Subject : FOOD SCIENCE AND COSTING **STD : XI**

COURSE : BAKERY AND CONFECTIONERY

SYLLABUS FOR STD : XI (VOCATIONAL)

CHAPTER 1 : CEREALS

* Wheat
* Types of wheat
* Nutritional Composition
* Wheat Processing and quality assessment
* Flour Milling
* Grades of Flour
* Storage of Wheat
* Safe Storage Techniques
* Composition of Flour

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* Food Poisoning
* Control of Bacterial growth
* Legal requirements of food handlers
* Basic Steps in HACCP
* Documented food safety management system
* Types of records

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Definition of Food Hygiene

Food hygiene is the practice of ensuring food is safe, sound and wholesome, by protecting it from contamination, preventing bacterial multiplication and by the destruction of harmful bacteria.

What is food poisoning?

Food poisoning is an illness that occurs usually between 1 and 36 hours after eating contaminated or poisoned food, the most common symptoms being diarrhea, vomiting and dehydration.

Food workers must report all instances of diarrhea, vomiting and skin infections to a supervisor before returning to work and must not work while suffering from these symptoms. Failure to observe these rules is the most common reason for food workers being prosecuted.

Foodborne illness

Foodborne illness is an illness that occurs when food containing harmful bacteria is ingested. This term also covers foodborne disease and food poisoning.

Foodborne disease

Foodborne disease – A disease or illness caused by micro-organisms carried by food or water.

Causes of food poisoning

• Bacteria – Pathogenic bacteria are the most common cause
• Viruses
• Metals
• Chemicals
• Natural poisons in food (toadstools, green potatoes, and red kidney beans)
• Moulds

Factors contributing to food poisoning cases

- Food prepared too far in advance
- Cooling food too slowly
- Not re-heating food to high enough temperatures
- Using cooked food contaminated with food poisoning bacteria
- Poor food safety practices

People most at risk
- The elderly
- Babies and toddlers
- Pregnant women
- Individuals who are already unwell

Spores are small round bodies with thick walls which allow the bacteria to stay dormant but alive, over long periods of time, e.g. during freezing, defrosting, cooking and cooling. When conditions become favourable the spores germinate and active bacteria are produced once more. It is vital therefore that food is kept out of the danger zone as far as possible.

Toxins are poisonous chemicals produced by certain types of bacteria, e.g. the bacteria Staphylococcus aureus produces a toxin in food, which normally causes severe illness very soon after the food is eaten.

Different classes of micro-organism

Bacteria

Yeasts

Fungi

Moulds

Viruses

Conditions required for the growth of bacteria
- Moisture
- Time
- Food
- Warmth (37°C optimum for growth)
- Oxygen
- pH

Once the conditions required for growth are ideal, bacteria will multiply by binary fission: simply by splitting in two. Most bacteria will double every 10 to 20 minutes.

Preservation methods

To preserve food, remove one or more requirement for bacterial growth. For instance, dehydrate food to remove moisture.

What is the danger zone?

The danger zone is the optimum temperature range within which bacteria
can multiply: +5°C to + 63°C.

Important temperatures to note

- Cook to a minimum core temperature of 75°C: too hot for bacteria to survive. At this temperature bacteria are killed off and food is deemed safe to eat
- 0 to +5°C: bacteria do not multiply or multiply very slowly
- -18°C or below: bacteria are dormant and do not multiply at freezer temperatures
- Pasteurization 72°C x 15 seconds

How can bacterial growth be controlled?

- Good quality control systems, such as not storing raw food next to ready-to-eat and cooked food
- Temperature control, such as cooking food to a minimum core temperature of 75°C
- Personal hygiene, such as washing hands after visiting the toilet and then preparing food
- Cleaning and disinfecting

The legal requirements of food handlers

- Keep yourself clean
- Keep the workplace clean
- Protect food from contamination or anything that could cause harm
- Follow good personal hygiene practices – e.g. hand washing
- Wear appropriate protective clothing
- Tell your employer if you are suffering from or are a carrier of a
foodborne disease

Required training of food handlers

- By law food handlers must receive adequate supervision, instruction/ or training in food hygiene for the work they do
- Those responsible for HACCP should also receive adequate training

HACCP – Hazard Analysis Critical Control Point.

Food hygiene legislation requires food businesses to have a food safety management system such as HACCP or a system based on HACCP principles.

The main principle of HACCP is to try to identify a potential problem or hazard that may occur at any stage before it happens and so guarantee the quality of the food.

HACCP is a system used by food businesses to:

- Identify any step in the activities of their food business which is critical to ensuring food safety
- Implement safety measures to reduce risks to health.

The seven basic steps in HACCP

1. Identify the hazards associated with the food business, e.g. a hazard could be a chemical contaminant
2. Identify points where hazards may occur – the hazard may occur if the food is left out when cleaning - and how this can be controlled
3. Establish limits to allow these hazards to be controlled at each critical point
4. Establish monitoring procedures to measure the limits set for each point identified at step 2.
5. Determine what corrective action would be required if the control of a hazard was unsuccessful
6. Establish recording procedures commensurate with the nature and extent of the food business
7. Establish verification and review procedures

The use of documented food safety management systems

- It is a legal requirement to keep records as part of the HACCP - based food safety management system
- Record keeping helps to ensure that the business complies with the law and provides evidence of how the food is produced and handled
- Records need to show that the steps in the production and sale of food that are critical to food safety are being controlled.

