Answer 1.

(i). Production by Services: here the chemical and mechanical properties of the materials are improved without any physical change. Ex. Heat treatment of metal.

(ii). Assemble-To-Order Production System: When a number of alternative combinations or options are available to customers and the customer is not willing to wait until the product is made, manufacturers resort to the assemble-to-order production system. Manufacture produce and stock standard component parts. When the customers place the order, the manufacturer does the assembling from the parts and components selected by the customer. Since the parts and components are already made and stocked, the only time taken is the time to assemble it. This leads to lower costs and short lead time. Ex: Consumer electronics goods and computers.

(iii). Design Capacity: Design capacity of a facility is the planned or engineered rate of output of goods or services under normal or full scale operation conditions. Eg: The designed capacity of a cement plant is 100 Tones per day. (TPD)

(iv). Static Plant layout: The material or major components remain in a fixed position and tools, machinery and men are brought to this location. This type is suitable when one or two pieces of identical heavy products are to be made only. Examples of this kind of layout is ship-building, aircraft-building.

(v). Jib crane and Gantry Crane: It is a material handling equipment. Jib crane consists of a cantilever of “I” section on which the load carrying trolley with hoist will move. It is power operated. For small type of crane it may be hand operated. It is preferred where the building features do not suitable for installation of overhead bridge crane. Gantry crane acts as an auxiliary to bridge crane. This may be installed in open space by means of fabricated framework.

(vi). Statistical Quality Control: It is a quality control system performs inspection, testing and analysis to insure that the quality of the products produced as per the laid down standards. It is a systematic as compared to guesswork of haphazard process inspection and the mathematical or statistical approach neutralizes personal bias and uncovers poor judgment.

(vii). Predictive Maintenance: Predictive maintenance techniques help to determine the condition of in-service equipment in order to predict when maintenance should be performed. In this, sensitive instruments (e.g. vibration analysers, amplitude meters, audio gauges, optical tooling, pressure, temperature and resistance-g gauges) are used to predict trouble. Conditions can be measured periodically or on a continuous basis and this enables the maintenance people to plan for overhaul. This will allow an extension to the service life without fear of failure.

(viii). FSN analysis: Under this method items are classified on the basis of their movement. A complete movement analysis is done based on the consumption pattern of these items. Three classes are created on the basis of such movement, i.e., items fast moving, slow moving and non-moving. If there is rapid
change of technology, then this classification will have to be updated quite often. This analysis is specially used to overcome obsolete items particularly for spare parts.

(ix). **SIMO Chart:** Simultaneous Motion Cycle (SIMO) Chart
On SIMO chart, the activities of workers hands, legs & other body movements are recorded on a common time scale. To prepare SIMO chart, an elaborate procedure & use of expensive equipment are required & this study is justified when the saving resulting from study will be very high.

(x) **Tree type store layout:** Keeping stock on both the sides of the aisle, this types of layout of the store is called tree type store layout. *(diagram is needed)*

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**Section B**

**Note:** Under this section, examinee has to explain all the points mention in the answers with practical examples and can also include the latest developments of that particular areas.

**Answer. 2. Material Handling:** “Art and science involving movement, packaging and storing of materials in any form, by means of gravity, manual effort or power actuated machinery.”

The movement of materials should be minimized and handling should be avoided as far as possible or handling be integrated with processing. Materials have to received and stored, moved to processing departments, moved from workstation to another workstation and in process inventory are moved from department to department, then moved to the assembly section and then to inspection and testing department and finally to the shipping section - all the above said movements within the units is known as materials handling.

The selection of materials handling devices depends on the following factors;

I. Type of product
II. Volume of production
III. Size and shape of product
IV. Method of production
V. Sequence of process
VI. Production rate of the plant
VII. Space available
VIII. Distance to be covered
IX. Number of items to be handled
X. Possibility of future expansion.
XI. The type of container
XII. The power available
XIII. First cost of installation, operation and maintenance.
XIV. The location of assembly, testing and shipment
XV. Availability and charges of unskilled labour.
XVI. Design of the equipment, capacity and rigidity.

