding on process selection are (i) the expected volume of output, (ii)degree of equipment flexibility needed, (iii)how much variety of products or services need to be handled.

7. **List the major process decisions.**

   (i)Deciding the production type – Job shop process, Batch process, repetitive process, Continuous process, project process

   (ii)Vertical integration – back ward, forward, make or buy

   (iii)Resource flexibility – employees, equipment(lease,buy), general purpose machine

   (iv)Customer involvement – QFD , (v)Capital intensity

8. **What are the types of service operations?**

   (i)Quasi manufacturing –in this type of service operations, service activity occurs much as in manufacturing. Physical goods are dominantover intangible servicesassociated with the tangible goods. The emphasis is on production costs, technology, material. Ex-aircraft maintenance.

   (ii)Customer as participant – There is a high degree of customer involvement in the service operation , in which physical goods may not be significant. Ex-Retail trade

   (iii)Customer as product – This service is actually performed on the customer. Physsical goods may or may not be a significant part of service. Ex-hairdressing, hospital

   The above three services are not mutually exclusive. We can see two or three type of service operations in one firm.

9. **What is multiple resources scheduling?**

   In some service organizations, it become necessary to co-ordinate the use of more than one resources. Scheduling these various resources for executing one service is called multiple resource scheduling. For ex-educational institutions must schedule faculty, class room, audiovisual equipment and students to render the service of teaching. Similarly hospital to co-ordinate various para medical, logical, doctors for conducting a surgery.

10. **What is cyclical scheduling?**

    Cyclical schedule or rotating schedule rotates employees through a series of workdays or hours. Over a period of time each person has the same opportunity to have weekends of holidays off and to work days as well as evenings and nights. This schedule gives each employee the next employee's schedule the following week

11. **What is work study?**

    Work study is the body of knowledge concerned with analysis of the work methods, and the standard of proposed work methods. Objective of work study is to improve operational efficiency. The purpose of work study is to determine the best or most effective method of accomplishing a necessary operation.

12. **Mention the objectives of work study.**

    (i)To analyse the present method of doing a job, systematically in order to develop a new and better method.

(ii)To measure the work content of a job by measuring the time required to do the job for a qualified worker and hence to establish standard time

(iii)To increase the productivity by ensuring the best possible use of human, machine, and material resources and to achieve best quality product/service at minimum possible cost

(iv)To improve operational efficiency.

13. What is method study?

This is a scientific technique of observing, recording and critically examining the present method of performing a task with the aim of improving the present method and developing a new and cheaper method. It is also known as methods improvement or work improvement

14. What is the procedure in method study?

Select; Record; Examine; Develop; Install; Maintain.

15. What are the advantages of method study?

(i)work simplification, (ii)Improved working method(cheap), (iii)Better product quality, (iv)Improved work layout, (v)Better working condition, (vi)less fatigue to operator, (vii)Optimum utilization of all resources, (viii)Higher safety to workmen, (ix)Higher job satisfaction to workmen, (x)Reduced material consumption and wastage, (xi)Shorter production cycle time.

16. What is motion study?

It is the science of eliminating wastefulness resulting from using unnecessary, ill-directed and inefficient motion.

17. What is micro motion study?

This provides a valuable technique for making minute analysis of those motions/operations that are short in cycle, contain rapid movement and involves high production over a long period of time. Micro motions are also known as “therbligs”. Ex-sewing of garments, assembling small parts.

18. What are principles of motion economy?

It is the rules of motion economy and efficiency which referred to hand motions of operators developed by “Gilbreths”. The principles of motion economy are divided in to three groups namely (i)Effective use of operator, (ii)arrangement of the workplace, (iii)Tools and equipment. Twenty two principles of motion economy was developed by “Barnes”. Through the application of principles of motion economy, it is possible to greatly increase the output of manual labour with a minmum of fatigue.

19. Define work measurement.

Defined as the time required for carrying out the task at a defined way of performing by a qualified worker. This is measuring the work content of any activity. This is done after method study is done. This is also called “Standard Time”.

20. Who is a qualified worker?

As per international labour organisstion(ILO), a qualified worker is one who is accepted as having the necessary physical attributes, possessing the required intelligence, education, and having acquired the necessary skill and knowledge to carry out the work in hand to satisfactory standards of safety, quantity and quality.

21. List out the benefits of work measurement?

(i)To compare alternate methods developed in method study by establishing work content in each method of doing the job, (ii)To prepare realistic work schedule by accurate assessment of human work, (iii)To set standards of performance for labour utilization, (iv)To compare actual time taken by worker with the allowed time, (v)To assist in labour cost estimation, (vi)To provide information related to fixation of selling price and assessment of delivery time.

22. **Distinguish between production and productivity.**
    Production refers to the total output. Productivity refers to the output relative to the inputs. Productivity refers to the amount of goods and services produced with the resources used.
23. **How to measure productivity?**
    Productivity=Quantity of goods and services produced/Amount of resources used.
    Labour productivity=Output/Man-hours used.
24. **How to improve productivity?**
    Productivity can be improved by improving on workers, machines and environment
    (I)Workers – (i)Effective grievance handling, (ii)Efficient training, (iii)Workers incentives, (iv)Less absenteeism, (v)Strict discipline-penalty, (vi)Controlling overtime
    (II)Macines – (i)Better technology and machines, (ii)Better material for processing, (iii)maximum automation, (iv)Better production planning, (v)Better preventive maintenance. (vi)Better quality control and less rejection.
    (III)Environment – (i)Better layout, (ii)Better lighting and ventilation, (iii)Better sourcing of raw material, (iv)High inventory turnover.(v)Good record keeping.

