MGT613 Production Operations Management Solved Subjective For Final Term Exam Preparation

What are the reasons that support the use of process layout? (3 M)
1. Can handle a variety of processing requirements.
2. Not particularly vulnerable to equipment failures.
3. Equipment used is less costly.
4. Possible to use individual incentive plans.

Distinguish between independent and dependent demand with respect to inventory management. (3 M)
**Dependent demand**: Demand for items that are subassemblies or component parts to be used in production of finished goods. Once the independent demand is known, the dependent demand can be determined.

**Dependent demand** exists for those items for which demand is linked to the use of other items (for example, subassemblies which go into a higher-level component or finished item, such as the motherboard for a computer).

**Independent demand** exists where the rate of use for an item does not relate directly to the use of another item (for example, finished goods such as a computer). Controlling can take place by means of an ‘Order Point’ system.

Mr. Ali takes 2 vitamin tablets per day. After ordering he receives tablets after 4 days. At what minimum quantity he should order the tablets. Give complete calculation. (3 M)
Usage = 2 vitamins a day
Lead time = 4 days
ROP = Usage \times \text{Lead time} = 2 \times 4 = 8
Reorder Point = 2 \times 4 = 8

Objectives of queuing analysis (3 M)
Queuing theory: Mathematical approach to the analysis of waiting lines.
Goal of queuing analysis is to minimize the sum of two costs Customer waiting costs and Service capacity costs.
Organizations carry out queuing analysis to ensure that they are able to balance the service levels with costs which the organization can incur. The ultimate goal of queuing analysis is to minimize the sum of two costs that is the service capacity cost (represented on x axis) and customer waiting costs.

Why Pakistan has low productivity compared to other countries? Discuss factors. (5 M)
The following are the factors which effect low productivity in Pak:
- Illiteracy, general socio-economic backwardness, slow progress in implementing land reforms and inadequate or inefficient finance and marketing services for farm produce.
• Inconsistent government policy: Agricultural subsidies and taxes often changed without notice for short term political ends.
• The average size of land holdings is very small and is subject to fragmentation due to land ceiling acts, and in some cases, family disputes. Such small holdings are often over-manned, resulting in disguised unemployment and low productivity of labor.
• Adoption of modern agricultural practices and use of technology is inadequate, hampered by ignorance of such practices, high costs and impracticality in the case of small land holdings.
• Irrigation facilities are inadequate, as revealed by the fact that only 52.6% of the land was irrigated in 2003–04 which result in farmers still being dependent on rainfall, specifically the Monsoon season. A good monsoon results in a robust growth for the economy as a whole, while a poor monsoon leads to a sluggish growth.

**How can you judge effectiveness of inventory management? (5 M)**

A manufacturing organization has one or more of the following functions of inventory in mind when it tries to set up a pragmatic and effective inventory management system.
1. To meet anticipated demand.
2. To smooth production requirements.
3. To decouple operations.
4. To protect against stock-outs.
5. To take advantage of quantity discounts.
6. To permit operations.
7. To help hedge against price increases.
8. To take advantage of order cycles

**What are the various measures, an operation manager needs to consider while evaluating the existing or proposed service system? (5 M)**

A well designed service system should be consistent with the organization’s vision as well as mission. It should be user friendly, robust, easy to sustain, cost effective and should bring value to customers.
A good and well design should create an effective linkage between back operations and front operations. It should aim for a single unifying theme. It should ensure reliability and high quality.
An operations manager often faces challenge of a poor service design. The reasons of a poor service design include variable requirements, difficult to describe requirements, high volume of customer contact. These challenges can be overcome easily with the aid of defining a standardized requirement that would be addressed by the service, make simpler requirements and handle only limited number of customers at each service station or outlet.

**Paper 2**
**Mcqs 56 and subjective: 8 questions**
How internet is useful for the productivity of organization. Marks:3
The Internet has a lot of characteristics that can be utilized to improve productivity. Just
to name a few, there are no time or space limitations for accessing the Internet, finding
information can be easy and efficient, and it is possible to transfer various kinds of
information in electronic form. Properties like these have led to totally new markets,
business models, and processes.