**Principles of Material Handling:**

I. **Planning principle:** All handling activities should be planned.
II. **Systems principle:** Coordinating the full scope of operations from start to finish.
III. **Space utilization system:** Make optimum use of cubic space.
IV. **Gravity Principle:** Utilise gravity to move material, wherever possible.
V. **Material Flow Principle**: Plan the sequence to optimize material flow.
VI. **Simplification Principle**: Reduce, combine and eliminate unnecessary movements, wherever possible.
VII. **Safety Principle**: Provide for safe handling of materials and equipments.
VIII. **Mechanisation Principle**: Use automated or mechanical methods wherever possible.
IX. **Standardisation Principle**: Standardise methods, types, size of materials handling equipments.
X. **Flexibility Principle**: Use methods and equipments that can do a variety of work.
XI. **Equipment Selection Principle**: Consider all aspects of material, their movement and method of production before selecting equipment.
XII. **Dead-weight Principle**: Reduce the quantity of dead weights
XIII. **Motion Principles**: Equipment designed to transport material should be kept in motion.
XIV. **Idle time Principle**: Reduce the idle time/unproductive time of both equipments and man power.
XV. **Maintenance Principle**: Plan for preventive maintenance or scheduled repair.
XVI. **Obsolescence Principle**: Replace obsolete handling methods. Equipments with more effective methods.
XVII. **Capacity Principle**: Use material handling equipment to help achieve its full capacity.
XVIII. **Control Principle**: Use equipment to improve production control, inventory control and other handlings.
XIX. **Performance Principle**: Determine efficiency of handling performance in terms of cost per unit handled.

Answer 2.

**SPC**: -Statistical Process Control is an analytical decision making tool which allows you to see when a process is working correctly and when it is not. Variation is present in any process, deciding when the variation is natural and when it needs correction is the key to quality control. Variations must be determined to control the process control

**Types of Variation**
(i). **Assignable causes**- tool wear, Material variation, Poor maintenance—Must be control
(ii). **Random Causes**- Changes in temperature, Machine adjustment- Sets limits to process capability

SPC technique at preventive defective work being produced by focus on the production process rather than the final product, SPC is an approach to control the non uniformity and it detects and eliminates non random variation as they arise during the operation of the process.

SPC involves the studying variation to emphasize control, once the process variations are measured, the non-random sources of variation can be eliminated and improvement of the process as random variation can be reduced.

**Implementation of SPC**
The steps are:
I. Information and awareness of management.
II. Management involvement and training of responsible persons
III. Communication of the information and training personnel.
IV. Identifying(and beginning with) priority processes.
V. Analysing the product
VI. Analysing the process
VII. Analysing the process of measurement
VIII. Analysing the information system and control of the process
IX. Correction of dysfunctions identified during stages 4 to 7
X. Experimenting and validating the adoption of the control chart
XI. Bringing the process under the control
XII. Evaluating the capability of a process
XIII. Implementation of a process of continuous improvement

**Control Chart**
A control chart indicates whether the process is in control or out of control, it determines the process variability and detects unusual variations taking place in a process.
It provides information about the selection of process and setting of tolerance limits

**Types of Control charts**
(a). **Variable process Control** or Quantitative measure of quality; In case of quantitative measure of quality the following types of control are used
   (i). Standard deviation chart or $\sigma$ chart
   (ii). Mean or $x$ bar chart
   (iii). Range or $R$ bar chart

(b). **Attribute process Control** or Qualitative Measure of Quality: When qualities are expressed as attributes, the following types of control charts are used
   (i). Fraction or $P$-defective chart
   (ii). Number defective or $np$-chart
   (iii). Number defective per unit chart or $C$ chart

**Answer 4.**

**Accident**: An accident is an event which was unexpected or the cause of which was unforeseen. An accident is an occurrence that interrupts or interferes with the orderly progress of the activity. Accidents have three main types of causes
- Unsafe acts, about 88%
- Unsafe conditions, about 10% (preventable)
- Natural calamities, about 2%
Accidents are always caused. They do not happen

**Classification of accidents**
Accident can be classified generally due to
(a). Failure of equipments or machines
(b). Unsafe operation/ unsafe act/ unsafe conditions of machines.
(c). Employee behaviorist cause,
(d). Environmental cause
(e). Calamity due to natural causes.
(f). Due to fire

**Methods to reduce the accident in factories**
I. Promote worker safety committees.
II. Evolve code of practice.
III. Depending upon job conditions.
IV. Transfer accident prone employees.
V. Impart adequate.
VI. Encourage employees working.
Answer 5 (a)

Time Study:
Time study is a work measurement technique for recording the times and rates of working for the elements of a specified job carried out under specified conditions, and for analyzing the data so as to obtain the time necessary for carrying out the job at a defined level of performance.