12 Mark Questions:

1. Enumerate the factors influencing product design.
2. Enumerate the challenges in scheduling of services and discuss the strategies to handle them.
3. Discuss the principles of Motion economy in detail.
4. Discuss the major Process decisions considered by Operation managers.
5. Discuss the objective and procedure for method study.
6. Prepare a flow chart for a stenographer taking dictation and typing a letter.

UNIT – V

2 Mark Questions:

1. **What is material management?**
   Material management is Organising, and coordinating all management functions that are responsible for every aspect of material management, storage and transformation. This refers to the movement of production materials, from the stage of their acquisition to the stage of their consumption.
2. **What are the basic objectives of material management?**
   Cost Effective and timely (i)Buying, (ii)Storage and (iii)Movement of material are the three basic objectives.
3. **What is material planning?**

This is the scientific way of determining the requirements of raw materials, components, spares and other items that go into meeting the production needs within the economic investment policies of the organization.

4. **What is material Budget?**
   It is a report containing quantity and money value of material to be purchased over a period of time. Once the material requirement is worked out, the material budget is prepared taking into account inventory on order and inventory in transit.
5. **What is material control?**
   The function of maintaining constantly available supply of raw materials, purchased parts and the supplies that are required for the manufacture of the products. Functional responsibilities include the requisitioning of material for purchase in economic quantities at the proper time, and their receipts, storage and production, the issuing of material to production upon authorised request and the maintenance and verification of inventory records.
6. **What is material management information system (MMIS)?**
   MMIS provides online information about stock level for rawmaterials, work in-progress, finished goods and stores and spares. Any intelligent MMIS should request the supplier computer to send materials whenever the stock level comes to re order level. It should also detect errors and help in prompt decisions. Further MMIS should be able to take decision, when to make parts, when to buy, when to employ co-producers.
7. **What is role of purchasing department?**
   In a narrow sense, the role is buying any item at a price. In a broader sense, the role include research and development required for the proper selection of material and sources from which those materials may be bought, the follow up to insure proper delivery, the development of proper procedures, coordination with other department and communication with top management.
8. **What is vendor rating?**
   It is a process of grading the supplier s based on certain criteria. An objective and accurate vendor rating can become an asset and valuable tool for a buyer in making his purchase decision and also give feed back to supplier with low rating to improve their performance. Rating followed by one company should not be copied by another as it may not match their requirement.
9. **List the factors considered for vendor rating.**
   The following factors are normally considered to rate a supplier.
   Price, Discounts received, Maintenance of specification, Compliance with other specifications, Promptness of delivery, Freight and delivery charges, installation cost, Service availability, market information, Co-operation, Management competence, credit terms, Employee training, Financial position.
10. **What is value analysis?**
    It is aimed at modifying the specifications of materials, parts, and products to reduce their cost while retaining the original function. It is the job of Purchasing and methods engineering department. Value analysis requires a questioning attitude like – what does each component contribute, can less expensive product will perform the function, can

parts be combined, can less expensive material be used, can it be designed for easier assembling.

11. What is the role of stores?

The major functions are receiving, storing and issuing materials. It involves supervision of incoming supplies, ensure they are maintained in good condition, safely, issuing them against authorized requisitions. Stores not only deals with Raw material but also with semi finished and finished goods.

12. What is JIT?

Just in Time. It is an integrated set of activities designed to achieve high value production using minimal inventories like raw material, SFG,FG. Parts arrive at the work station just when they are required.

JIT works on a pull system. When an item is sold, the market pulls a replacement from the last work station that is finished goods. The last work station in turn pulls parts or sub assemblies from the station upstream of it and assembles another unit.

JIT was first used in Toyoto car company. Toyoto based it on two philosophies – elimination of waste and respect for human being.

13. What is KANBAN?

Kanban in Japanese means Instruction card. Toyoto introduced Kanban system of production control. Kanbans are used to signal or authorize movement of parts from an upstream work station to a downstream work station. In paper less organizations, kanban is replaced by crates or bins in which parts are transported from one work station to another.

12 Mark Questions:

1. Elucidate the objectives of Material management.
2. Write a detailed note on material Budget and control.
3. What is vendor rating and discuss three techniques of vendor rating.
4. Discuss the different aspects to be considered in preparing a store's layout.
5. Discuss the costs involved in Inventory management.
6. Discuss JIT and KANBAN system of inventory control.
7. Elucidate value analysis as a tool for cost reduction.
8. Discuss diff type of inventory control management techniques.

CASE STUDY _ 1

A well established retail store wants to start its retail market chain in Tier II cities of Tamil Nadu. They formed a team to do a feasibility study of this proposal. You have been asked to head this team as the project manager. Submit a feasibility report comprising of

a) Market potential
b) Profitability
c) Infrastructure required
d) Manpower planning

CASE STUDY _ I1

Mr. Arun Mehta ia a planter having about 1000 acres planted with coffee near Naduvattam in the Niligiris which borders with Kerala. There are many natural springs in his estate which plenty of good water even in summer. A few colonies around his estate get water from his estate and they do not have any other source for water.. Consequent to low price for coffee over the last few years and labour scarcity he wants to diversify in to the business of supplying bottled water.Mr.Arun is having a liquid cash of Rs2 crores and he can mobilize another 2 crores. which is enough for the project.

You have been appointed as his consultant to advise on factory layout, labour, distribution, advertising and promotion.