What are the factors of Quality assurance sampling? Marks:3
Achieving Service Quality: Service Quality can be achieved by making use of the
following strategies
I Cost of Quality
I Service Process Control
I Statistical Process Control
I Unconditional Service Guarantee

What do you know about single card in Kanban system? Marks:3
Single-Card Kanban System
1. Each container must have a card.
2. Assembly always withdraws from fabrication (pull system).
3. Containers cannot be moved without a kanban.
4. Containers should contain the same number of parts.
5. Only good parts are passed along.
6. Production should not exceed authorization.

Write capacity planning inputs and outputs. Marks:5
The necessary inputs are:
1. Planned order releases for MRP
2. The current shop load
3. Routing information
4. Job times
Outputs include load reports for each work center

Write Characteristics of Finite source in queing model Marks:5
Queuing Models: Infinite-Source
1. Single channel, exponential service time
2. Single channel, constant service time
3. Multiple channels, exponential service time
4. Multiple priority service, exponential service time

Find estimated time and standard deviation from the activity table. Marks:5
(answer: handout page 202)
Effectiveness of MRP
I Low levels of in-process inventories
I Ability to track material requirements
I Ability to evaluate capacity requirements
I Means of allocating production time

Role of internet in increasing productivity:
The Internet has a lot of characteristics that can be utilized to improve productivity. Just
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information in electronic form. Properties like these have led to totally new markets,
business models, and processes.

Role of inventory file records in MRP
Material Requirements Planning (MRP) is software focusing on production planning
and inventory control system used to manage manufacturing processes.
2. An MRP system is intended to simultaneously meet three objectives:
1. Ensure materials and products are available for production and delivery to customers.
2. Maintain the lowest possible level of inventory.
3. Plan manufacturing activities, delivery schedules and purchasing activities.

What is loading & ideal characteristics of loading?
Loading involves assigning jobs to work centers and to various machines in the work
centers. If a job can be processed on only one machine, no difficulty is presented.
However, if a job can be loaded on multiple work centers or machines, and there are
multiple jobs to process, the assignment process becomes more complicated. The
scheduler needs some way to assign jobs to the centers in such a way that processing and
setups are minimized along with idle time and throughput time.
Two approaches are used for loading work centers: infinite loading and finite loading.
With infinite loading jobs are assigned to work centers without regard for capacity of the
work center. Priority rules are appropriate for use under the infinite loading approach.
Jobs are loaded at work centers according to the chosen priority rule. This is known as
vertical loading.
Problems arise when two or more jobs are to be processed and there are a number of
work centers capable of performing the required work. Managers often seek an
arrangement that will minimize processing and setup costs, minimize idle time among
work centers, or minimize job completion time. In contrast, horizontal loading involves
loading the job that has the highest priority on all work centers it will require, then the job
with the next highest priority, and so on. Horizontal loading is based on finite loading.

Bills of material diagram was given & we had to ascertain inventory requirements

Overtime & slack is better than lay-off explain

Prepared by: Irfan Khan
Q: Standardization role in Product Design? (5)
Standardization is the extent to which there is an absence of variety in a product, service or process. Standardized products are immediately available to customers. You go to a market and request for a charger for your cellular phone, the shopkeeper would ask for the model, make and deliver you as special product which is made by your cell phone company or by an independent manufacturer, who provides a standardized compatible model.

Q: Advantages of Scheduling? (5)
Scheduling: Establishing the timing of the use of equipment, facilities and human activities in an organization
1. Effective scheduling can yield
2. Cost savings
3. Increases in productivity

The benefits of production scheduling include:
1. Process change-over reduction
2. Inventory reduction, leveling
3. Reduced scheduling effort
4. Increased production efficiency
5. Labor load leveling
6. Accurate delivery date quotes
7. Real time information

Q: Components of MRP? (5)
Components of Processing MRP:
Inputs of MRP:
MRP has three Inputs:
• Master Schedule Plan: One of three primary inputs in MRP; states which end items are to be produced, when these are needed, and in what quantities
• Bill of Materials: One of the three primary inputs of MRP; a listing of all of the raw materials, parts, subassemblies, and assemblies needed to produce one unit of a product.
• Inventor Records: Includes information on the status of each item by time period, Gross requirements, Scheduled receipts, Amount on hand, Lead times, Lot sizes, And Assembly Time Chart

MRP Outputs:
Planned orders - schedule indicating the amount and timing of future orders.
Order releases - Authorization for the execution of planned orders.
Changes - revisions of due dates or order quantities, or cancellations of orders.