Objectives
The main objective is ‘to find out by direct observation, the quantity of human work in a specified task and hence to establish a standard time, within which an average worker working at a normal pace should complete the task using a specified method.’

The other are-

a) To furnish a basis of comparison for determining operating effectiveness.
b) To set labour standard for satisfactory performance.
c) To compare alternative methods in method study in order to select the best method.
d) To determine standard cost.
e) To determine equipment and labour requirements.
f) To determine basic times/normal times.
g) To determine the no. of machines an operator can handle.
h) To balance the work of operators in production or assembly lines.
i) To provide a basis for setting price rate or incentive wages.
j) To set the completion schedules for individual operation or job.
k) To determine cycle time or completion of a job.

Time Study Equipment
The following equipment is needed for time study work:
• Timing device
• Time study observation sheet
• Time study observation board
• Other equipment (like tachometer for checking the speed, etc)

Time Study Procedure:
The procedure for time study can best be described step-wise, which are self explanatory.

Step 1: Define objective of the study. This involves statement of the use of the result, the precision desired, and the required level of confidence in the estimated time standards.
Step 2: Analyze the operation to determine whether standard method and conditions exist and whether the operator is properly trained. If need is felt for method study or further training of operator, the same may be completed before starting the time study.
Step 3: Select Operator to be studied if there is more than one operator doing the same task.
Step 4: Record information about the standard method, operation, operator, product, equipment, quality and conditions.
Step 5: Divide the operation into reasonably small elements.
Step 6: Time the operator for each of the elements. Record the data for a few numbers of cycles. Use the data to estimate the total numbers of observations to be taken.
Step 7: Collect and record the data of required number of cycles by timing and rating the operator.
Step 8: For each element calculate the representative watch time. Multiply it by the rating factory to get normal time.
Normal time = Observed time * Rating factor
Add the normal time of various elements to obtain the normal time for the whole operation.

**Step 9:** Determine allowances for various delays from the company's policy book or by conducting an independent study.

**Step 10:** Determine standard time by adding allowances to the normal time of operation.

Standard time = Normal time + allowances

**Answer 5 (b)**

**Work sampling:** Work sampling is a work measurement technique that randomly samples the work of one or more employees at periodic intervals to determine the proportion of total operations that is accounted for in one particular activity. These studies are frequently used to estimate the percentage of time spent by the employee in unavoidable delays (commonly called as ratio-delay studies), repairing finished products from an operation, and supplying material to an operation.

**Uses of work sampling**

- To estimate the percentage of the protracted time period consumed by various activity states of the resource such as equipments, machines and operators.
- To determine the allowances for inclusion in standard times.
- To indicate the nature of the work distribution of work activities within a gang operation.
- To estimate the percentage of utilization of groups of similar machines or equipment.
- To indicate how materials handling equipments are being used.
- To provide a basis for indirect labour time standards.
- To determine the productive and non productive utilization of clerical operations.
- To determine the standard time for a repetitive operation as an attention to stop watch methods.
- Work sampling is applicable to a wide variety of situations in manufacturing, distribution, or service industries.

**Characteristics of work sampling study**

- The sufficient time available to perform the study.
- Multiple workers.
- Long cycle time.

**Steps in work sampling**

i. Determining the objective of the study, including definitions of the states of activity to be observed.

ii. Plan the sampling procedure including:
   - An estimation of the percentage of time being devoted to each phase of the activity.
   - The setting of accuracy limits.
   - An estimation of the number of observations required.
   - The selection of the length of the study period and the programming of the number of reading over this period.
   - The establishment of the mechanics of making the observations, the route to follow and the recording of data.

iii. Collect the data as planned.

iv. Process the data and present the result.
Advantages of work sampling

- Economical to use and usually costs considerably less than a continuous time study.
- Can be used to measure many activities that are impractical to measure by time study.
- Not necessary to use a trained work measurement analyst to make the observations.
- Work sampling measurement may be made with a pre-assigned degree of reliability.
- Measure the utilization of people and equipment directly.
- Eliminates the necessity of using stopwatch for measurements.
- Provides observation over a sufficiently long period of time to decrease the chance of day to day variation affecting the results.

