### HOTEL DESIGN

The design of a Hotel is one of the major considerations in planning of efficient Hotel. While designing the Hotel following factors should be kept in mind:

1. Attractive appearance
2. Efficient plan
3. Location
4. Suitable material
5. Workmanship
6. Sound financing
7. Competent Management

Developing an efficient design is a complex sequential process requiring intense interaction of many professionals to successfully planned, designed and operate all facilities. The result of participation will surface following decisions: -

1. Manage all services
2. Prepare a programme defining requirements for all services and operations
3. Apply principles of design and layout to service facilities
4. Select most appropriate equipment for all services provided by the Hotel

These design programmes will fall into two basic categories i.e.

1. Guiding programme
2. Confirming programme

Guiding Programme: Guiding programme will be written prior to undertaking design process. The programme inputs will be gathered all appropriate sources.

Confirming Programme:

This programme will be written after the facility design process is well under way which contains both basic criteria and describe design philosophy, constrain and capability to develop. This programme is used to provide with all available information to the designer. A working copy of the programme is to be continuously updated during design process.

The following design consideration is to be kept in mind:

1. Attractive appearance
2. Efficient plan
3. Location
4. Suitable material
5. Workmanship
6. Sound financing
7. Competent Management
8. **Attractive appearance:**

All over appearance of a Hotel is one of the very important considerations for a Hotel. It should be attractive and should reflect the architecture of that area and should also have character of the services being provided in that Hotel.

1. **Efficient Plan:**

The plan of the Hotel should be such that it should be functional and also appeal to the eye. All the services should be so designed that it meets various principles of layout and design.

1. **Location:**

The design of the Hotel will be guided by the geographical location of the Hotel e.g. if a Hotel is situated near the airport or railway station, the reception of the Hotel will be designed in such a way that it could handle large number of guests at one time because there is a possibility of guest checking in large groups and around the clock. Similarly, Hotel situated at hill stations, beaches and the Hotels located in heart of the cities and metros will be designed differently.

1. **Suitable Material:**

The Hotel should be designed in such a way that it should be able to use the material locally available, which will be cost effective and efficient.

1. **Workmanship:**

While designing a Hotel one should consider the fact that what kind of workmanship is available and designer should take advantage of local expertise. This will not only make the hotel efficient but also will be economical.

1. **Sound Financing:**

One of the very important factors is finance in designing the Hotel. The availability of ready funds and management of finance is a crucial factor and it should be considered very carefully in Hotel Design.

1. **Competent Management:**

The design of a Hotel will depend upon the quality of management available to operate the establishment. If we have the quality management and manpower only then Hotel should be designed for sophisticated equipment and high tech gadgets.

These are some of the consideration, which affect the design of hotel.

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**FACILITY DESIGN & ARCHITECTURAL CONSIDERATION**

Hotel design is an interactive process bringing together the skills and expertise of owners, managers, Architects, builders and a host of others to conceive and construct a building that meets a variety of Travel and business objectives. The people involved in designing and constructing the hotels are:-

1. Owner
2. Consultant
3. Architect and others

Owner Sees as a real estate and investment

a hotel opportunity.

Consultant Expects to meet the strategic goal and

a hotel revenue earner.

Architect involves For development and design.

Others

A proper communication and coordination between all the above is a must though the onus to accomplish the project is on Architect but the owner must spell out clearly the need of creating a particular design to suit his philosophy of service and must explain why the need is:

**Design must be such that:**

1. suits the investment available.
2. easy to maintain.
3. must have sufficient circulation area.
4. it provides proper flow of work.

**A project may be initiated in two ways:**

1. A site exists in a particular location and the study is conducted to explore the feasibility for development as a hotel.
2. It is considered that a particular town or area offers opportunity and it is studied in order to confirm this or otherwise.

Whatever the starting point happens to be, the methodology remains the same which is to study the market feasibility. The feasibility should include the P.P.P.P. i.e.

* Physical facilities
* Place
* Price
* Promotion

**The Feasibility Report must cover:**

1. **L.A.E. (Local area evaluation):** Analysis of the economic vitality of the city or region. Describe the suitability of the project site for a hotel.
2. **L.M.A. (Local Market analysis):** Assess the present demand and future growth of several market segments. Identity the existing properties and their probable growth.
3. **P.F. (Proposed Facilities):** Propose a balance of guest room and revenue generating public facilities (Restaurant and lounges, function area, recreating facilities). Assess competitive position of the property).
4. **F.A. (Financial analysis):** Estimate income and expenses for a hotel over a five year period to show its potential cost flow after fixed charges.

**Development process:** The development process starts with.

**PRE-DESIGN PHASE which includes the following activities:-**

1. Establish project objective.
2. Assemble development team.
3. Commission feasibility study.
4. Establish project budget and schedule.
5. Investigate potential financing and negotiate joint ventures.

**(Action by Owner/Developer)**

1. Conduct market study and prepare financial analysis.
2. Recommend Architect, establish design and operating criteria.

**(Action by consultant)**

1. Analyse site.
2. Prepare initial conceptual design.
3. Review programme and Budget.

**(Action by Architect)**

**The space allocation program.** Among the many tasks of the development team is to establish a space allocation program. The allocation of space among the principal functions in a hotel varies from property to property. The most obvious difference among properties is the ratio of guest room space to public space and support area space. This varies from 90% in budget hotels and many motels to 50% - 65% in large commercial hotels.

**Architectural Consideration** will include the Site Design and the Design Phase.

**Site Design** – The Architect is responsible for site planning, analysis of site, its constraints and opportunities. Before firming up design, the Architect must consider:-

1. **Visibility and Accessibility:** Consider road access and surrounding street patterns.
2. **Surface Conditions:**  Analyse terrain, vegetation, existing buildings and roads and environmental constraints.
3. Sub Surface Condition: Confirm location and underground utilities, height of the water table, bearing capacity of the soil, existence of environmental hazards.
4. Regulatory restriction: Height restrictions, parking requirements, Highway restrictions etc.
5. Site Character: Describe qualities of the site such as surrounding uses and views.
6. Orientation: for Sunlight.
7. Adaptability: Potential for future development

**DESIGN PHASE:** Commences with the preparation of schematic design (set of alternate plans) and establish design directions considering the space allocation programme. Provide design team with approvals. Establish design schedule, Freeze structural drawings and specification of finishes etc.

While working for design, it is important to consider:-

1. Site Benefit: Potential sites needs to be considered in relation to the main tourist and service attraction. View influences the plan from, compensatory attraction (garden view, recreational focuses) should be provided for disadvantages rooms. The orientation of sun, shade and prevailing winds will affect building design.
2. Traffic Analysis: An analysis of traffic flows is necessary to identify:-
3. Counter flows of traffic.
4. Restrictions on new entries to the highway and
5. Condition relating to signage on highway
6. Density and Height: The density and massing of building is dictated by location, land costs and local regulation.
7. Circulations: The movement and guests, non-resident visitors, staff and supplies in a hotel tend to flow distinct, circulatory patterns. Where practical, guest, supply and staff circulation be kept separate.
8. Guest Room Plans: Guest room may be arranged in rows or one on both sides, of the corridor forming a slab plan or stacked around the circulation core of a tower structure, which are explained as under:-
9. Slab Plan: Can be double loaded slab or a single loaded slab. In double loaded slab the rooms are laid out on both sides of the corridor whereas in single loaded slab, the rooms are only on one side of the corridor. Double loaded corridors are most efficient so far as space utilization is concerned and work out to be more cost effective and economical.
10. Atrium designs: These are internal corridors overlooking the central space which may be open or sub-divided by mezzanine extensions to increase utilization. Elevators extending through the atrium are invariably transparent. The guest rooms are arranged in a single loaded corridor.
11. Tower Structure: The rooms are spread over around a central core which enable the guest rooms to be cantilevered, propped or suspended around the sides. The proportion of space taken up in circulation, including corridors on each floor, is high and tower structures are generally used for high rise buildings where the advantages of view justify the higher costs.

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**WHY LAYOUT PLANNING?**

Many managers ask “Why plan layouts at all?” In some cases it would seem to be about as easy to move the furnishings into an area and then have the fun of arranging them and rearranging them until you are satisfied. For the housewife who likes the freshness of rearranging her house occasionally, this makes sense. But for industry, merely rearranging will, in practically every case, result in lost time, idle equipment, and disruption of personnel. In addition, it may well lead to serious blunders in the use of a company’s available land, in costly rearrangements, in actually tearing down buildings, walls or major structures which are still usable but which subsequently turn out to be roadblocks to efficiency and low-cost operation.

A little time spent in planning the arrangement before it is installed can prevent such losses. Moreover, it allows the integration of subsequent moves and rearrangements into a logical program. Planning makes facilities arrangements an orderly, logical sequence. Layout planning pays off: Obviously, it is much easier to move templates or replicas of facilities and equipment around on a piece of paper than it is to move the actual buildings, machinery, or equipment around. As professor School used to say, “You can make as many mistakes as you want in layout planning, and they will all pay for themselves if they avoid mistakes in the physical installation”.

Actually, from an installation standpoint, it is about as inexpensive to put in a god layout as to put in a poor one-frequently much less expensive. However, once a poor layout is installed, the cost of rearranging, disrupting production, and fighting your way through a new financial appropriation prohibit remaking it into a good layout.

**The Key to Unlocking Layout Problems**

There are two basic elements on which every layout problem rests:

1. Product (or material to service) - what is to be made or produced.

2. Quantity (or volume) - how much of each item is to be made.

Directly or indirectly, these two elements underline all other features

or conditions in layout work. Therefore, facts, **estimates,** or

information about these two elements are essential.

**P PRODUCT (MATERIAL)**

**Q QUANTITY (VOLUME)**

**R ROUTING (PROCESS)**

**S SUPPORTING SERVICES**

**T TIME (TIMING)**

By Product (or material or service) we mean the goods produced by the company or area in question, the starting materials (raw materials or purchased parts), the formed or treated parts, the finished goods, and / or service items supplied or processed.

Products may be termed, varieties, models, styles, part numbers,

formulations, product groups, or material classes. By Quantity (or volume) we mean the amount of goods or services produced, supplied, or used.

Quantity may be termed number of pieces, tons, cubic volume, or value of the amount produced or sold.

In terms or unlocking layout problems these two elements represent the handle of any key we must grasp. For it seems obvious that if we are planning the layout of a Hotel or department, the layout must accomplish something. That “something” is certain products in certain quantities.

After obtaining the product and quantity information, we must next learn about the routing (or process). The routing refers to how the product or material will be made

By routing we mean the process, its equipment, its operations and their sequence. Routing may be defined by operation and equipment lists, process sheets, flow sheets, and the like. The machinery and equipment used will depend on the operations selected to change the form or characteristics of the material. Similarly, the movement of work through the area to be laid out is dependent upon the sequence of the operations. Therefore, the operations involved in the process and their sequence become the body (or stem) of our key. Backing up the direct forming or assembly operations the producing activities or areas are a number of supporting services. In a sense these are the things that give strength to the producing operations, for without adequate support, the producing equipment and workers could not function adequately.

By supporting services we man the utilities, auxiliaries, and related activities or functions that must be provided in the area to be laid out, so that it will function effectively.

Supporting services include maintenance, machine repair, tool room, toilets and locker rooms, cafeteria, first aid and shop, offices (or “out area”). It is common to include storage areas as a part of the supporting services as well.

Taken all together, the supporting services often occupy more floor area than the producing departments themselves. Therefore, adequate attention must be given to them.

One other basic element of the key to unlocking layout problems is time (or timing). By time (or timing) we mean when, how long, how often, and how soon.

Time or timing involves when products will be produced or when the layout being planned will operate (one shift only, during festival season). Operating times for the producing operations determine how many of a given piece of machinery are required, which in turn determines the space required, man power staffing, and operation balancing. Urgency (of delivery of action) is also a part of timing, as the frequency of lot or batch “run” and the response of supporting services.

Perhaps the most important of all, time affects us the layout planners. Every layout project takes a certain amount of time to accomplish, and usually there is deadline to meet.

|  |  |  |
| --- | --- | --- |
| **P. PRODUCT**  **MATERIAL**  **WHAT IS THE**  **PRODUCT** |  | **S. SUPPORTING -**  **SERVICES**  **WITH WHAT**  **SUPPORT** |
|  | **R. ROUTING - PROCESS**  **HOW IT WILL BE FORMED** | **WILL PRODUCTS**  **BE BASED** |
| **Q. QUANTITY -**  **VOLUME**  **HOW MANY OF**  **EACH ITEM TO**  **THE PRODUCT** |  | **T. TIME - TIMING**  **WHEN WILL**  **W H Y ?** |

The above figure shows the elements as a key. But note that these letters at the business end of the key; W H Y. These are an essential reminder to the layout man to question the basic data - to check with reliable sources or his top management find out the basic figures on which lay out planning will depend. Therefore a few challenging “W H Y’s”may be necessary to be sure the starting data is sound.

**Phases of layout planning**

The four steps that the layout planner takes may be translated into what is known as the “Four Phases of Layout Planning”. These include the following:

**Phase I - Location**

**Determine the location of the area to be laid out.**

This is not necessarily a new site problem. More often it is one of determining whether the new layout (or re-layout) will be in the same place it is now, in a present storage area which can be made free for the purpose, in a newly acquired building, or some other potentially available space.