Q: Output of Aggregate Planning? (5)

Aggregate Planning Outputs
1. Total cost of a plan
2. Projected levels of inventory
3. Inventory
4. Output
5. Employment
6. Subcontracting
7. Backordering

Q: JIT is a true Pull System, Explain? (3)

Just in time is a ‘pull’ system of production, so actual orders provide a signal for when a product should be manufactured. Demand-pull enables a firm to produce only what is required, in the correct quantity and at the correct time. This means that stock levels of raw materials, components, work in progress and finished goods can be kept to a minimum. This requires a carefully planned scheduling and flow of resources through the production process.

Q: Problems in supply chain management? (3)

Challenges to an Effective Supply Chain Management
1. Barriers to integration of organizations
2. Getting top management on board
3. Dealing with trade-offs
4. Small businesses
5. Variability and uncertainty
6. Long lead times

Q: Find EOQ, if Annual demand = 200, Ordering Cost = 10, Carrying Cost = 6 (3)

Annual demand=D= 200
Ordering cost = S=10
Carrying cost=H=6
EOQ= Sq Root of (2 DS)/H
=Sq Root of 2(200)(10)/6
=sq root of 666.66

=25.819

Q: Activities performed by R & D in an organization? (3)

R&D: refers to the Research and Development departments or divisions which generate new ideas for the existing products or services or simply new ideas for
new products or services. Research & Development (R&D) is the organized efforts to increase scientific knowledge or product innovation & may involve:
1. Basic Research advances knowledge about a subject without near-term expectations of commercial applications.
3. Development converts results of applied research into commercial applications.

Paper

Write any three benefits of JIT (just in time) inventory system? 3
1. Reduced inventory levels
2. High quality
3. Flexibility
4. Reduced lead times
5. Increased productivity

What is scheduling? Scheduling services 3
Scheduling is an important tool for manufacturing and service industries where it can have a major impact on the productivity of a process. In manufacturing, the purpose of scheduling is to minimize the production time and costs, by telling a production facility what to make, when, with which staff, and on which equipment. Similarly, scheduling in service industries, such as airlines and public transport, aim to maximize the efficiency of the operation and reduce costs.

What are the Benefits of electronic purchasing? 5
Benefits of e-Purchasing
• Meets immediate requirements
• Enables fast time to market ethos
• Next day delivery
• Right goods, first time is essential
• Ideal for low cost, high volume transactions

How services contribute in the growth of an economy? 5
Service enterprises are organizations that facilitate the production and distribution of goods, support other firms in meeting their goals, and add value to our personal lives. Role of Services in an Economy

What is queuing analysis? And what are its uses for waiting lines? 5
Waiting Lines
Queuing theory: Mathematical approach to the analysis of waiting lines.
1. Goal of queuing analysis is to minimize the sum of two costs Customer waiting costs and Service capacity costs.
2. Waiting lines are non-value added occurrences
Paper:6
Project life cycle (5 Marks)
The Project Life Cycle comprises of a new concept idea for a unique activity which is then evaluated through feasibility reports, planned with certain sequence of activities, execution of activities and terminated after the project has been completed or shelved due to certain unavoidable. What is important is to note that all stages of Project Life Cycle are administered and handled by competent Project Management team or Project Managers.
1. Planning and Scheduling involves the following key decisions:
2. Deciding which projects to implement
3. Selecting a project manager
4. Selecting a project team
5. Planning and designing the project
6. Managing and controlling project resources
7. Deciding if and when a project should be terminated

2. Models help the managers in work. Explain statement. (5 or 3 Marks)

Don't remember
/. Easy to use, less expensive
/. Require users to organize
/. Systematic approach to problem solving
/. Increase understanding of the problem
/. Enable “what if” questions
/. Specific objectives
/. Consistent tool
/. Power of mathematics
/. Standardized format