Limitations of work sampling

- It is of ‘little value’ in helping to improve work methods and doesn’t offer some of the opportunity for methods analysis that accompanies time study methods.
- Statistical work sampling may not be understood by workers.
- If random sampling is not done, the result may be biased.

Answer 6:

Store: store as a building where goods are kept. Stores is defined as supplies of goods. And storage is defined as the act of storing the goods. Some people use the term storekeeping which has the same meaning as storage. the following serve as a few examples to “introduce” the need for Stores to you:-

Retail shops such as the footwear shop (or store), need Stores to house reserves of goods for sale to customers and from which to replace those sold.

Wholesale businesses (often called simply ‘wholesalers’) purchase goods in large quantities from the producers or manufacturers of them, so they need Stores in which to hold the goods until they are required for supply in smaller quantities to retailers.

A manufacturing concern, for example a footwear factory, must hold stocks of all the items (materials and components): leather, plastic, heels, buckles, nails, glue, etc, which are used in making the different types of shoes, etc.

An office is likely to need stocks of printed and plain paper, envelopes, pins, clips and other items. Even an enterprise which provides a service, like a garage for example, must hold stocks: of spare parts for vehicles, consumables like oil, and, of course, tools for use by its mechanics.

Importance:

Efficient storage of stores yields the following benefits:

i. Ready accessibility of major materials permitting efficient service - to users.
ii. Efficient space utilization and flexibility of arrangement.
iii. A reduced need for materials handling equipment.
iv. A Minimization of materials deterioration and pilferage.
v. Ease of physical counting

Approaches to Stores Location:
The problem of the materials inside the store-room is tackled with the help of the following three approaches:
(1) Fixed location; (2) Random location; and (3) Zoned location.

(1) Fixed location: Under this approach, a specific fixed place is assigned to each item of the material. The allocation of the space is made on any of the following basis:
   i. On the basis of supplier.
(ii) On the basis of similarity of the item.
(iii) On the basis of the joint issue of the items.
(iv) On the basis of the size and frequency of the use.
The last basis is more efficient and economical. Under this approach, the fast moving items are stored nearest the point of issue, and the slow moves in the remote areas.

(2) **Random location**: Under this approach, the materials are stored at any vacant place available in the store-room. This approach is workable where the stores function is operated by one or two persons and the storing is required for only few items. The location is memorized by the store-keeper. This is the most unscientific method with its many drawbacks.

(3) **Zoned location**: This approach divides the total storage space into different zones. Popularly there can be three zones (i) for bulk stock, (ii) for reserve stock and (iii) indirect materials like spares and consumable stores.
Zones can be devised on certain other basis also like liquid materials, metal, bars, inflammable materials, costly materials dangerous materials etc. Zone approach attempts to avail the maximum benefits out of the available space and other storing facilities.

**Answer 7.**

**Aggregate Planning Strategies**
The variables of the production system are labour, materials and capital. More labour effort is required to generate higher volume of output. Hence, the employment and use of overtime (OT) are the two relevant variables. Materials help to regulate output. The alternatives available to the company are inventories, back ordering or subcontracting of items.
These controllable variables constitute pure strategies by which fluctuations in demand and uncertainties in production activities can be accommodated.

- Vary the size of the workforce
- Vary the hours worked
- Vary inventory levels
- Subcontract

**Strategies to Meet Non-uniform Demand**

1. **Strategy**: Absorb demand fluctuations by varying inventory level, back ordering or shifting demand.

<table>
<thead>
<tr>
<th>Method</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce in earlier period and hold until product is demanded.</td>
<td>Cost of holding inventory.</td>
</tr>
<tr>
<td>Offer to deliver the products later when capacity is available.</td>
<td>Delay in receipt of revenue lost sales and customer dissatisfaction.</td>
</tr>
<tr>
<td>Special marketing efforts to shift the demand to slack period.</td>
<td>Cost of advertising, discounts or promotional programmes.</td>
</tr>
</tbody>
</table>
2. **Strategy**: change only the production rate in accordance with non uniform demand