**Phase-II - General Overall Layout**

**Establish the general arrangement of the area to be laid out.**

Here the basic flow patterns and the areas allocated are brought together in such a way that the general size, relationships, and configuration of each major area is roughly established. Phase-II is sometimes termed block layout or area allocation of merely rough layout.

**Phase-III - Detailed Layout Plans**

**Locate each specific piece of machinery and equipment.**

In detail planning, the actual placement of each specific physical feature of the area to be laid out is established. And this includes utilities and services as well. The detailed layout plan is customarily a sheet or board with replicas of the individual machines or equipment placed or drawn thereon.

**Phase-IV - Installation**

Plan the installation, seek the approval of the plan, make the necessary physical moves.

Once the detailed layouts are completed (Phase III), considerable detailing of installation drawings and planning of moves must be worked out. Funds for the installation must be appropriated and the actual moves to install the machinery, equipment, and the services as planned must be made.

These four phases come in sequence, but, for best results, they should overlap each other. Every layout project passes through these four phases even though the layout planning analyst may not be specifically charged with the responsibility for Phase I and / or Phase IV. That is, he must make sure that Phase I has been agreed to or that a specific decision has been, or will be made as to where the layout he is planning is to be located. Obviously, he cannot be very specific about his detailed layout planning if he does not have information about number of floors, ceiling heights, column spacing, and building features. All the generally dependent upon a location- or a reasonably acceptable assumption as to the location -having been established.

In many cases, the Phase I work actually involves a plant location study or a new site analysis. In such cases, the person actually responsible for making the layout plan may or may not be involved directly in Phase I.

Likewise, in Phase IV some other group may do the physical installation. However, in any case the layout planning engineer should be aware of this four phase sequence and should be prepared to integrate his work with Phase I and V.

**THE SYSTEMATIC LAYOUT PLANNING PATTERN**

Systematic Layout Planning is an organized way to conduct layout planning, it consists of a framework of phases, a pattern of procedures, and a set of conventions for identifying, rating, and visualizing the elements and areas involved in a planning a layout.

We explained the frame work of four phases in Chapter 1. In this chapter, the systematic layout planning pattern of procedures is described. The conventions will be introduced at the appropriate places in later chapters.

The strictly “layout planning” phases of any facilities rearrangement involve creating a general overall layout and subsequently a detailed layout plan for each portion of the general overall layout. In both Phase II and Phase III. In both Phase II and Phase III, the pattern to be followed is essentially the same.

Every layout rests on the three fundamentals:

**. Relationships -** the relative degree of closeness desired or required among things.

**Space** - the amount, kind, and shape or configuration of the things being laid out.

**Adjustments** - the arrangement of things into a realistic is best fir.

These three are always the heart of any layout planning project, regardless of products, processes, or size of project. It is therefore logical and to be expected that the pattern of layout planning procedures is based directly on these fundamentals.

**The SLP Pattern**



In the previous chapter, we indicated the importance of Product (P) and Quantity (Q) to any layout. An analysis of them individually and in their “mix” is a necessary preliminary to any real layout planning. Process routing and equipment, supporting services, and timing information are also basic input data. And in addition, identifying the various activities (or areas) included in the layout is a preliminary planning step.

Box 1 of the pattern - and in process - dominated industries often the most significant aspect of layout planning - is flow of materials. By planning the layout around the sequence and intensity of material moves, we attain a progressive flow through the areas involved.

In addition to the operating or producing areas, many supporting - service areas must be integrated and planned. As a result, developing or charting the activity relationships - that is, the relationships among the service or support activities or functions is frequently or equal or greater importance then relationships based on flow of materials alone.

These two investigations are then combined into Flow and / or Activity Relationship Diagram. Here the various activities, departments, or areas are geographically related each other without regard to the actual space each requires.

Next, the space requirements: These are developed from analysis of the process machinery and equipment necessary and from the service facilities involved. Area requirements must, however, be balanced against the space available. Then the area allowed for each activity is “hung” on the activity relationship diagram to form a space relationship diagram.

The space relationship diagram is essentially a layout. But, in all likelihood, it is not an effective layout until it is adjusted and manipulated to integrate with its space any modifying considerations. These include such basic considerations as the handling method, operating practices, storage scheduling, and the like. As each potentially good consideration or idea concerning these features is thought up, it must be tested against practical limitations like cost, safety, and employee preference.

As the integrating and adjusting of the various modifying considerations and their limitations are worked out, one idea after another is probed and examined. The ideas that have practical value are retained and those that do not seem worthy, we end up with two, three, four, or five alternative layout proposals. Each of them will work; each has value. The problem lies in deciding which of these plans should be selected. These alternative plans may be termed Plan X, Plan Y and Plan Z.

At this point, a cost analysis of some kind should be made for purposes of comparison and justification. in addition, some evaluation of intangible factors should also be made. This is called an evaluation of alternative layouts or an Evaluation of costs and Intangibles. As a result of this evaluation, one of the alternatives is chosen - although frequently a modification or combination of two or more layouts may actually result from the evaluation process itself.

The alternative layout that is chosen becomes the Selected Layout, the General Overall Layout. With the selection of this general overall layout, phase II is completed.

Tie-in P,Q,R,S and T

We have seen how the pattern of Systematic Layout Planning is constructed. Now lets us relate it to the basic input data, P,Q,R,S AND T. P,Q,R,S AND T underline most of the calculations needed for layout planning. The preparations of the data for the various boxes in the SLP pattern starts with these five basic elements. The product designs and sales forecasts must be woven together and integrated with a P-Q analysis- sometimes called volume-variety or study of product mix. The logical splits and combines of various products or product groups or layout groupings are derived from the P-Q analysis. Specifically, this analysis of product mix, along with analyses of Routing(R), Services(S) and Times (T), leads us to an identification or delineation of the individual activities (areas, machine groups, work places) involved, and thus often to the 4 actual type of layout.

P,Q and R are then woven together to develop the flow of materials P,Q and S are woven together to develop a service activity relationship. From the flow of materials or the activity relationship chart, or a combination of the two, the relationships are then diagrammed. It is Routing(R), together with Time(T), which essentially determines the machinery and equipment required. Similarly, the services (S) called for are translated into the various service facilities required. The process machinery and equipment and the service facilities are then translated into space requirements. These space requirements are then worked into the SLP pattern as described above.

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**FLOW OF MATERIALS-HEART OF LAYOUT**

* The third letter of our Key to unlocking layout planning problems is R (Routing).
* Routing means how an item is made - its process.
* The process is established essentially by selecting the operations and sequences that will best produce P and Q wanted in the optimum operating T.
* The routing yields the basic data for analyzing the flow of materials

**Each step in the process routing to be checked**

1. Eliminate - Is the operation necessary, or can it be eliminated ?
2. Combine - Can it be combined with some other operation or action ?
3. Change sequence, place, or person - Can these be changed or rearranged ?
4. Improve details - Can the method of performing the operation or action or its equipment be improved ?

**Factors that Affect the Flow Pattern**

* Number of parts in each product
* Number of operations on each part
* Sequence of operations in each part
* Number of subassemblies
* Number of units to be produced
* Product versus process type layout
* Desired flexibility
* Locations of service areas
* The building

**Determining Method of Flow Analysis**

The P-Q chart can be used as a guide, for the method of flow analysis varies with the volume and variety of the items being produced.

1. For one or a few standardized products or items, use operation process chart or some similar flow chart.

2. For several products or items, use multi-product process chart, if assembly and disassembly are not involved.

3. For many products of items (a) Combine them into logical groups and analyze as 1 or 2 above; or (b) Select or sample products or items and apply 1 or 2 above.

4. For very many diversified products or items, use the from-to-chart.

**Flow Analysis Information**

* Assembly Chart
* Operations Process Chart
* Flow Process Chart
* Multi-Product Process Chart
* Flow Diagram
* From-To Chart

**Assembly Chart**

It is an analog model of the assembly process. Circles with a single link denote basic components, circles with several links denote assembly operations/subassemblies, and squares represent inspection operations. The easiest method to constructing an assembly chart is to begin with the original product and to trace the product disassembly back to its basic components.

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**Operations Process Chart**

By superimposing the route sheets and the assembly chart, a chart results that gives an overview of the flow within the facility. This chart is operations process chart.

****

**Flow Process Chart**

This chart uses circles for operations, arrows for transports, squares for inspections, triangles for storage, and the letter D for delays. Vertical lines connect these symbols in the sequence they are performed.

****

**Flow Diagram**

It depicts the probable movement of materials in the floor plant. The movement is represented by a line in the plant drawing.

****

**From-To Chart**

This chart is a matrix that contains numbers representing a measure (units, unit loads, etc.) of the material flow between machines, departments, buildings, etc.



**Flow Pat.: Flow between Departments**

* Flow between departments is a criterion often used to evaluate flow within a facility.
* Flow typically is a combination of the basic horizontal flow patterns shown below. An important consideration in combining the flow patterns is the location of the entrance (receiving department) and exit (shipping department).





|  |
| --- |
| Approximate cost distribution in percentage (in comparison to the total cost of the hotel)  1. Civil work 35  2. Plumbing 5  3. Electrical work 10  4. Air condition & Ventilation 12  5. Elevators 3  6. Hotel equipments 12  7. Interior 18  8. Operational supplies 3  9. Consultancy charges 2 |

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**SPACE ALLOCATION GUIDELINES FOR HOTEL FACILITIES**

I Guest Rooms: The total square footage of the guest room block is typically 65-75 percent of the total floor area of the entire hotel.

-The net guest room area (includes living space, bathroom, and closet) for typical room:

##### Square feet

Budget 200-275 (1&2 star including Motel)

Standard 275-325 (3&4 star)

First Class 325-375 (5 star)

Luxury 375-450 (5 Deluxe)

To determine the total square footage of the guest room, block (including corridors, elevators, stairways, linen closet, vending areas and storage) generally add 50 per cent to the net guest room are (assumes & single-loaded corridor).

**For atrium hotels**, add 60 percent of the net guest room area (assumes a single loaded corridor).The total square footage for some extremely efficient hotels may be as low as 35 percent of the net guest room area (assumes a double-loaded corridor). Very inexpensive hotels very too dramatically for a general rule; consider them on a case by case basis. The minimum finished width of a room is generally 12 feet. The minimum finished width of corridors on guest room floors is usually 6 feet, which may be reduced to 5 feet if the guest room doors are recessed.

II Public Facilities: The amount of space allocated to the various public facilities shown below will fluctuate dramatically. However, except for budget hotels or those with no restaurant or meeting facilities, it typically approximates 10 to 20 per cent of the total floor area of the entire hotel.

**Lobby: typically 2 to 6 percent of the hotel’s total floor area.**

**Square feet Per Guest Room**

###### Main Lobby (general circulation) 7.0 - 10.0

Seating Area 0.7 - 1.0

Front desk and related 3.0 - 4.0

Baggage storage 0.5 - 1.0

Public washrooms (lobby) 0.5 - 1.0

**Retail Shops**: A gift/sundry shop is generally included with 1.0 to 1.5 square foot per guest room; the size of other retail outlets can range from 100 to 1,200 sq. ft. or more depending on whether they are “desk” operations for car rentals or airline tickets, or regular shops. The scope of what is recommended in dependent on market requirements.

**Dining rooms and lounges**: typically 4 to 6 percent of the total floor area of the hotel, the

size of outlets will be dependent on the market and assumed utilization.

**Square feet Per Seat**

Coffee Shop 15-18

Specialty Restaurant 18-20

Formal Dining 20-22

Cocktail Lounges 15-18

Function space: Can range from none to extensive depending on market requirements; when

meeting space is included, it typically ranges between 1.0 & 2.0 meeting seats per guest room

**Square feet required**

Ballroom 10-12 per person (seat)

Meeting rooms 10-12 per person (seat)

Boardrooms/hospitality suites 12-16 per person (seat)

Pre-function area 25-40 per percent of Ballroom area

**Public washrooms:**

Men 4 per meeting seat

Women 6 per meeting seat

Coatroom 4-5 per meeting seat

Recreational facilities**:** can range from none to extensive depending on market requirements.

**Square ft. required**

Swimming pool & deck 10-20 per guest room

Lockers/Shower/Toilet Area 2 per guest room

Health Club 2 per guest room

Putting Green 1500

**Circulation:** from 15 to 20 percent of the total public area (excluding the ballroom) should

Be added to allow for circulation; the circulation related to the ballroom was included above

in the “pre-function area” allocation.

III Support Facilities and Services: the amount of space allocated to various support facilities and services will vary considerably based on the public facilities included, the concept of operation (full-service versus no frills), and the facilities provided for employees. The space required typically ranges between 10 and 15 percent of the total floor area of the hotel.