3. Numerical from KANBAN (5 Marks)
We can mathematically construct the Kanban Formula, If we designate the following alphabets
N = Total number of containers (Or Kanban Cards)
D = Planned usage rate of using work center
T = Average waiting time for replenishment of parts plus average production time for a container of parts
X = Policy variable set by management possible inefficiency in the system often called Alpha
C = Capacity of a standard container

K= DT (1+X) / C

4. Numerical from EOQ (3 Marks)
5. JIT in Health care (5 Marks)
**Just-in-time (JIT):** At the intra organization level, JIT forms a healthy alliance between the management and the workforce; all this contributes in elimination of waste. JIT A highly coordinated processing system in which goods move through the system, and services are performed, just as they are needed. As operations managers we should remember this point onwards that
1. JIT is also known as lean production
2. JIT is the true pull (demand) system
3. JIT operates with very little “fat”

6. Types of Inventories (5 or 3 Marks)
The five common types of inventories are:
1. Raw materials & purchased parts.
2. Partially completed goods called *work in progress*.
3. Finished-goods inventories:
   a. *(manufacturing firms)* or
   B. merchandise, *(retail stores)*
5. Replacement parts, tools, & supplies.

**Paper 7**

Judgmental forecasting features 3 marks
- Judgmental Forecasts rely solely on judgment and opinion to make forecasts.
- In the absence of enough time, it is easy to use qualitative type of forecast.
- In case of changing external environment economic and political conditions, organizations may use judgmental forecasts.
- When introducing new products, services, new features, new packaging, and judgmental forecasts are used in preference over quantitative techniques.

Reasons to (Produce in-House or Outsource) Make or Buy
There are 6 reasons which are available to us in order to decide whether to develop a competence in house or hire an outside competent organization to supply that product, service or particular expertise. The latter requires that the outsourcer to be honest, ethical, competent. It also requires that outsourcing contract should be flexible yet pragmatic and carry proper levels of services.

1. Available capacity if an organization has the equipment, necessary skills and time, it often makes sense to produce an item or perform a service in house. The additional costs would be relatively small compared with those required to buy items or subcontract them.
2. **Expertise.** If a firm lacks the expertise to do a job satisfactorily, buying might be a reasonable alternative.
3. **Quality considerations.** Firms that specialize can usually offer higher quality than an organization can attain itself. Conversely, special quality requirements or the ability to closely monitor quality may cause an organization to perform a job itself.
1. **Nature of demand.** When demand for an item is high and steady, the organization is often better off doing the work itself. However, wide fluctuations in demand or small orders are usually better handled by specialists, who are able to combine orders from multiple sources, which results in higher volume and tend to offset individual buyer fluctuation.

1. **Cost.** Any cost savings achieved from buying or making must be weighed against the preceding factors. Cost savings might come from the item itself or from transportation cost savings. If there are fixed costs associated with making an item that cannot be reallocated if the item is purchased, that has to be recognized in cost analysis.

1. **Risk.** Outsourcing or buying the services carries risk; often companies retain flexibility by carrying out certain critical activities in house and repetitive menial activities through outsourcing.