<table>
<thead>
<tr>
<th>Method</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work additional hours without changing the workforce size.</td>
<td>Overtime premium wages.</td>
</tr>
<tr>
<td>Increase workforce size for high production so that overtime is avoided.</td>
<td>Excess wages during slack period.</td>
</tr>
<tr>
<td>Subcontract work to other firms.</td>
<td>Reduce company overheads and increase subcontractors profit.</td>
</tr>
<tr>
<td>Revise make or buy decisions to purchase items when capacity is fully loaded.</td>
<td>Waste of company skills, tooling and equipment unutilised in slack periods.</td>
</tr>
</tbody>
</table>

3. **Strategy**: Change the size of the workforce to vary production level in accordance with demand

<table>
<thead>
<tr>
<th>Method</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hire additional personnel as demand increases.</td>
<td>Employment costs for advertising and recruitment, cost of additional shift, if shift is added</td>
</tr>
<tr>
<td>Lay off personnel as demand decreases.</td>
<td>Cost of compensation to workers for lay off.</td>
</tr>
</tbody>
</table>

**Functions of MRS**
Master production schedule (MPS) gives formal details of the production plan and converts this plan into specific material and capacity requirements. The requirements with respect to labour, material and equipment are then assessed. Main Functions of MPS are:

- To translate aggregate plans into specific end items
- Evaluate alternative
- Generate material requirement
- Generate capacity requirements
- Facilitate information processing
- Effective utilisation of capacity

**Answer 8. (a)**
**Work study:**
Work study is a generic term for those techniques, particularly Method Study and Work Measurement, which are used in the examination of human work is all its contexts, and which lead systematically to the investigation of all the factors which affect the efficiency and economy of the situation being reviewed, in order to effect improvement. – defined in B.S. Glossary.
Work study has a direct relationship with productivity. It is most frequently used to increase the amount produced from a given quantity of resources with little or no further capital investment. Work study includes two techniques;

- **Method study**: Method study is the systematic recording and critical examination of existing and proposed ways of doing work, as a means of developing and applying easier and more effective methods and reducing cost. – British Standards Institution
- **Work Measurement**: Work Measurement is the application of techniques designed to establish the time for a qualified worker to carry out a specified job at a defined level of performance.
Work study is efficient because it is systematic both in the investigation of the problem being considered and the development of its solution. It is a valuable tool for management for the following reasons:

1. It is a means of raising the productive efficiency of a factory or firm by the reorganization of work, which generally involves no or very little extra cost.
2. It is systematic. No factor involving the quality of an operation is overlooked. All the facts of an operation are made available.
3. It is the most accurate means of setting standards of performance, on which the planning and control of production is involved.
4. The savings resulting from properly applied work is immediate and continues so long as the improved form of production goes on.
5. It is a tool which can be applied everywhere. It can be used with success wherever manual work is done.
6. It is one of the most penetrating tools of management to weed out inefficiency.
7. It has universal application.

**Basic steps in Work Study:**

There are 8 steps in the performing of work study: They are:

(i) **Select** the job or process to be studied.
(ii) **Record** from direct observation everything that happens so that the data will be available in the most convenient form, to be analysed.
(iii) **Examine** the recorded facts critically and challenge everything that is done, considering in turn; the purpose of the activity, the place where it is done, the sequence in which it is done, the person who is doing it and the means by which it is done.
(iv) **Develop** the most economic method, taking into account all the circumstances.
(v) **Measure** the quantity of work involved in the method selected and calculate a standard time for doing it.
(vi) **Define** the new method and the related time so that it can always be identified.
(vii) **Install** the method as agreed standard practice with the time allowed.
(viii) **Maintain** the new standard practice by proper control procedures.

Steps 1, 2 and 3 occur in every study. Step 4 is part of Method Study while step 5 calls for the use of work measurement.

**Advantages of Work Study:**

(i) It helps achieve smooth production flow with minimum interruption.
(ii) It helps to reduce cost of product by eliminating waste and unnecessary operations.
(iii) It encourages better worker-management relations.
(iv) It ensures that delivery schedules are met.
(v) It reduces rejection and scrap production and brings about higher utilization of resources in the organization.
(vi) Helps to bring about better working conditions.
(vii) Ensures optimum utilization of space and brings about proper layout.
(viii) Brings about standardization and simplification through work simplification.