## 

## **Food Preparation Sq.Ft. Required**

Coffee shop kitchen 10-25% of coffee shop

Main Dining Room Kitchen 30-45% of dining room area

Banquet Kitchen 20-30%of ballroom meeting space

Room Service 1 per guest room

Food & Beverage Storage Area 30-45% total kitchen space

**- Receiving: Sq. ft. required**

Office 0.3-0.5 per guest room

Platform 100-250 per bay

**- Hotel Employee Facilities: Sq. ft. required**

### Lockers/Restrooms 6-10 per guest room

Cafeteria 4 per employee

Lounge (if any) 1 per guest room

**- Housekeeping Sq. ft. per Guestroom**

Laundry 7

Linen Storage (not on guest floor) 3

Guest laundry 08.1.5

Uniform Issuing 1

**- Other Storage, Maintenance and Miscellaneous Sq. ft. required**

Hotel general storage 3-7 per guest room

Ballroom/meeting room storage 1.0-1.5 per seat or

10-20% of ballroom area

Miscellaneous storage (garbage, Empty bottles) 1.0-1.8

Telephone Switchboard/Equipment 1.3-2.0 per guest room

Computer Room 1.0-1.5 per guest room

Mechanical, electrical and air handling

Rooms and systems 13.18 per guest room

Maintenance Shop 5 per guest room

Security 3.6 per guest room

Circulation 10% total area for support

Facilities and services

IV Hotel Administration: the amount of space allocated to administrative offices typically ranges between 1 and 2 percent of the total floor area of the hotel. It includes the executive offices as well as the sales, accounting, personnel and any other administrative support offices. A total of 10 square feet per guest room is generally allocated to this category.

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**FLOW OF MATERIALS**

The third letter of our Key to unlocking layout planning problems is R (Routing). Routing means how an item is made - its process. The process is established essentially by selecting the operations and sequences that will best produce P and Q wanted in the optimum operating T - although many other consideration be involved in the determination.

The routing yields the basic data for analyzing the flow of materials. But before utilizing the routing handed him, the planner should recall the meaning little word why, the business end of our key. The routing should be examined and proved reasonably right; it should be restudied when the planner feels it can be improved.

The standard word - simplification check originally developed by Allan H.Mogensen - and discussed in all industrial engineering text is handbooks - is especially applicable. Mogensen’s check challenges each step in the process routing with these words.

1. Eliminate - Is the operation necessary, or can it be eliminated ?

2. Combine - Can it be combined with some other operation or action ?

3. Change sequence, place, or person - Can these be changed or rearranged ?

4. Improve details - Can the method of performing the operation or action or

its equipment be improved ?

**Flow of Materials - Heart of Many Layouts**

The analysis of materials flow involves of determining the most effective sequences of moving materials through the necessary steps of the process involved and the intensity or magnitude of these moves. An effective flow means that materials move progressively through the process. Always advancing toward completing and without excessive detours or back-tracking (counter flow).

Flow-of-Materials analysis is the heart of layout planning wherever movement of the materials is a major portion of the process. This is especially true when materials are large, heavy, or many in quantity or when transport of handling costs are high compared with costs of operation, storage, or inspection. In extreme cases of this kind, the desired flow is developed and then diagrammed directly. The space requirements are hung on the flow diagram. Little investigation of supporting services and made, and no activity relationship chart is constructed. The services and other than flow relationships are simply picked up as part of the Modifying Considerations.

Analyzing materials flow, therefore, is one of the primary steps every layout planner should understand and know how to do.

**Factors that Affect the Flow Pattern**

* Number of parts in each product
* Number of operations on each part
* Sequence of operations in each part
* Number of subassemblies
* Number of units to be produced
* Product versus process type layout
* Desired flexibility
* Locations of service areas
* The building

**Determining Method of Flow Analysis**

There are several different methods of analyzing flow of materials. Part of the problem of course is knowing which method to use for a given project. The P-Q chart can be used as a guide, for the method of flow analysis varies with the volume and variety of the items being produced.

1. For one or a few standardized products or items, use operation process

chart or some similar flow chart.

2. For several products or items, use multi-product process chart, if assembly

and disassembly are not involved.

3. For many products of items (a) Combine them into logical groups and

analyze as 1 or 2 above; or (b) Select or sample products or items and

apply 1 or 2 above.

4. For very many diversified products or items, use the from-to-chart.

**Flow Analysis Information**

* **Assembly Chart**
* **Operations Process Chart**
* **Flow Process Chart**
* **Multi-Product Process Chart**
* **Flow Diagram**
* **From-To Chart**

**Assembly Chart**

It is an analog model of the assembly process. Circles with a single link denote basic components, circles with several links denote assembly operations/subassemblies, and squares represent inspection operations. The easiest method to constructing an assembly chart is to begin with the original product and to trace the product disassembly back to its basic components.

**Flow Process Chart**

This chart uses circles for operations, arrows for transports, squares for inspections, triangles for storage, and the letter D for delays. Vertical lines connect these symbols in the sequence they are performed.

**Flow Diagram**

It depicts the probable movement of materials in the floor plant. The movement is represented by a line in the plant drawing

GOODS ENTER

CHEF'S OFFICE STAFFCLOAK ROOMS

WEIGH-IN POINT

COMMODITY STORE VEGETABLE STORAGE

COLD STORE

PATISSERIE VEGETABLE PREPARATION

GARDE MANGER

DRY EQUIPMENT STOVE PARTIES WET EQUIPMENT

PREPARATION TABLES

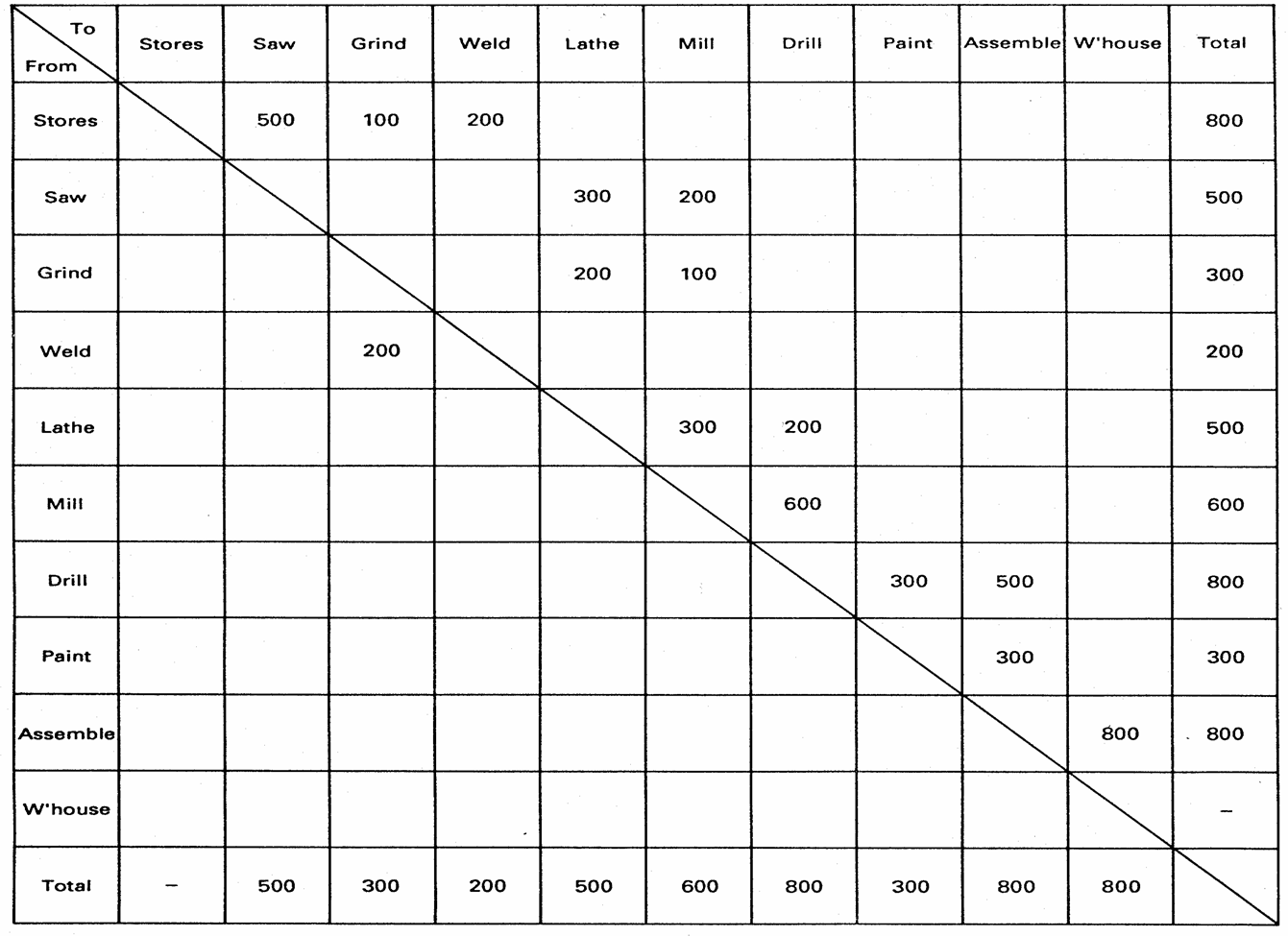
SERVICE COUNTER

RESTAURANT

WASH - UP

Work flow diagram. A well-planned layout depends largely on the following requirements, which, if properly provided for, establish good basic kitchen conditions: incoming supplies and raw materials (checking and weighing); food storage; food preparation; cooking; serving area arrangements; pan-washing arrangements; crockery and cutlery wash-up. From Fuller, Professional Kitchen Management

**From-To Chart.** This chart is a matrix that contains numbers representing a measure (units, unit loads, etc.) of the material flow between machines, departments, buildings, etc.



**Flow Pattern.: Flow between Departments**

* Flow between departments is a criterion often used to evaluate flow within a facility.
* Flow typically is a combination of the basic horizontal flow patterns shown below. An important consideration in combining the flow patterns is the location of the entrance (receiving department) and exit (shipping department).

**A Relationship (REL) Chart is constructed as follows:**

1. List all departments on the relationship chart.

2. Conduct interviews of surveys with persons from each department listed on the relationship chart and with the management responsible for all departments.

3. Define the criteria for assigning closeness relationships and itemize and record the criteria as the reasons for relationship values on the relationship chart.

4.Establish the relationship value and the reason for the value for all pairs of departments.

5. Allow everyone having input to the development of the relationship chart to have an opportunity to evaluate and discuss changes in the chart.

|  |  |
| --- | --- |
| Code Reason  1 Frequency of use high  2 Frequency of use medium  3 Frequency of use low  4 Information flow high  5 Information flow medium  6 Information flow low | Rating Definition  A Absolutely Necessary  E Especially Important  I Important  O Ordinary Closeness OK  U Unimportant  X Undesirable |

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**LAYOUT OF COMMERCIAL KITCHENS**

After developing the work places, determining the specific equipment to use, and finalising the space requirements, the food facility consultant is ready to accomplish the layout phase of the planning process. Some of the equipment layouts for certain functions may already have been completed during the design of the work places. Now the designer will formalize them, first as rough sketch and ultimately in the form of blue prints.

The layout process may be described as two separate stages that occur at the same time. One stage deals with arrangements of individual pieces of equipment, work tables, and sinks with a unit which comprise a functional area or a functional department i.e. one particular area may be developed for the function of Indian and Tandoor preparations, (or) salad and sandwich preparation, as a single unit.

The second stage of layout process involves arranging the functional areas into a total facility. For e.g. the receiving, storing, prep reparation, production, pot washing areas, and non-production areas such a rest rooms, offices are brought together to form the basic floor plan for the facility.

There may be some doubt as to whether these 2 stages of layout are done at the same time. Even though the designer may be working on one stage or another at any given time, layout design must be considered in term of both stages. In essence, the layout of the total facility must be considered when laying out the component areas and vice versa.

**Concepts of Layout:**

There are 4 concepts of layout for a kitchen plan, they are

1. Materials or products

2. Machines and equipment

3. Workers

4. Movement.

**1. Materials or products**

1. The products should be designed for ease of production.
2. Raw materials used should require minimum no. of processing steps.
3. The layout should protect the material from detrimental factors such as moisture, dust, vibration and temperature changes.
4. To provide flexible layout to handle change with product
5. Material storage area should facilitate taking inventory.
6. Provide facilities for storing waste and scrap materials.

**2. Machines and Equipment’s.**

1. The equipment provided in the layout should be united to the required processes.
2. Maximum use of the equipment should be planned.
3. Layout should provide for each operations of the equipment.
4. Layout should facilitate movement of mobile equipment.
5. Sufficient access space for equipment maintenance should be provided.
6. Proper ventilation and exhausting of equipment to be provided.

**3. Workers:**

1. Layout should safeguard the workers by eliminating hazards.
2. Adequate light should be provided.
3. Proper exhaust system for fresh air should be provided.
4. Layout should be free of distracting activities.
5. Design of work place should correspond to the height of the workers.
6. Layout should provide adequate work space.

**4.Movement:**

1. Layout should provide for easy movement of material and workers.
2. Provide for smooth flow into and out of work place
3. Layout should prevent back tracking
4. Delays in movement of material should be minimised.

**Layout configuration:** The arrangement of equipment and work places for functional areas is usually is the form of a straight line or in combination and modifications of straight line configurations. The basic patterns that may be used include;

**Single straight line arrangement**: This is the simplest of designs, but it is limited in the number of pieces of equipment or work places that can be arranged. The straight line arrangement may be placed along a wall or take the form of an island.