**Bill of Materials**

```
Product A (1)

  Product B (3)
  |
  |
  Product G (3)
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  |
  Product F (2)

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  Product C (2)
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  Product D (3)

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Product E (4)
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How many units of Product C, D, E, G, and F will be require producing the 4 units of Product A

**NOTSURE.PLZANY ONEGIVECORRECTANSWER**

My answer:
8 unit of product C = 4 unit of product A
16 unit of product E = 8 unit of product C = 4 unit of product A
12 unit of product D = 8 unit of product C = 4 unit of product A
12 unit of product B = 4 unit of product A
12 unit of product G = 12 unit of product B = 4 unit of product A
8 unit of product F = 12 unit of product B = 4 unit of product A
**Paper: 8**

Types of Inventories

Importance of Supply Chain Management

*Supply Chain:* The sequence of organization’s facilities, functions, and activities that are involved in producing and delivering a product or service.

**Need for Supply Chain Management**

1. Improve operations
2. Increasing levels of outsourcing
3. Increasing transportation costs
4. Competitive pressures
5. Increasing globalization
6. Increasing importance of e-commerce
7. Complexity of supply chains
8. Manage inventories

**Benefits of Supply Chain Management**

1. Lower inventories
2. Higher productivity
3. Greater agility
4. Shorter lead times
5. Higher profits
6. Greater customer loyalty

Project Management

**Responsibilities of Operation Manager** 3 marks

Operation manager is the person who is responsible for the complete operation in the company and accountable for the performance. Operation manager should have complete control over the operation he performs and he is accountable and must report mostly to the president of the company.

**Responsibilities of Operation Manager**

Each operation manager has got a performance goal, his responsibility to do end to end planning and objective is to achieve performance goal and to develop productivity and improve quality standards for the company.

1. Should have skills to train the associates, staffs and make sure they are executing the plan properly.
2. Make sure to deliver higher quality standards by planning and execution.
3. Responsibility of an operation manager to analyze sales and plan the deliverables according to it.
4. He/she must travel frequently and meet clients.
5. Reporting must be done on a frequent basis.
6. Responsibility to have higher level of communication and ensure the team is performing level in the operation.
7. Skills required
8. Just an bachelor’s degree is enough for this job. To work in a big company at least he/she must need 3 years or above experience. Good analytical and problem solving skills are very necessary for this job. Excellent leadership skills are required for this job. Ability to work under deadlines is a must for this job.

Reorder determinist 3 marks

When to Reorder with EOQ Ordering
Reorder Point - When the quantity on hand of an item drops to this amount, the item is reordered.
Safety Stock - Stock that is held in excess of expected demand due to variable demand rate and/or lead time.
Service Level - Probability that demand will not exceed supply during lead time.

Waiting lines, FCFS and EDD with examples 5 marks
Waiting Line (Queuing) Models have been used extensively in service operations scheduling because:
--demand patterns are irregular or random
--service times vary among customers
--managers try to strike a balance between efficiently utilizing resources and keeping customer satisfaction high.
First-come, first-served (FCFS) rule: The customer who arrives first and is at the head of the line has the highest priority. Other possible rules are shortest processing time (SPT) and earliest due date (EDD): Jobs are processed according to due date, earliest due date first.
FCFS is perceived as being fair by all parties, a preemptive discipline is also perceived as reasonable if the priority nature of the later arrival is understood by all parties. Earliest due-date rule minimizes the number of late customers.

Application of lean manufacturing 3 marks
Applications of Lean Manufacturing
1. Lean Healthcare Systems
2. Lean Software Manufacturing
3. Systems Engineering
4. Lean Systems in Defense Industry

Important of layouts decision:
Operations Managers are often questioned about the importance of a new or existing facilities layout. In addition to the fact that operations manager work for improvement towards design and effect use of operation systems, they should also know the importance of layout decision in terms of money. Some of these are:-
1. Layout decisions require substantial investments of money and effort.
2. Layout decisions involve long-term commitments.
3. Layout decisions have significant impact on cost and efficiency of short-term operations.

**Paper 9**

**Question No: 57  (Marks: 3 )**

Explain the basic purpose of acceptance sampling?

Acceptance sampling is an important form of inspection applied to lots or batches of items before or after a process, to judge conformance with predetermined standards. A point to remember is that the main purpose of acceptance sampling is to decide whether or not the lot is likely to be acceptable, not to estimate the quality of the lot.

**Question No: 58  (Marks: 3 )**

Briefly discuss Part-Period Model with the help of an example?