Helps to establish standard time for an operation or job which can be applied in man power planning and production control.
Answer 8 (b)

**Production Planning & Control:**
Production planning and control is a tool available with management to achieve stated goals. Production planning starts with analysis of given data, i.e., demand for product, delivery schedule, etc., and on the basis of the information available, a scheme of utilization of firm’s resources like machine, material, and men are worked out to obtain the target in the most economical way. Once a plan is prepared it is executed in line with the details given in the plan. Production control comes into action if there is any deviation between the actual and the planned. Whatever corrective action is required is taken to achieve the target, by using control methods.

This is a pre-production control activity.

**Need for PPC:**
(i) Effective utilization of resources.
(ii) To achieve production objectives with respect to quality, quantity, cost and timeliness of delivery.
(iii) To obtain uninterrupted production flow in order to meet customer’s varied demands,
(iv) To help the company to supply products of good quality at competitive rates.

Factors that affect production system, causing deviations;
(i) Non-availability of material
(ii) Plant, machine and equipment breakdown
(iii) Changes in demand and rush orders
(iv) Absenteeism
(v) Lack of coordination and communication between functional departments.

**Objectives of PPC:**
(i) Systematic planning of function of production activities
(ii) To achieve the highest efficiency in products.
(iii) To organize means of production like man, material, etc
(iv) To achieve stated products in time and cost.
(v) Optimum scheduling of resources
(vi) Coordination with other departments in regards to production.
(vii) To conform to delivery schedule commitment
(viii) Material planning and control
(ix) To enable adjustments arising out of change in demand and rush orders.

**Functions of PPC:**
(i) Materials function
(ii) Machine and equipment function
(iii) Methods
(iv) Process planning (Routing):
(v) Estimating:
(vi) Loading and scheduling
(vii) Dispatching
(viii) Expending
(ix) Inspection:
(x) Evaluation

Answer 9 (a)

Product Layout (Line layout):
In this type of layout, the machines are arranged in the sequence as required by the production scheme. If the volume of production of one or more items is large, the facilities can be arranged to achieve efficient flow of material and lower cost per unit. Special purpose machines that do work more quickly can also be used.

{diagram is needed}

Characteristics: This types of layout is used where

(i) The number of end products is small
(ii) The products are highly standardized and interchangeable.
(iii) The volume of production for any item is high or large.
(iv) The demand of the product is fairly steady
(v) The continuity of material flow can be maintained

Advantages: The product layout is advantageous as under:

(i) Reduced material handling cost due to straight line production flow.
(ii) Mechanization of material handling is possible due to handling between fixed points.
(iii) Line balancing may eliminate bottlenecks an idle capacity.
(iv) Shorter operating cycle due to shorter and speedier movement of materials.
(v) Maximum utilization of machine and labor capacity through developing proper balance between them.
(vi) Effective control over production with reduced supervision by generalist supervisors. By reducing the manufacturing to simple steps we can often use less skilled labor.
(vii) Effective quality control with reduced inspection points. It does not require frequent changes in machine set-up.
(viii) Effective production planning and control. Unlike process layout, the routing, scheduling, dispatching and follow up are relatively easier.
(ix) Maximum use of space due to straight production flow and reduced need of interim storing.
(x) It facilitates the implementation of the group inventive schemes for the workers.
(xi) It is relatively easy to control

Disadvantages:

(i) Lack of flexibility – change in product may require total change
(ii) Large capital investment
(iii) Dedicated or special purpose machines required
(iv) Dependence. Breakdown of one machine may result in entire stoppage of work
Functional Layout (Process layout)
In this type of layout, which is recommended for batch production, all machines performing similar types of operations are grouped at one location. That is, all lathes, milling machines, etc., are grouped in one cluster. They are grouped according to function.

Characteristics: This type of layout is used where

(i) Volume is low
(ii) Variety of products is many
(iii) The demand for the product is small or intermittent
(iv) General purpose machines are desirable.
(v) Machines or processing produce unbearable noise, vibration, fumes or heat can be located in isolated

Advantages:
- Flexibility of equipment and personnel
- Lower investment on account of fewer number of machines
- Higher utilization of production facilities
- Greater flexibility of distribution of machine and worker time.
- Variety of jobs does away with boredom
- Supervisors become more knowledgeable about the functions
- More workers and machines can be supervised at a time.

Disadvantages:
- Backtracking and long movements may occur in the handling of material, thus reducing material handling efficiency.
- Material handling cannot be always mechanized.
- Process time is prolonged, causing excessive inventories
- Production, planning and control is difficult.
- More space is required.
- Lower productivity due to number of set ups.