**‘L’ Shaped arrangement**: This is a modification of the straight line arrangement to accommodate more equipments and work places, it is sometimes used where linear space is limited. The ‘L’ shaped configuration is suitable for seperating two major groups of equipment. One group of equipment would be placed on one leg of the ‘L’, the other group forming the second leg.

**‘U’ shaped arrangement**: ‘U’ shaped configuration is ideal for small areas where only one or two employees are working. One disadvantage of this configuration is that straight line flow through the area is not possible.

**Paralell, back to back arrangement**: This configuration is an arrangement of two parallel lines where the backs of the equipment and/or work places on each line are adjacent to each other. This arrangement centralizes the utility lines required for the equipment. Some time a short wall is constructed between the two rows of equipment, in which case provision for cleaning and maintenance should be provided.

**Parallel face to face arrangement**: This arrangement utilises two straight lines of equipment and work places where the front face each other and are separated by an aisle space. This is very common configuration that can be used in many areas of facility. This configuration requires two separate utility lines for equipment as compared to the single utility line used in the parallel back to back arrangement.

The final arrangement for most facilities is usually composed of a combination of configuration of equipment and work places. Only the smallest of operations would use a single configuration of the layout facilities.

After arriving at the total area requirement for the main kitchen, the following is the estimated percentage of production/space for functional areas:-

|  |  |
| --- | --- |
| **FUNCTIONING AREAS** | **SPACE ALLOTTTED %** |
| Receiving | 5 |
| Food storage | 20 |
| Pre - preparation | 20 |
| cooking | 12 |
| Baking | 10 |
| Potwash - KDS | 5 |
| Traffic apsles | 16 |
| Garbage – wet/dry | 5 |
| Employee facilities | 5 |
| Miscellaneous | 2 |

**PLANNING OF VARIOUS SUPPORTING SERVICES**

**Pot and Pan Washing:**The pot and pan washing function is also preferably done in a separate area instead of combining it with other areas as some small operations may be inclined to do. The basic pot and pan washing function can be handled with a 3 compartment sink and drain boards, sufficient space for storing the soil utensils have to be provided.

In some operations, a large storage area for soiled utensils may be required because they are not washed as soon as they are received. This occurs when the same personnel who wash dish, also wash the pots and pans. Pot washing machine are considered for large food facility if they can be economically justified.

A pot wash area is suppresed by 6” than the regular floor level of the kitchen, to avoid the water flowing into the main kitchen area. Heavy jet washers with water at a temperature of 88 degrees is used to wash pots because they easily remove the dirt and fat and make cleaning easy. Since the pot wash area becomes very messy with waste food and fat, anti-skid tiles are recommended for the floor and white glazed tiles on the three side walls upto 8’ feet height. A minimum area of 10’ x 10’ is required.

**Wet Grinding Area:** In India wet grinding area is considered to be one of the supporting services to the main kitchen. There will be a minimum of two wet grinders in any small hotels, so that there is a stand by in case of breakdown. Wet grinders are tailor made and are of different capacities. The ideal functional area required for a wet grinding is 10’ x 4’. The area has to have anti-skid tiles for the floor and glaze tiles on the wall to maintain hygienic conditions.

**Chef’s Cabin:** The chef’s cabin has to be ideally located, so that, he has a clear view of the entire kitchen. In some organizations and some hotels the Chef cabin is being utilized to store the imported stock of ingredients like, spices, wine etc. Ideally 10’ x 10’ is required for the chefs cabins.

**Chef’s Larder:** This is a sub - store which is located within the kitchen, in the control of the chef. The quantities of material drawn for the day from the main food store is stored in the chefs larder, since there is no space to store this in the individual kitchen, the drawn material is stored in a place with the kitchen, which is called as chefs larder. Chefs larder is convenient for the cooks, because they can draw material at any given time of the day even after the main food store is closed for the day in the evening. Large quantities of food material should not be stored in a chef larder because it blocks the capital of the hotel.

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EQUIPMENT REQUIREMENT FOR COMMERCIAL KITCHEN AND SPECIFICATION

There are various heavy and light equipment required for the commercial kitchens. Determining the specific equipment required for the proposed kitchen is one aspect of design on which considerable time can be spent.

**Factors to be considered**

Type of equipment

Capacity

Type of Menu

Number of Portion

* No. of customers,
* Menu preference, and their arrival pattern.

Size

Space available

Efficiency

Future Changes Anticipated

The method of preparations and production for each item is then evaluated.

* Items individually prepared to order.
* Items prepared in small batches in anticipation of orders,
* Item prepared in large batches,
* Item that are partially batch prepared and finished when orders are received.

Maintenance

* After sale service

**Equipment Check list**

The equipment required for the kitchen varies from one type of operation to another depending on the menu offerings, the nature of food materials, and method of preparation, service, and personal desire of the owners, manager, or chefs. The following list of equipment is grouped by typical functional areas.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Refrigerated, storage**  **Cold Rooms:**   * Shelves * Dairy * S.S.Trolleys * Vegetables   **Freeze Room:**   * Fish * Meat   **Cold Kitchen**   * Meat Saw * Gravity feed slicer * Meat Block * Reach in Refrigerator * Reach in Freezer * Scales * Work Table with service and drain board * SS Utility Trolley * Mincer – Chopper * Sausage Stuffer * Buffalo Chopper | **Vegetable and Salad Preparation**   * French-fry cutter * Peeler * SS preparation table * Salad rack * Vegetable cutter * Slicer/Chopper   **Pantry**   * Griddle * Microwave oven * SS worktable – sink drain board * Toaster * Salamander * Reach in Refrigerator * Bread Cabinet * Juice extractor * Coffee/Tea Pantry man * Ice Cream cabinet | | **Cooking – All kitchens**   * Bain Marie counter with overhead heaters. * Chinese range * Condiment cabinet * S.S.work table * S.S. work table with sink unit * S.S.work table with OH shelf * Deck oven * Food warmer * Brat pan * Griddle * Grill * Gas cooking ranges (a la carte, Indian kitchen, Banquet,) * Refrigerated Table * Reach in Freezer * Reach in Refrigerator * Salamander * Steam jacket kettle * Pot rack * SS utility trolley * Vertical cutter/Mixer * Dosa Plate * Chapatti Puffer * Wet Grinder | |
| **Bakery and Confectionery**   * S.S.Work Table * Bread Moulder * Bread Slicer * Cooling rack * Convection oven * Deck own * Dough divider * Dough rounder * Dough sheeter * Dough kneader * Weighing scale * Planetary Mixer * Proofing cabinet * Proofing rack   Ice cream machine | | **Snacks bar**   * S.S.Counter * Coffee maker * Food warmer * Freezer * Fudge warmer * Griddle * Grill * Gas range * Work table * Working table with sink and drain board * Slush Machine * Juice dispenser * Pastry cabinet * S/W grill * Soda fountain * SS utility trolley * Bain Marie counter * Chaat Counter * Dosa Plate | | **Pot work**   * Pot rack * Shelves * Sink * Pre rinse faucet * Water agitator * Drying rack   **Wet Grinding**   * Convention wet grinder * Tilting model wet grinder * Worktable. |

**EQUIPMENT SPECIFICATION**

**STAINLESS STEEL WORK TABLEWITH THE UNDERSHELF.**

* OS - 2100 x 750 x 850 mm
* MS framework
* Table top 16 gauge S.S.304
* Under shelf with 20 gauge S.S.304, 6 inch. above ground level.
* Tubler stainless steel bullet legs.
* Edges to be marine edge. No.4 finish.

**STAINLESS STEEL WORK TABLE WITH SINK:**

* OS - 2100 x 750 x 850 mm
* MS framework
* Table top 16 gauge S.S.304
* Under shelf with 20 gauge S.S.304, 6 inch. above ground
* Level only on non-sink side.
* Tubler stainless steel bullet legs
* Edges to be crimped edge.
* The unit shall be provided with one sink on LHS size
* 450 x 450 x 450 mm.
* Splash back shall be provided 150 mm height.No.4 finish.

**DOSA PLATE:**

1. The unit shall be of open frame construction with 12” Stainless steel panels on all sides with loovers.
2. The framework of the dosa plate is 12 SWG S.S. Rods.
3. One under shelf shall be provided - 20 swg. 200 mm from GL.
4. Uprights shall be provided with bullet feet.
5. The griddle plate (GI) of 16 mm thickness, machine polished
6. Splash back shall be welded to the frame, 6 inch. height.
7. S.S.trough to be provided with the removable grease-collecting tray.
8. “V” burners 2 Nos. to be provided with individual pilots, United (Mumbai) make.
9. Gas inlets on both sides of the unit.
10. O.S. - 1500 x 750 x 850 + 150 mm.No.4 finish.

**TWO BURNER S.S.GAS RANGE (BULK COOKING)**

1. The unit shall be open frame structure provided with cross bracings.
2. Top S.S.sheet shall be 16 SWG.
3. S.S.panelsupto 12” from the top shall be 18 SWG.
4. The vessel rests shall be of cast iron size 450 x 450 mm.
5. S.S. spillage or drip tray to be provided.
6. 2 Nos. high-pressure burners - T.22 United (Mumbai) make along with pilots.
7. Provision of gas inlets shall be on both sides.
8. Exhaust loovers on all 3 sides of the panel.
9. Needle control valve to be provided.
10. Marine edges to be provided.
11. O.S. 1500 x 700 x 600 mm.No.4 finish.

**IDLI STEAMER:**

1. All stainless steel 18 gauge unit shall be steam injected on all sides.
2. The capacity of the unit 108 idlies per batch.
3. The unit shall have 2-chamber model with each unit having chamber to prepare 54 idlies per batch.
4. Stainless steel idly trays shall be provided to make 9 idlies each tray.
5. Door shall be insulated and provided with rubber gaskets.
6. Hinged mechanism for doors closing.
7. Water outlet for the unit to be provided.

**STEAM JACKETTED VESSEL:**

1. All stainless steel 16 SWG steam-cooking unit shall be double jacketed.
2. The width of the mouth shall be 18” dia. with lid.
3. The vessel shall be mounted on 16 SWG stainless steel pipes provided with base plates of 4” x 4” 10 SWG SS to facilitate grouting.
4. The unit shall be provided with tilting handles and necessary standard bearings for smooth operation.
5. The vessel shall be provided with drain valve and pressure release valve.
6. The capacity of the vessel 75 lits.
7. Heliarc welding to be used in all places.
8. Overall size 750 x 750 x 900 mm.

**CHAPPATHI PLATE WITH PUFFER:**

1. The unit shall be open frame structure with under shelf (20 SWG)
2. Under shelf 6” above ground level.
3. Stainless panel of 12” width shall be provided on all sides with loovers.
4. A splash back 150 mm shall be provided.
5. The chapatti plate shall be a one-piece machine polished 5/8” thick plate.
6. The puffer shall be a cast iron with vents.
7. V” burner to be used. 2 for chapatti plate and 1 for puffer
8. Individual pilots and control valves to be provided.
9. Spillage/drip tray to be provided in S.S.
10. Adjustable nylon bullet feet.
11. O.S. 1300 x 750 x 850 + 150 mm
12. Chapatti plate - 950 x 700 mm
13. Puffer plate - 300 x 700 mm.

**ALL STAINLESS STEEL 6in1 BAIN MARIE SERVICE COUNTER:**

1. The top of the bainmarie shall be 16 SWG S.S.
2. 3 side blinders shall be of 20 SWG
3. The under shelf 18 SWG shall be 6” above GL
4. The unit shall be provided with 1/2 G.N.pans (gastro norm pans) 200 mm deep and with 2 Nos. round containers of 225 mm x 200 mm depth made of 16 SWG with lids.
5. The unit shall be provided with rotator switch on/off, thermostat and pilot lamp indicator of standard make.
6. One partition inside the counter on the non-bainmarie container side at 12” height from the bottom.
7. O.S. 1500 x 700 x 850 mm.

A complete discussion of selecting and sizing of all the different types of kitchen equipments is beyond the scope of this study material. A brief discussion of frequently specified major items of equipment would serve to illustrate this part of the planning process.

**A: DEEP FAT FRYERS:** Deep fat fryers are available in a variety of types, capacities and degree of automatic operation desired. The productive capacity of a fryer is related to the litres of fat in the fryers, the heat input, and the cooking time required for various foods. Typical designs of fryers are based on a fat-to-food ratio 6:1. This indicates that each kg. of food to be fried requires 6 lits. of oil (or) fat in the deep fat fryer. Conventional fryers are tailor made to the requirement of the client to various capacity, 1/2 lit, 1 lit. 3, 5, 7 and so on.

Pressure fryers make another category of deep fryers they are sealed to permit steam pressure to build up between the lid and the fat surface. The steam is generated from the foods fried or by water injectors. The pressure fryer reduces the loss of moisture from foods. Heat transfer in a pressure fryer is greater than a conventional fryer and consequently the cooking time is shorter. The food is brown outside, moist and juicy on the inside.

**B. BRATT PAN (Tilting frying pan):** The brat pan is one of the most versatile pieces of cooking equipment. Its design is such that it can be used to boil, simmer, grill, sauté, fry and curries. For some items like Indian gravies, sambar, foogath can be done in the tilting frying pan with some savings in time that would normally be spent transferring foods and cleaning other utensils. Brat pan may be free standing; walls mounted, counter mounted and are available in gas and electricity model. There are models which are ignited by electricity and working on gas. The brat pan is tilted by a worm and gear assembly operated by hand wheel. They are tailor made to difference capacities of 50 lits to 300 litrs.