Part-Period Model represents an attempt to balance set up and holding costs. The part period term refers to holding part or parts over a number of periods, e.g. if a business holds 20 parts for 3 periods this would be a 20 X 3= 60 parts period.

**Question No: 59  (Marks: 3 )**

Compute slack time for each of the following activities in the following table:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LS</td>
</tr>
<tr>
<td>1-2</td>
<td>0</td>
</tr>
<tr>
<td>1-3</td>
<td>6</td>
</tr>
<tr>
<td>2-4</td>
<td>10</td>
</tr>
</tbody>
</table>

Slack Time = LS-ES

**Question No: 60  (Marks: 3 )**

For what purpose the transportation method is used?

**Transportation Method** is a quantitative approach that can help solve multiple facility location problems. It is used to determine the allocation pattern that can be used to minimize the cost of shipping products from two or more plants or sources of supply to two or more warehouses or destinations.

1) Based on Linear Programming.
2) It does not solve all the problems of the multiple facility location.
   1. It only finds the best shipping pattern between plants and warehouses for a particular set of plant locations with a given capacity.
   2. The Operations manager or logistics analyst must try a variety of location-capacity combinations and use this to find the optimal distribution for each alternative.
I Distribution costs (variable shipping and possible variable production costs) are important inputs in evaluating a particular location allocation combination.
I Investments costs and other fixed costs are also considered.
I Qualitative factors (like land and construction cost against annual profits) are also included in the analysis for each location capacity combination.

Question No: 61  (Marks: 5)
You are employed as an operations manager in ABC Company. At some stage you make an analysis of the changes in product design. What analysis you carry out to feel this change? Also elaborate its different procedures
Methods analysis deals with analyzing how a job gets done, begins with overall analysis and then moves to specific details like changes in tools and equipment, Changes in product design or new products, Changes in materials or procedures and other factors (e.g. accidents, quality problems)
Methods Analysis Procedure is simple and effective and does the following
I identifies the operation to be studied
I Get employee input
I Studies and documents the current method
I analyzes the job
I proposes new methods
I installs new methods
I Follow-ups to ensure improvements have been achieved

Question No: 62  ( Marks: 5 )
As operations of a manufacturing concern, you are required to carry out aggregate planning. What inputs you require for aggregate planning?

Agggregate Planning Inputs
DResources
1. Workforce
2. Facilities

DDemandforecast

DPolicies
1. Subcontracting
2. Overtime
3. Inventory levels
4. Back orders

DCosts
1. Inventory carrying
2. Back orders
3. Hiring/firing
4. Overtime
5. Inventory changes
6. Subcontracting
Question No: 63  (Marks: 5 )
EDI is beneficial for organization. Elaborate some of the rewards of EDI to an organization.
Electronic data interchange (EDI) is the structured transmission of data between organizations by electronic means. It is used to transfer electronic documents or business data from one computer system to another computer system, i.e. from one trading partner to another trading partner without human intervention.
Electronic Data Interchange gives an organization the following benefits and advantages.
1. Increased productivity
2. Reduction of paperwork
3. Lead time and inventory reduction
4. Facilitation of just-in-time systems
5. Electronic transfer of funds
6. Improved control of operations
7. Reduction in clerical labor
8. Increased accuracy

Question No: 64  (Marks: 5 )
What are the various assumptions an operations manager needs to consider for implementing priority rules? Deterministic

Assumptions to Priority Rules
1. The set of jobs is known, no new jobs arrive after processing begins and no jobs are cancelled.
2. Setup time is deterministic
3. Processing times are deterministic rather than variables.
4. There will be no interruptions in processing such as machine breakdowns, accidents or worker illnesses.

Paper 10
1- annual ordering cost
Ordering costs: Costs of ordering and receiving Inventory, these are the actual costs that vary with the actual placement of the order.
2-Cmpnies cost reduction activities
Cost reduction can be achieved through reduction, elimination, modification of manufacturing activity. Through in depth analysis the best and least cost path is adopted for each activity.
Focuses on in-house procedures and processes at this stage, the company will do a functional analysis of every department to determine where efficiencies can be improved. In a manufacturing plant the cost of production will be evaluated. In a non-profit, the value of service offered will be compared to the cost of the service to determine if it
should be continued. Purchasing departments will evaluate inventory levels. The cost of selling will be broken down into activities.

3- Expected time or standard deviation

5- Queuing for waiting customer

Queuing theory: Mathematical approach to the analysis of waiting lines.

1. Goal of queuing analysis is to minimize the sum of two costs Customer waiting costs and Service capacity costs.
2. Waiting lines are non-value added occurrences

Implications of Waiting Lines

1. Cost to provide waiting space
2. Loss of business
   a. Customers leaving
   b. Customers refusing to wait
3. Loss of goodwill
4. Reduction in customer satisfaction
5. Congestion may disrupt other business operations