**C. GRIDDLE:** Griddle are flat top piece of equipment heated from beneath, as compared to grills which have heating sources both above and beneath. Griddles are used for high production food service and fast food operations. Grills are more of a specialty piece of equipment. Both gas fired and electric models are suitable for most purposes. Griddle are available in variety of sizes from small i.e. 10” x 20” to as large as 72” x 24”. Griddles are free standing, counter-mounted, mobile or built in as the situation demands. The height of the splashguard, location and the width of the grease trough should be considered when specifying griddles. Combination griddle-grill is also available. This provides greater flexibility for the preparation of different menu items.

**D. FOOD CUTTERS:** Food cutters are versatile piece of equipment that can handle meats, vegetable and fruits. The food cutters can cut, dice, shred, and almost liquefy foods, depending upon the amount of time the food is left in the cutter. The foods to be size reduced are placed in a bowl, which rotates and exposes them to high speed rotating blades. Both bench and floor models are available. Some cutter models are equipped with an attachment hub for accepting various attachments.

**E. STEAM JACKETED KETTLES:** Steam jacketed kettles are constructed of two stainless steel bowls sealed one within the other, with almost 2” of space between them for the introduction of steam. The amount of steam surface between the bowls is referred to as jacketing, and models from half-jacketed to full jacketed are available. The operation of steam-jacketed kettles utilizes steam, which is condensed back to water in the jacket to provide the heat for the inner kettle. A condensate line is provided to remove the water that accumulates. The amount of heat input is dependent upon the pressure and amount of steam allowed to enter the jacketed area. There is a pressure gauge to indicate the pressure. In case of excess pressure is let into the jacket, there is a pressure /air release valve to reduce the pressure. These kettles are used to cook rice, dhal, boil milk, and cook vegetables. They are available in 50, 100, 200 and 300 lit. Capacity.

**F. GAS COOKING RANGE:** Gas cooking ranges have open top burners with high-pressure burners, T-22, T-35. They are tailor made for the client’s is requirement. They are manufactured in different combinations such as 2 in 1, 3 in 1, 4 in 1 and 6 in 1. The length and breath of the range depends on the quantity food to be prepared. In case of a la carte preparation, a combination of high and low pressure burners is used, the area being 14”x 14”. The height of the cooking ranges 33” - 34”. But for ideal bulk cooking the length various between 20” to 24” per range, and. the height is reduced to 18” to 20”. Heavy gauge stainless steel and heavy-duty supports are used for these cooking ranges since it involves bulk preparation.

A Chinese gas cooking range is aptly designed for authentic Chinese delicacies, with a cast iron dome, to prevent the direct heat on to the chef while cooking with a wok. A 12” to 14” height splash back with a swivelling faucet with controls in front panel for immediate water, and a drain channel at the rear to enable to chef to empty the wastewater is also provided in this equipment. They are ideal with flat open top gas range in the middle for stockpot and dome cover gas ranges on either side for a la carte preparations.

**G. DOSA PLATE:** The dosa plate are similar to the griddle which have hot plates specially designed to prepare dosas. The plate is thick machine polished, mild steel with even heat distribution for optimum use. The M.S. plate rests on stainless steel frame, and it has S.S.top, front and a specially placed oil spillage trough. The splash back on all three sides of the dosa plate to avoid splash of oil or batter. For uniform heat distribution a “V” shaped burner is placed. This unit is available in electric/gas. It is custom-built size to prepare a minimum 2-3 dosas to 8-10 dosas at a time.

**H. IDLI STEAMER:** Idly steamers are S.S.cabinets with tight fitting doors with gaskets. Steam is injected into the cabinet to pre heat to the required temperature. Idly plates are made of S.S./Alum. with different combinations. The steam is injected from the sides, top and bottom. These cabinets are tailor made to accommodate 2-4-6 idly plates at a time. It is advisable to have 2 plate compartments because steam is lost during the process of loading the idly plates.

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**KITCHEN STEWARDING & GARBAGE DISPOSAL**

Kitchen stewarding department is the very important part of the hotel industry but is often a neglected and underestimated area of operations. However, it is realized that how important a section it is, only when in any catering organizations delays are caused in service and production due to uncleaned utensils, unwashed plates, crockery and cutlery for service and for kitchen purpose. Poor attention paid to this section often causes operational delays. Which brings down the efficiency of the entire F & B department. This may lead to guest dissatisfaction, decrease of sale, increase in budget for service equipment and a lowering of departmental profits. Each and every department is interconnected therefore in a successful and complete operation the stewarding department plays an equally important role in providing clean and hygienic equipment’s on time. In this operation work is divided into 2 parts one is cleaning of kitchen and its equipment and back of service area.

**IMPORTANCE OF KITCHEN STEWARDING**

The department is primarily concerned with the storage, maintenance, cleanliness and issue of cutlery, crockery, hollowware, chinaware, glassware to the restaurants and kitchens.

The main duties to be carried out by the Kitchen stewarding dept. personnel is as follows:  
1. Handling stocks of small operating equipment’s like cutlery, crockery, glassware, kitchen equipment etc.  
2. Cleaning and washing of all such operating equipment’s.  
3. Washing and cleaning of entire kitchen and f & B department.  
4. Coordinating the securing of kitchen equipment with the maintenance department.  
5. Planning the requirement list and purchasing orders for all small operating  
6. equipment and helping the F & B manager with budget in this area.  
7. Garbage clearance operations from all F & B areas.  
8. Ordering clearance operations from all F & B areas.  
9. Handling polishing & buffing of silver ware.  
10. Minimizing the breakages and losses.  
11. Kitchen pot washing operations.  
12. Kitchen stewarding is also responsible for pest control activity of the kitchen.  
13. It procures, installs, and service gas connections and coal supply for cooking. The department would ideally have a large store for kitchen and service equipment, dishwashers and pot washing section  
Hierarchy & Staffing of Kitchen Stewarding Department.

F & B Manager  
Kitchen Stewarding Manager  
Asst Stewarding Manager: (For Kitchen and F&B Service)  
Overseers - Kitchen dept. Overseers - F&B dept.  
Utility Workers Pot Washers Dish Washers  
Depending on the size and type of establishment the no. and brigade of stewarding department varies

KITCHEN STEWARDING MANAGER is responsible for planning, organizing, directing and controlling the stewarding activity. He would control the kitchen stewarding stores and ensure that the kitchens and the restaurants get their needs smoothly.

OVERSEERS: this is a supervisory level responsible for the shift. Stewarding activity is a 24 hr activity in a busy hotel.

UTILITY WORKERS: these are the cleaning brigade, who clean kitchens and equipment and do other heavy work.

DISH WASHERS: they operate the dishwashing machine that cleans all service ware.

POT WASHER: they clean large pots and cooking utensils of the kitchen using jet water sprays.

KITCHEN PORTER: is the title given by small independent hotels to utility workers who do multi tasks.

CLEANING OPERATIONS.

• There are two kinds of cleaning ---1) Daily cleaning 2) Special or Spring cleaning  
• Stewarding manager make a definite program with one overseer for the above cleaning.

Cleaning of the above service areas is accomplished by the following equipments and required staff and as per the drafted program  
1. Liquid detergent all-purpose  
2. Abrasive powder like Vim powder  
3. Chlorine base detergent like Clorax  
4. Phenyl ( anti-bacterial agent)  
5. D’spot ( for removing carbon formation—Degreasing)  
6. D’scale ( for removing scales from boilers and dish washing machines)  
7. Mops  
8. Rubber squeezers  
9. Dusters  
10. Scorch pads  
11. Glass brushes  
12. Hard brushes  
13. Steel scrubbers  
14. Sponge/ Plastic scrubbers etc  
EQUIPMENTS FOUND IN STEWARDING DEPT

1. Dish washing machine  
2. Glass washing machine  
3. Neptune high pressure machine (120 lb/sq inch)  
4. S.S. trolleys  
5. Glass trolleys  
6. Glass racks  
7. Burnishing; Silver plating machine ( for EPNS; silverware)   
8. Hose pipe  
9. Hot water injection type cleaning machine  
10. Three sinks unit or chambers.  
**The kitchen stewarding is basically divided into two areas:**

**a) Wash up area.** It is an important service area and should be ideally situated so that the brigade can work speedily and efficiently while passing from the food service area to the kitchen. The waiter should stack the trays of dirties correctly at the side board with all the same sized plates together and all the tableware stacked on one of the plates with the blades of the knives running under the arch of the forks. All glassware should be stacked on separate trays and taken to a separate wash up area. Wash up section should be the first place when the waiter enters the back area.

Hygiene is of utmost importance at the wash up area, as all sorts of germs can originate from here and can contaminate the food. This section is normally in the charge of the stewarding supervisor who may in turn have number of wash up boys as per need.

**Dishwashing Methods:**

There are two main methods used for dishwashing for foodservice operations-

1. Manual (tank) method.

The dirty crockery is placed in a tank of hot water containing a soap detergent solution. After washing, these are placed in wire racks and dipped into a second sterilizing tank containing clean hot water at a temperature of approximately 75˚C (179˚F). The racks are left for two minutes and then lifted out and the crockery left to drain. If sterilized in water at this temperature the crockery will dry by itself without the use of drying up cloths. This is more hygienic. After drying the crockery is stacked into piles of the correct size and placed on shelves until required for further use.  
  
**2. Dishwashing machine-**Most commercial and welfare catering sectors use washing machines to wash service equipment. Washing machines of different efficiencies, sizes, and cost are available, allowing operators to select according to their need and budget. These machines save labour and time and ensure sterilized service equipment’s.

The three main types of machines are

**1. Spray type:** Dishes are neatly stacked in racks which slide into the machines where they are sprayed with hot water and detergents (48°C-60°C) from above and below. The rack then moves to the sterilization section where the dishes are subjected to a hot water shower (of 82°C). Dishes sterilized at this temperature dry quickly when passed out into the air.  
**2. Brush type:** Dishes are scrubbed in hot detergent water (48°C-60°C with revolving brushes. Then they are rinsed and sterilized in another section of the machine.  
**3. Agitator water machines:** In this method, baskets of dishes are immersed in deep tanks and cleaned by mechanical agitation in hot detergent water (48°C-60°C). The baskets are given a final hot water rinse for sanitization (82°C).  
These machines are usually operated by two people, one to sort soiled items and feed the machine and the other to collect the clean ware.  
It is important to follow the instructions of the manufacturer with regard to use and maintenance of the washing machine.  
Great care should be taken while washing glassware. There is a wide range of glass

Washing machines available.

Used in larger establishments. Debris should be removed from the crockery before it is placed into the wire racks. The racks are then passed through the machine, the crockery being washed, rinsed and sterilized. Having passed through the machine the crockery is left to drain for two or three minutes and is then stacked and placed on shelves until required for further use.

**b) Silver room/ plate room-** In larger establishments the silver room or the plate room, as it is sometimes known, is a separate service area controlled by the kitchen stewarding supervisor. They take care of all the silverwares and the china wares stored in the silver room and are also responsible for silver polishing. The silver room should hold the complete stock of silverware required by the different department to meet the day to day requirements along with a surplus stock in case of emergency.

While stacking, large silver ware, like salver, flat platter etc. should be stored on shelves. When stacking heavier items should go on the shelves lower down and smaller and lighter items on the shelves higher up to prevent accidents. Flatware and cutlery should be kept in drawers lined with baize cloth to prevent them from moving about in the drawer and getting scratched or marked.

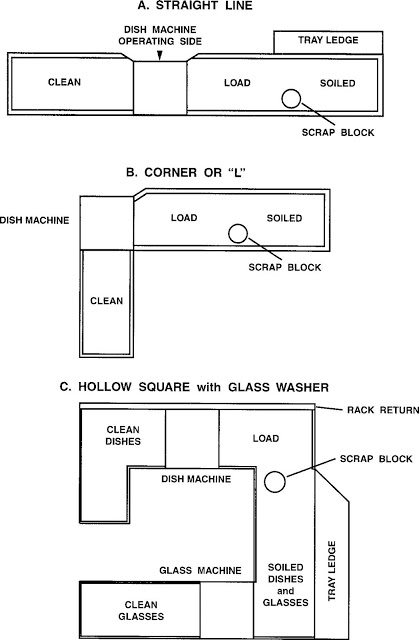
**The burnishing machine.** It consists of a revolving drum half filled with small ball bearings. It may be divided into compartments to bold silver articles of particular kinds. The silver to be cleaned is placed inside the drum, which is then half filled with water and a certain amount of special detergent and closed tightly. The machine is switched on and slowly rotated for about 10 minutes. As the drum revolves, the mixture of water and detergent acts as a lubricant between the silver and ball bearings and gently removes any tarnish on the silver without leaving any scratches. The silver should be thoroughly rinsed and dried manually after removing from the drum. The drum is lined with rubber to avoid any damage to the silver during the cleaning process.

This method is not suitable for cleaning forks and knives as the prongs of forks are not cleaned properly and continuous use may damage the cutting edge of knives.  
**The polivit method.** The polivit plate, which is made of aluminium, is placed in a container together with washing soda. The silver to be cleaned is placed in such a way that at least one piece of silver is in contact with the polivit. Piping hot water is poured to cover the silver. Chemical action of soda and aluminium removes the tarnish. After a few minutes, the article is thoroughly rinsed in boiling water and wiped dry with a clean cloth.This method is suitable for large pieces of silver such as salvers, trays, etc.  
**The plate powder.** Tins method is ideal for articles that cannot be cleaned by the above method, Typical items cleaned by this method are cruets, toast rack, parts of trolley, etc. The articles to cleaned must be free from grease. Plate powder, winch is pink in colour, is mixed with spirit and sobbed over die surface of article to remove tarnish. If spirit is not available, water may be used, Once the paste has dried, it is rubbed with a clean piece of cloth. A small brush may be used remove the paste that may have lodged into the engravings. It is then rinsed well in hot water and dried with clean cloth. This method demands more time and labour. Readily available metal may be used to clean articles in the same ways

**Silver dip-** The silver to be cleaned is kept in a wire basket and immersed in the silver dip, which is a pink-coloured liquid. It is left in the solution for a very short period, removed, rinsed in warm water, and wiped dry with clean cloth. This method is quick but may damage the silver due to chemical reaction between silver and solution.  
**Quick dip method-** This method is quick and simple to follow. Hot water, crushed aluminium foil, lemon juice, and salt are placed in a container and stirred. The tarnished silver is dipped in this solution for about 2-3 minutes. The chemical reaction removes the tarnish. Silver is removed, rinsed in hot water, and wiped dry.

Stainless steel is cleaned with a detergent product specially meant for it and treated with de-liming agent once a week to prevent build-up of haze and film on the surface. It is a solution of low foam acid detergent designed to remove lime scale, iron stains, and other tough deposits of hard water.

The plate room is controlled by the head plate room man who is assisted by skilled and semi-skilled staff.

[](http://1.bp.blogspot.com/-ViwGOqRpvZU/T9XAxjjM1qI/AAAAAAAABGo/wNoZfPLUn7k/s1600/stewarding+dept.jpg)

**Garbage Disposal**

Kitchen stewarding department is 24 hrs Operational. The staff is more in number for night shifts for floor and for equipment more in the day time. Every food service operation has different requirements for waste disposal and many factors must be evaluated before designing a system to handle this function which depends upon amount of waste generated, type of waste, cost of destroying waste and dumping frequency of paper.

Types of Hotel waste: Hotel waste comprises of two components,  
1.Biodegradable (Wet) waste: The wet waste comprises of food, vegetable and non veg waste  
2.Non-biodegradable (Dry) waste: the dry waste comprises of plastic bottles, papers, plastic wrappers, etc.  
The following processes can be followed for garbage disposal:  
1. Compaction: The use of compaction is usually considered where large volumes of disposables are to be handed. Compacters reduce the volume of waste so that it can he handled in smaller quantities. The weight of the compacted waste should be less than 50 pounds (23 Kg.)  
2. Incineration: It can be used only if the amount of garbage which has to burned is of a great volume and if it is economically viable while installing an incineration machine in the department. The pollution ordinance should also be checked.  
3. Grinding: Garbage grinding is generally allowed in areas in municipal sewage system.  
4. Pulping: Waste pulping creates a liquefied waste by using heavy duty grinders with a recirculation water system. The liquefied waste is then passed through a water extractor where it is reduced to a semidry pulp and then stored in bins. Metal and glass cannot be processed in this way.  
Some methods for management of Hotel Restaurant and Club food waste could be as follows :  
1. Bio Sanitizer by Excel Industries: Excel Industries Ltd. supplies machines of capacity 500kg, per day, 1 tonne per day and 3 tonnes per day machines along with biosanitizer. This machines can crush the food waste to 1/3rd of the original volume and odourless compost produced can be used as manure after curing.  
2. Biomethanation : Biomethanation Plants of capacities 100 -500 kg per day can be installed in the premises of hotels if adequate space is available. Gas generated can be used for cooking.  
3. Composting/ Vermicomposting – Options of composting/vermicomposting could be explored.  
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**STORES ORGANIZATION**

**INTRODUCTION**: In any large or small catering establishment there exists a department called a "Store" which is essential for the smooth functioning an for reasons such as :-

1. To keep and maintain stocks at suitable levels eliminate the risk of running out of any commodities.

2.  To maintain checks on the receiving and issues made to various other departments.

3. In order to maintain a check on percentage profit if each department

**FEATURES:**

1. It must be cool and facing the north or south to prevent the sunlight from coming inside.

2.  It must be located in a convenient place to receive the goods being delivered by the suppliers also convenient to make issues to various department and preferably on the same level as the kitchens are.

3. It must be well ventilated and free from dampness, exces­sive dryness.

4.The walls and ceiling should be free from crackle tiled to ease cleaning. The flooring must be of material which will not break with heavy truck.

5. Good lighting either natural or artificial is necessary.

6.  There must be ample well-arranged storage space with shelves of varying depths and separate sections for each type of food.

7. Skids, ballets / trolleys should be used for bulk packages or bags of flour etc. galvanized iron drums are used to store dry provisions, glass to store spices etc.

8. Tables, scales, adding machines.

**REFRIGERATION AND FREEZERS:**

There are three different kinds of refrigeration facilities provided for various perishables.

1. Meat, fish and poultry

2. Fruit and vegetables

3. Milk and dairy products

**STORAGE PROCEDURE**: All frozen storage should be properly wrapped to prevent deterioration and discoloration. Unwrapped food suf­fers dehydration and oxidation. Aluminum wrappers are not vapour proof and therefore not suitable for freezer storage.  Polythene, plastic films are suitable for freezer storage.

**Temperature: Fruits and Veg 4-7°C**

**Meat and poultry 0-3°C**

**Fish and seafood 1-2°C**

**Dairy product 2-4°C**

**Freezer 17-23°C**

**Ice cream 12-17°C**

**PHYSICAL PROPERTIES OF REFRIGERATORS:**

Should be of material that can   be cleaned easily. There must be a low temperature bulb for adequate lighting. Should have self-closing doors. All walk-in cold rooms have an alarm.

The levels of the cold room and the floor must be the same. Cold rooms must have mobile shelving to facilitate cleaning. Exterior remote temperature gauge is desirable. Periodical checks for the temperature must be made. Small and expensive items such as wine, caviar must be kept locked.

**STORAGE RECOMMENDATION:**

1. Fresh meat and poultry must be refrigerated as soon as it is received.

2.  Fresh fish must be covered with finely crushed ice and stored in the coldest part of the refrigerator.

3.  Dairy products specially butter must be stored covered. Strong flavored foods must be kept away from eggs and other items.

**STORES OPERATION:**

**Purchase:** The purpose of stores operation is that the food is received is available for processing when needed without spoi­lage or deterioration.

**Space** must be assigned for every item. Labels should be pasted. Items must be arranged preferably in the order of the stock or inventory book. The date of arrival of goods must be entered.

**Storekeeper:** The essentials that go to make a good storekeeper are a) Sound experience b) Knowledge of how to handle, and organ­ize the stock in his charge c) A tidy mind and a sense of detail d) A quick grasp of figures e) Clear handwriting f) A liking for the job g) Honesty.

**DUTIES OF A STOREKEEPER:**

1) To keep a good standard of tidiness and cleanliness.

2) To arrange proper storage space for all incoming food stuffs.

3) To keep up to date price list of all commodities.

4) To ensure that an ample supply of all important food stuffs is always available.

5) To check that all orders are correctly made out and dispatched in good time.

6) To check all incoming stores-quantity, quality and price.

7)  To keep all delivery notes, invoices, credit notes, receipt and statements efficiently filed.

8) To keep all daily stores issue sheets.

9) To keep and maintain a set of bin cards.

10) To issue only against a signed indent or requisition slip.

11) To check stock at frequent intervals.

12)  To ensure that all chargeable containers are properly  kept, returned and credited that is all money charged for sacks,  boxes etc are deducted form the account.

13) To obtain best value at the lowest buying price.

14) To have a knowledge of seasonal availability.

**STOCK CONTROL - STOCK LEVELS ROTATION**

Types of books and statements used in stores control:

**1) BIN CARD** : There must be an individual bin card for each item in the stock and the following details must be there on the card:-

**BIN CARD**

UNITS :\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ PRICE :\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

COMMODITY :\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ MAX. STOCK:\_\_\_\_\_\_\_\_\_\_\_\_

CODE NO.:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ MIN. STOCK:\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| DATE | RECEIVED | ISSUED | BALANCE | INITIAL |
|  |  |  |  |  |

**2)  STORES LEDGER** : This is usually found in the form of a  loose leaf file giving one ledger sheet to each item held in stock. The following details are found on a sheet:-

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| BIN NO | DISCRIPTION | CLASSIFICATION | CODE | UNIT | MAXIMUM  MINIMUM |
| DATE | DETAIL INVOICE NO. | QUANTITY | UNIT | VALUE  RECEIVED BALANCE | |

Every time goods are received or issued the appropriate  entries should  be  made on the necessary stores ledger  sheets  and  bin cards. In this manner the balance of your bin cards should be the same as the balance in the stores ledger sheet.

**3) DEPARTMENTAL REQUISITION BOOK:** Such books should be issued to each  department in catering establishment which finds it  neces­sary to draw goods from the store.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DEPARTMENTAL REQUISITION BOOK**  **DATE:** | | | | |
| DISCRIPTION | QUANTITY | UNIT PRICE | ISSUED IF DIFFERENT | QTY UNIT |

**4) ORDER BOOK :** This is in duplicate and has to be filled in  by the storekeeper  every time he wishes to have  goods  delivered. When  ever goods are ordered an order sheet has to be  filled  in and  sent  to the supplier. On receipts  they  must  be  checked against  the  delivery challan/note and duplicate  of  the  order sheet.

**5)  STOCK SHEET :** Stock must be taken at regular intervals  of  a week  or month. spot checks are advisable once in  three  months. The details followed on the stock sheet are as follows:-

1 Description of goods

2 Quantity received issued and balance

3 Price per unit

4 Cash columns

**6) COMMERCIAL DOCUMENTS:** The essential part of a control  system of  any  catering  establishment are  delivery  notes,  invoices, credit notes and statements.

a)  Delivery notes : Are sent with the goods supplied as a  means that  everything  ordered has been delivered. The  delivery  note should also be checked against the duplicate order sheet.

b)  They are bills sent to clients setting out the cost of goods supplied.  An invoice must be sent on the day the goods are dispatched or the services are rendered or as soon as possible.  At least one copy of each invoice is made and used for posting up the books of account, stock records and so on.

**Invoices contain the following information:**

1. The name, address, telephone No etc.

2. Name and address of whom the goods are supplied.

3. The word- INVOICE.

4. The date on which the goods or services were supplied with the price.

5. Terms of settlement(eg. term 5% one month) which indicates  a discount of 5% if the bill is settled  within  a month.

Credit notes are advices to clients, setting out allow­ances made for goods returned or adjustments made through errors of overcharging on invoices. They should also be issued when crates, boxes or containers are returned. Credit notes are exactly the same form as invoices except that the word "Credit note" appears in place of the ward/invoice. To make them more easily distinguishable they are usually printed in red, whereas Invoices are always printed in black.

**ACCOUNT**

The following are the essentials for maintaining of a simple cash account:

1. All entries must be dated.

2. All money received must be clearly named and entered on the left.

3. All money paid out must be entered on the credit side of the book .

4. At the end of the given period at the end of each page the book must be balanced.

5. A debit balance cannot occur because it is impossible to pay out more than received.

A credit note should be sent as soon as it is known  that a  client is entitled to the credit of a sum with which has  been previously  charged by invoice "Statements" are summarize of  all invoices  and  credit notes sent to client  during  the  previous accounting  period,  usually one month. They also show any  sums owing  or paid from previous and the total amount due. A  statement is usually a copy of a client’s ledger account and does  not contain more information than is necessary to check invoices  and credit  notes  when  a client makes payment he  usually  sends  a cheque,  together with the statement he has received. The cheque is  paid into the bank and the statement may be returned  to  the client duly received. Cash discount is a discount allowed in consideration of  prompt payment.

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**ENERGY CONSERVATION IN HOTELS**

**Introduction:** The energy is of critical importance for moving the wheels of a hotel. We use coal, petroleum, fuels, gas, electricity etc in hotels. The energy bill is increasing every month. There are also chances that we may not get sufficient energy in future. The proper consumption of energy is necessary in hotels.

Tuning of combustion, proper maintenance, optimum use of capacity etc has proved that energy up to 25% can be saved. There is need to evolve housekeeping standards and propagate the message of energy conservation to every user. Tax incentives for energy savings are essential. The need for rectifying the defects in pumping system such as high resistance foot valve, pipe line configuration, matching of pump & prime mover etc should be considered. Financing energy conservation investment is desirable at cheaper interest rate. These funds should be available not only for the marginal investment on equipment but also for the supporting training and educational activities.

**General Tips for energy conservation:**

1. Turn off all the lights / fans of a room when it is physically unoccupied.
2. Use natural light as far as possible.
3. Use proper fixture, bulb / tube light, fan, air conditioner, heating element etc.
4. Use proper colour & intensity of light.
5. Fixtures should be installed at proper height and place.
6. Fan should be fixed at proper place. Height of fan blades from floor should proper.
7. Light system should be properly designed.
8. Install chandeliers and other decorative light fixtures for public place. Areas such as Banquet rooms, bars, night clubs, discotheques etc should have dimmers of non-resonant type.
9. Place alternate lights in corridors, staircases, backyards, compounds.
10. Control neon sign, flood light, spot light for illuminating building exteriors.
11. Use in store switch controls (in CB) in all lights in the guest room which can be synchronized with locking arrangement from outside the entrance door.
12. Use 40W slim fluorescent tube in guest room.
13. Compact fluorescent lamp of 40W gives equivalent light of 75 watt incandescent lamp, use fluorescent lamps.
14. At lawns, roofs, swimming pool, etc sodium lamp, discharge lamp, electronic lamp, mercury vapour lamp should be used.
15. Solid state fan regulators should be used.

**Energy Conservation tips in Front Office:**

1. Group of rooms being served by the same source of energy during lean seasons. Unrented rooms should be switched off.
2. Switch of lights in unused areas.
3. Display lighting in shopping should be reduced.
4. When room is vacant, light should be switched off.
5. Reduce lighting level to the minimum in public areas.
6. Keep draperies closed to minimize solar heat.
7. Tinting of glasses should be done.
8. Switch off HVAC equipment for areas not in use.
9. Good door closing mechanism should be provided & maintained.
10. Proper air lock at the main entry of air conditioned rooms should be provided.
11. All public toilets should be checked for leakage.
12. Proper insulation should be provided where heat transfer is not desired.
13. Regroup lighting circuits which are mostly used in night.

**Energy conservation in heating, ventilation & air conditioner.**

1. Adjust compressor, air and water quantities to obtain maximum output.
2. Use heat reclaiming equipment in air conditioning plant. The heat of cooling is rejected through cooling tower to the atmosphere. This hot water can be used for the guest room, laundry and kitchen if continuous cold water is available for condenser.
3. Air quantities can be reduced if the return air is passed through fixtures.
4. Avoid sealing or fouling of heat exchangers.
5. Location of cooling tower should be such that it should prevent boiler and generator flue gases, kitchen & laundry exhaust from entering cooling tower air intake.
6. Where high dry bulb temperature and low humidity is available, use evaporative cooling. This calls for additional capital investment but operating costs during summer will be low.
7. Reduce air handling unit speed and air quantity.
8. Chiller operating at half load consumes less energy as compared to one at full load.
9. Duct air leakage, water leakage should be avoided. Ineffective and damaged insulation should be changed as early as possible.
10. Heat exchanger, cooling tower, condenser, cooling coils are thoroughly cleaned.
11. Ensure constant water temperature in cooling tower which will reduce brake horse power consumption.
12. Filters should be cleaned regularly.
13. Recover heat from the diesel generator jacket cooling water system.
14. Hot water pipes should be insulated.
15. The addition of a small percentage of water with furnace oil gives complete combustion.
16. The boiler may accumulate soot, scale, slag, or ash, which can be removed by scraping, brushing, or vacuuming. Boilers using water heat transfer may benefit if the water side of the heating surfaces is cleaned with chemicals.
17. As far heat distribution system is concerned the cleaning of finned coils, radiators, and convectors will allow heat to flow more easily.
18. Strainers on hot water or steam lines and air vents, if regularly inspected and cleaned, will allow the free flow of water, steam, or air, respectively.
19. The air cooling equipment can also benefit from cleanliness.

**Energy saving in kitchen**

1. Keeping ovens, stoves or grills switched on much before they are required for use.
2. Sometimes cooking range tops are left switched on by mistake when the fuel being burnt is not visible, such as in equipment with solid tops in which a radiant filament is not visible.
3. Fuel may be wasted if equipment is lighted for full heat irrespective of the size of container in which the cooking is done.
4. When the temperature of cooking is higher than is necessary for a particular food, wastage takes place. This is also true for extended periods of cooking, which may not be required.
5. Food cooked straight from the freezer without thawing use up more fuel than if thawed in advance.
6. Methods of cooking involving preparation of food long before the time of service, require food to be held hot for longer periods. Besides affecting food quality fuel bills go up.
7. Use of high wattage bulbs in areas where lesser light can do.
8. Keeping exhaust fans running when kitchens and service areas are not being used.
9. Using colours on walls and ceilings, and materials which absorb light instead of reflecting it back for good visibility. This aids to the necessity of providing artificial lighting involving the use of electricity, which could otherwise have been saved.
10. Up to 30 per cent energy can be saved through good cooking habits.
11. Use only high efficiency ISI marked gas or kerosene stove.
12. Use pressure cooker. It cooks faster and saves between 20 to 46 per cent fuel.
13. Surplus water consumes up to 65 per cent additional fuel. Use optimum water.
14. Soak dal, rice, etc., before cooking. This reduces cooking time.
15. Place a lid on an open cooking vessel or pan. An open vessel loses heat to the atmosphere.
16. Regularly clean the burner and trim or replace wicks of kerosene stoves.
17. Keep frozen food out of the fridge for some time before putting them on the stove.

**Energy Saving in Food Preparation**

* Load and unload ovens, steamers and refrigerated cabinets as quickly as possible and do not leave doors open.
* Whenever possible, cover pots and pans while cooking.
* Ensure maintenance contract includes adjustment of gas burners.
* Install timers to switch off cooking processes automatically.
* Use internal thermometers to avoid the necessity to open the door when checking core food temperatures in ovens, etc.
* Segregate cooking equipment from refrigeration equipment within the kitchen.
* Encourage staff to use high-efficiency modern equipment where there is a choice; pressure cookers, combination ovens, brat pans etc.

|  |  |
| --- | --- |
| **Kitchen equipment** | **Consumption** |
| Steam Toaster | 1.5 kw to 3 kw |
| Fryer | 2 kw to 4 kw |
| Griller | 4 kw to 6 kw |
| Oven | 3 kw to 12 kw |
| Ranges | 5 kw to 7 kw |
| Dish washer | 3 kw to 5 kw |

1. Set up a schedule of preheating times for appliances and stick to it, 10-15 minutes preheat period for solid top gas ranges, 5-15 minutes deep fat fryer.
2. Cool in the largest volume possible.
3. Set thermostat to the lowest temperature that will give satisfactory results, lower temperature results in lower energy consumption because less energy will be lost to the surrounding air.
4. Plan menus to, as not to over load particular equipment.
5. Reduce peak load.
6. Practice preventive maintenance.
7. Schedule energy intensive cooking.
8. Use solar energy for cooking.

**Dish Washers:**

1. Locate hot water boosters within 1.5 metre of the dish washer to avoid heat loss in the pipes.
2. Do not wash dishes until you have a sufficient load.
3. Adjust the power dryer.
4. Check the flow controls.
5. Use steam hose if necessary to remove excessive grease.
6. Regularly remove water lime deposit from spray nozzles and tanks.
7. Check speed reducer on conveyor type dish washers for proper lubrication.
8. Keeps pressure reducing valves in good condition.
9. Check pumps regularly.

**Energy Conservation in Food and Beverage Department:**

1. Use optimum capacity ovens
2. Switch on equipment when it is required.
3. Time required for preheating of oven should be controlled.
4. Stagger start up time of electrical equipment if possible.
5. Oven thermostats should be set regularly.
6. Replace outdate ovens with more efficient ovens.
7. When possible resort to slow cooking at low temperature.
8. The tip of the gas flame should touch the bottom of the pan or pot.
9. Use incinerator when full load is available.

**Energy Conservation in Banquet Hall:**

1. Try to make a match of the space to the size of function. Start the days baking with foods that require the lowest oven temperature.
2. Plan baking and roasting operation to use ovens to full capacity. Allow at least a 5 cm clearance for air to circulate around pans.
3. In roasting, use lowest practical temperature.
4. Load and unload quickly to avoid unnecessary heat loss and minimize opening door to check food condition.
5. Remove boil ovens and spill ovens promptly to avoid building of carbon deposits which reduces efficiency.
6. Repair broken door hands and cracks that allow heat to escape. Clear all crumbs and encrusted matter from around the door opening. Do not slam or stand on oven doors.

**Energy saving in House Keeping:**

1. Switch off room lights when not in use. Fix posters which attract the attention all guests, requesting them to switch off lights when they leave the room.
2. Use of maximum natural light should be possible in the room.
3. Use light finishes for walls and ceilings for better light reflection.
4. Reduce light in corridors to minimum.
5. Switch off lights in store room, linen rooms etc., when not in use.
6. Use higher wattage bulb when possible.
7. Use lamp shade.
8. Keen draperies closed in guest rooms.
9. Consider double glazing of windows and tinting of single glasses.

**Energy Conservation in Laundry:**

1. Usage of cold water detergents reduces hot water requirements.
2. Use final rinse waters for the first wash so the next batch.
3. Have preventive maintenance programme for the laundry equipment.
4. Regular cleaning of rotating cylinders of dryers is desirable.

**Energy Conservation and Management;**

Management must be committed for energy conservation. A committee can be made up of one person from each department for the same purpose.

Programme can be:

1. Those things that can be done now to conserve energy with a minimum of inconvenience.
2. Readjustment of operational practice to save energy.
3. Require additional owner investment involves changes in the property.

**Energy Saving in Sanitation:**

* Use hot water only when necessary
* Do not use running water for cleaning purposes.
* Accumulate full loads for dishwasher; do not keep a flight washer running with no loads or small loads.
* Install heat recovery on dishwashers to recover energy form final rinse cycle.

**Energy Audit:**

Auditing of the consumption of energy is done with the view point of regulating the way in which it is being used.

The energy audit is an essential step in the establishment of a professional energy management programme. The objective is to analyze and evaluate collected data to determine the energy performance of the entire building. This is relatively easy for the whole hotel, can be obtained from historic records of utility consumption data, relevant hotel statistics, equipment technical date and weather information.

An energy audit should be conducted, which will show:

* Energy consumption and cost date for upto five years.
* Frequent meter readings to show day-time, night time and weekend energy consumption.
* An inventory of all energy-consuming equipment showing age, power loading and maintenance record, together with date or frequency of use.

Particularly for expensive energy use areas such as kitchens and the laundry, submerging can be an important first stage in reducing energy waste since it allows the monitoring of energy consumption down to a level at which control can be exercised. It also allows for the full implementation of energy monitoring and targeting programmes. The installation of sub –meters for each of the utilities may be of value in order to assess consumption by major energy consumers, such as chillers, boilers, air handlers and the kitchen. Although this is an expensive process, it is well worth doing, as lack of information on consumption within individual departments is often the cause of failure of savings programmes. It has the following advantages.

* Accurate energy audits.
* Correct determination of true efficiencies of major consumers such as chillers, boilers and air handlers.
* The ability to trace inefficiency and waste.
* Immediate feedback of results of specific energy conservation measures that would otherwise be lost in the total consumption of the building.
* Enhanced departmental management accountability, by placing responsibility with the individuals who control and consume utilities.
* Determination of the feasibility of capital investment projects and their resultant true savings after installation.
* Control of public utility meters and deliveries.
* Information on consumption for designers and energy expert for the proper sizing of new or replacement equipment.

**Energy Saving in Guest Rooms:**

Guest rooms consume a major proportion of the hotel’s energy and water, typically 30 percent of the total for the hotel. Consumption is governed by two major factors:

1. Climate affects heating and air-conditioning loads,
2. Occupancy affects other sources of energy and water consumption. Savings can be achieved by:

* Monitoring utility consumption on an hourly basis afor 24 hours and noting the relationship between usage and activity. Excessive use of water during the night might indicate leaks, and high usage of water between 10 am and 4 pm might indicate excessive usage by housekeeping staff for cleaning purposes.
* Modifying the cleaning procedures of housekeeping staff. In some hotels cleaning of bedrooms can account for one-third of water consumption it the rooms.
* During periods of low occupancy, concentrating rooms allocated to areas of the hotel which are zoned for heating purposes. This allows those areas of the hotel not in use to be shut off.
* Adjusting thermostats for summer and winter use to prevent guests adjusting temperatures by opening windows.
* Training housekeeping staff to switch off lighting and televisions as soon as rooms are vacated.
* During hot or cold weather keeping curtains closed to reduce heating /cooling gains.
* Adjusting the volume of water usage by toilet flush to 6-8 litres.
* Installing pressure regulators on shower-heads and flow restrictors on water taps and sinks.
* Installing thermostatic control valves on radiators.
* Installing key switches on power supplies to rooms.

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**SPECIAL DESIGNS FOR DIFFERENTLY ABLED GUEST**

**General Overview**

The Disabled Room is been designed to provide room and facilities the guests that are looking for these special needs.  Each room is 45m2 in size which means that guests can move around the room without having to squeeze past the bed. The rooms normally have a Queen Bed and one Single Bed with a sofa that is also a separate single bed.

The room may have a small kitchenette, which is built lower for easier access, and tea/coffee facilities for a lovely cup of tea after a hard day. A microwave is available upon request. The fridge may be used by guests to keep those drinks nice and cool. For those guests that wish to order breakfast, hotels have a breakfast hutch that enables them to deliver meals to the room without entering the room - further privacy for our guests.

En suite wide entry bathroom with a wide entry door-less "Mediterranean style" walk in shower, a shower seat is available..

Access to the reception and dining areas without the need to negotiate steps. Extra wide fire escape door directly out to the car parking area.

Fold away supports for the toilet.

The bathroom has additional facilities that will help the guests that are looking for this assistance.

There are ramps at the entrance. The courtyard and public toilets may also be accessible for physically impaired guests.

Low rise front desk counters for physically impaired guests,.

All rooms now-a-days have remote controlled doors, curtains and other equipments.

Facilities for Orthopedically Impaired

* Lever-entry door operable with closed fist
* View-port/Windows at wheelchair level
* At least 32" space on either side of the bed to allow for wheelchair
* Curtain pulls accessible without moving furniture
* Easily operable switches and lamps
* Connecting door to nurse room
* Entry door minimum 32" clear opening width to allow for wheelchair access
* Grab bars beside and behind toilet
* Adequate clear turning space for wheelchair in room (5' 0" diameter circle)
* Grab bars provided on two adjacent walls by tub and shower
* Padded or enclosed plumbing pipes beneath open-front vanity
* Hand-held shower
* Fire Alarm Listening device for the visually impaired, deaf and/or hard of hearing is available on request
* A Doorbell unit, for the visually impaired and/or hard of hearing is available on request

**Hearing impaired:**

* TDD / text telephone available for guest room use
* Visual fire alarm notification
* Closed caption TV or decoder available on request
* Portable Induction Loops for the hard of hearing available on request
* Telephone amplifiers for the hard of hearing available on request
* Staff are trained in hearing awareness and sign languages.

**Visually Impaired**

* Fully accessible facilities and staff are trained in visual awareness
* Provide auxiliary aids and services leading to effective communication such as Braille, large print, and audio tape and interactive audio systems.
* Facilities for guide dogs and pet dogs are also available

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# **NETWORK ANALYSIS**

(**PERT and CPM)**

## **INTRODUCTION**

PERT and CPM are two well-known network techniques or models **especially useful for planning, scheduling and executing large time-bound projects which involve careful co-ordination of a variety of complex and inter-related activities and resources**. **PERT** is the abbreviated form for Program Evaluation and Review Techniques and **CPM** for Critical Path Method. Both the techniques were developed in U.S.A. during the late 1950s. **PERT** was developed by US Navy Engineers to plan and control the huge Polaris Submarine Program**. CPM** was developed by E.I. DuPont Nemours & Co., U.S.A. and the Univac Division of Remington Rand Corporation in 1956 in connection with the periodic overhauling and maintenance of chemical plants. It resulted in reducing the shut-down period from 130 hours to 90 hours and saving hours and saving the company $1 million.

Both the techniques have been applied successfully to improve efficiency of execution of large projects within pre-determined time and cost limits. Any new venture may be regarded as a project, such as constructing a new plant, bridge, dam, shopping centre or residential complex, design of a new aircraft, manufacture of ships, R& D projects, introduction of a new product, installing pipeline, floating a new issue of shares, major repairs and overhaul of plant and machinery units, organizing a large conference/convention, handling an earthquake relief work and so on.

**PERT** and **CPM** converge on several aspects, and are almost treated as twins; there are, however, some points of difference between them which will be discussed later. The techniques recognize the systems or inter-related nature of activities on large work projects and translate the job proposed into a model by drawing a network of the activities involved. They are used in planning and controlling (monitoring) the projects. Planning in this context implies developing the overall layout of the project with estimates of time, the resources required and the detailed time scheduling and sequence of various jobs to be performed. The control, on the hand takes place during the work on the project. Gradually as resources get used and completion times are obtained, project management techniques can be used to reallocate, if necessary, the rescues, according to the revised criticality rankings of the jobs remaining to be done.

**Constructing the Network**

A project network is a directed graph that consists of finite collection of elements called events (or nodes) together with a subset of the ordered pairs (i, j,) of nodes called activities (or jobs or tasks or operations). In other words, a network is the graphical representation of logically and sequentially connected arrows and nodes representing activities and events of a project. (Also called arrow diagrams) diagrams show the operations/activities to be performed to complete a job, the sequence and inter-relationship of various activities involved.

In networks, an activity is a clearly identifiable and manageable operation or an element of work entailed in the project and it is represented by an arrow. An event (or node), is the and/or finish of an activity or group of activities. Others terms used are junction, milestone or stage. In general milestone is reserved for particularly significant events that require special monitoring. An activity arrow (i, j,) extends between two nodes, the tail node (or event), i, represents the start of an activity and the head node (event) j, represents the completion of an activity as shown below:

Activity

1. (j,)

starting event completion event

Activities may also be termed jobs, tasks or operations. Activities which must be completed before a certain other activity starts are called the predecessor activity starts are called successors activities.

**Predecessor activity:** Activities that must be completed immediately prior to the start of another activity called predecessor activities.

**Successor activities:** Activities that cannot be started until one or more of the other activities are completed, but immediately succeed them are called successor activities.

**Concurrent activity:** Activities which can be accomplished at the same time are known as concurrent activities.

**Path:** An unbroken chain of activity arrows connecting the initial event to the final event via other events is called a path.

**RULES OF NETWORK CONSTRUCTION.**

1. Each defined activity is represented by one and only one arrow in the network. Therefore, no single activity can be represented more than once in the network. These arrows should be kept straight and not curved.
2. Before an activity can be undertaken all activities preceding it must be completed. Thus, a network should be developed on the basis of logical or technical dependencies between various activities of the project. The discipline of networking requires that the project be considered in a thorough and analytic manner and the predecessor-successor relationships between the various activities clearly laid.
3. The arrows depicting various activities are indicative of the local precedence only. The length and bearing of the arrows are of no significance, although arrows in network diagrams should be drawn to show time flow left to right i.e. in the forward direction.
4. The arrow direction indicates the general progression in time. Each activity must start and end in a node (or event). The tail of an activity represents the point in time at which the **“activity start”** occurs and the node marking this start is called the tail event for this event. The head of an activity represents the point in time at which the **“activity completion”** occurs and the node marking this termination is called the head event for that activity.
5. When a number of activities terminate at one event, it indicates that no activity emanating from that event may start unless all activities terminating there have been completed.
6. Events are identified by numbers. Each event identified by a number higher than that allotted to the event immediate preceding one. ie., events should be numbered such that for every arrow there is an event number before and after. In assigning numbers to the events, care should be taken that there is no duplication of event numbers in a network. The event numbered **1** denotes start of the project and is called initial node (or event) while the event carrying the highest number denotes the final event in the network. A network should have only one initial and one terminal node
7. The activities are identified by the numbers of their starting and the ending events. An event which represents the joint completion of more than one activity is known as a merge event, while an event which portrays the initiation of more than one activity is called the burst event.
8. Parallel activities between two events, without intervening events, are prohibited. Thus two or more activities cannot be identified by the same beginning and ending events. By implication, any two events should not be connected with more than one arrow. When two or more activities in a project have the same head and tail events, dummy activities are needed in constructing the network. The figure on the left is the wrong way to represent the two activities while the figure on the right shows the correct representation of the two activities using a dummy.
9. WRONG RIGHT

1. DUMMY ACTIVITY: Dummy activities are usually shown by arrows with dashed lines. Dummy activities are also very useful in establishing proper logical relationships in the networks which cannot, otherwise, be adequately represented.
2. Looping is not permitted.
3. Dangling is not permitted.

**Numbering the events (Fulkerson’s Rule)**

After the network is drawn in a logical sequence, every event is assigned a number which is placed inside the node circle. The number sequence should be such so as to reflect the flow of the network. The rule devised D R Fulkerson is used for the purpose of numbering and involves the following steps.

1. The initial event has all outgoing arrows with no incoming arrow is numbered 1.
2. Delete all the arrows coming out of node 1. This will convert some more nodes (at least one) into initial events. Number these events 2,3 …
3. Delete all the arrows going out from these numbered events to create more initial events. Assign the next numbers to these events.
4. Continue until the final or terminal node, which has all arrows coming in with no arrow going out, is numbered.

**CRITICAL PATH :** The critical path in a network diagram is the longest continuous chain of activities (i.e. a path along which it takes the longest duration) through the network starting from first to the last event and is shown by thick line or double lines. All activities lying on this critical part are called **critical** **activities,** as any delay in their execution will lead to a delay in the completion of the entire project.

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**NETWORK CRASHING**

**Project Time & Cost in Networking**

**Introduction**: For completing a project various activities have to be completed which requires lot of money. Hence, the project manager always remains conscious of time as well as costs involved. CPM assumes direct relationship between time and cost and uses time-cost trade-off concept, which is its unique feature. This concept relates to the fact that on a crash basis, it will cost a little more but even this increase in cost may prove economical in various ways. As such the project manager will keep in mind the time-cost consideration before taking decisions regarding the project and its different activities.

**CRASHING:** is employed when project manager want to shorten the project completion time by spending extra resources (more money). In real life, it is always possible to employ more resources. For example, the activity of laying tiles which requires team of mason assisted by a labourers. By increasing the number of mason and labourers the activity duration can be shortened or crashed. But this to has limitation by increasing the mason and labourers would not reduce the duration any more since they are liable to jam up. Concerned specialists would have to estimate the crashing limit for each activity as also the extra money for crashing each activity.Crash time is the minimum activity duration to which an activity can be compressed by increasing the resources and hence by increasing the direct costs.

**Time-cost optimisation algorithm**

The process of shortening a project duration is called crashing and is usually achieved by adding extra resources to an activity.

**Project crashing involves the following steps:**

**NETWORK CRASHING**

**Step I:** Find the critical path and identify the critical activities. List all possible paths starting and duration of each path.

**Step II:** Calculate the cost slope for the different activities by using the formula.

Cost slope = Crash cost - Normal cost

Normal time - Crash time

The crash slope indicates the extra cost required to expedite an activity per unit time.

Identify the activities on critical path which have cost slope less than the indirect

cost.

**Step III**: Crashing the activity having minimum cost slope i.e. Less than the indirect cost. Redraw the network diagram with the crashing time. And find out the critical path if there is no change. This means that the network cannot be further crashed. This is the optimum network.

**Step IV:** Calculate the total cost of the project before and after crashing. Check whether crashing reduces the cost of project. By calculating the difference of before and after crashing

**Total cost without crashing**

Direct cost + indirect cost

**Total cost after crashing**

Direct cost + indirect cost

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**SAMPLE QUESTIONS**

**FACILITY PLANNING**

### HOTEL DESIGN

1. Explain the seven design consideration
2. Explain the role of each member of the project team.
3. List the characteristic of a well-planned design.
4. How feasibility report is prepared and explains the various types of feasibility report.
5. List the factors of pre-design and design phase.
6. Explain Guest room plan- Slab Plan, Atrium Plan, Tower structure.

**FACILITIES PLANNING:**

1. What do you understand by key to unlocking a layout problem?
2. Explain the Phases of layout planning
3. With help of neat diagram explain the systematic layout planning pattern (SLP)
4. Give the fundamentals of layout planning.
5. What is Flow Process and flow of materials?
6. What is The operation process chart?
7. Difference between carpet area plinth area and super built

**STAR CLASSIFICATION OF HOTEL:**

1. List the general terms, conditions required for the approval of hotel at project level. And for applying for classification.
2. List all the factors of classifying a hotel 1.2.3.4.5.5D star

**KITCHEN LAYOUT AND DESIGN:**

1. Explain the principles of kitchen layout and design.
2. List the factors that affect kitchen design.
3. Explain the Concepts of Layout of a commercial kitchen.
4. List and explain the various Layout configurations.
5. What are the factors to be considered while planning of various supporting services?
6. How will you develop the standard for kitchen equipment?
7. Write short note on: S.S: -Type 302,304, Finish:, Galvanised steel: Welding: Soldering:
8. What are the different ways in which equipment specification can be written? And explain?
9. Give the equipment specification for
10. Stainless steel work table with the under shelf. Stainless steel work table with sink: Dosa plate: Two burner s.s.gas range (bulk cooking) Idli steamer: Steam jacketed vessel: Chapatti plate with puffer: Deep fat fryers Brat pan (tilting frying pan):

**KITCHEN STEWARDING LAYOUT AND DESIGN:**

1. Explain the importance of kitchen stewarding give the layout and equipment
2. Draw the store layout and list the equipment required and the records maintained

**ENERGY CONSERVATION:**

1. What is the need for necessity energy conservation?
2. List the methods of conserving energy in different areas of hotel.
3. How will you developing and implementing energy conservation programs for a hotel

**CARPARKING**

1. Write short note on car parking.

**FACILITY FOR DIFFERENTLY ABLED GUEST.**

1. List all the factors to be considered while planning the facility for differently abled guest.

**PROJECT MANAGEMENT:**

1. What is network analysis?
2. What is PERT and CPM?
3. Explain the basic rules and procedure for network drawing.
4. Explain the Advantages of using PERT/CPM as management tools of project control.
5. How PERT and CPM is used for answering the management problem?
6. List the Advantages and Limitations of PERT and CPM.
7. Distinguish between CPM and PERT.
8. Explain terms

|  |  |  |  |
| --- | --- | --- | --- |
| Dummy activity | Critical path | Activity | Event |
| Predecessor Activity | Concurrent Activity | Path | Slack |
| Node | Float |  |  |

1. What is network crashing?
2. What is Normal cost, Crash cost?

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