Types of records that might be kept

- Refrigerated storage, i.e. the date the food went into the fridge, daily recording of the temperature in the fridge, maintenance records
- Cooking and holding temperatures
- Cleaning records
- Staff training records – provides evidence that staff have been trained to the required standard
- Pest control
- Goods received delivery temperatures.

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COST CONCEPT

In catering, a cost may be defined as the price of goods used up, sold or consumed and services rendered. Items are said to be consumed even when they are wasted, stolen or discarded, as happens frequently in food services. This is because they are no longer available for the purpose for which they are purchased. The effort of every organisation is to maximize its profits and to do so, costs would have to be minimised. To be able o exercise any control on costs therefore, it is important to understand some of the basic concepts underlying them.

In every food service, there are basically three types of costs involved in its day to day operations:-

1. **Cost of Materials** – This includes raw food and other ingredients that makes up a dish, meal or a beverage and is commonly referred to as material or food cost.
2. **Cost of Employee** – This includes the salaries of staffs, and the value of all benefits provided to them such as meals, housing, medical facilities and uniforms, insurance, bonuses, pension etc. it is generally referred to as “labour or payroll costs”.
3. **Overhead Costs** – This includes all such costs which cannot be directly identified with food products, such as rent, depreciation, fuel, cleaning materials, administrative costs, and selling costs.

Cost can be of 3 types:-

1. **Fixed Costs** – As the name suggests, these costs remains virtually unaffected by changes in the volume of business of an establishment. For eg., Cost of rent, Insurance etc.

2. **Semi fixed cost** – It includes cost of fuel, cleaning materials etc. and change with output but not in direct proportion.

3. **Variable cost** – These includes food cost which changes in direct proportion to the output. In a food service establishment known for its standards, one would not expect portion sizes to be reduced if demand for meals goes up and therefore for each extra meal demanded the amount of food materials will increase in the same proportion.

FOOD COST CONTROL

Control is a process by which managers attempt to direct, regulate and restrain the actions of people in order to achieve goals. This is essential in the area of food and other costs because of the many ways in which loss is possible at each stage in a catering operation. Control may be exercised in many ways, through selection of techniques and devices suitable for each establishment. The two main causes of excessive cost in an establishment are inefficiency and waste. The food cost in any catering establishment whatever it's sized, vary between 40% to 60% of total sales, depending on the nature of the organisation. These costs being variable needs to be controlled because on them will depend the amount of profits that the establishment makes.

METHOD OF CONTROLLING FOOD COST

1. Ordering perishable foods in quantities for immediate use in preparation and service.
2. Ordering semi or non – perishable in quantities which can be turned over fast enough to prevent spoilage.
3. Close supervision and regular checks at strategic points in catering cycle.
4. Portioning in the kitchen and recording the number of portions before sending them for service and then recording the numbers that are returned to the kitchen.
5. Offering incentive schemes to staffs for achieving sales target at established gross profit margins.
6. Forecasting the quantities of each menu item that will sell so that excess leftovers are avoided.
7. Developing staff initiative and creativity by inviting their participation in forecasting and planning activity.
8. Investing on equipment which will save time of staff on routine jobs so that they can use their initiative better in meal production and food presentation.
9. Using standardized simple recipes from which portions can be clearly identified.
10. Maintaining control account to enable periodic assessments of profitability and efficiency. Such assessment helps to pin point areas at variance with expected results, so that corrective actions can be taken in time.

FOOD COST RATIO

$$\text{FCR} = \frac{\text{Food Cost}}{\text{Selling Price}}$$

If the FC is known and the target for the kitchen percentage is set, then the selling price can easily be worked out using the above formula.

GROSS PROFIT

Gross Profit is the figure which represents the sum total of labour costs, overhead expenses and the net profit of the establishment.

GP= Total sales – Food Cost

$$\text{GROSS PROFIT RATIO} = \frac{\text{Gross Profit}}{\text{Sales}}$$

$$\text{GROSS PROFIT PERCENTAGE} = \frac{\text{Gross Profit}}{\text{Sales}} \times 100$$

DETERMINE MENU ITEM SELLING PRICES

Menu Prices are initially determined to yield a predetermined overall food cost. Let us assume we wished to have a 40% food cost. We would simply take the cost of the menu item (let's take it as Rs. 60/-) and divide it by 40% to arrive at the selling price of that particular menu.

$$\frac{60}{40\%} = \frac{60}{40/100} = 60/40 \times 100 = \text{Rs. } 150/-$$

In order to calculate portion costs of recipes, one must first determine the cost of the ingredients. Portions cost or raw food cost is the total cost of all the ingredients in a recipe, divided by the number of portions served.

$$\text{Portion cost} = \frac{\text{cost of ingredients}}{\text{No. of portions}}$$

WHILE CALCULATING PORTION COST, FOLLOWINGS POINTS SHOULD BE KEPT IN MIND –

1. Cost must be based on As Purchase (AP) amount, even though recipes often give Edible Portion (EP) quantities.
2. Take everything that means all hidden cost like sugar that goes with the coffee, oil used for frying etc.
3. Record the number of portions actually served not just the no. of recipes intended to serve. For instance, if you dropped a piece of cake on the floor, those costs still have to be covered.

PROCEDURE FOR CALCULATING PORTION COST

1. List ingredients and quantities of recopies as prepared
2. Convert the recipe quantities as As Purchased (AP) quantities.
3. Determine the price of each ingredient. The units in the step 2 and 3 must be the same in order for you to do the calculation.
4. Calculate the total cost of each ingredient by multiplying the price per unit by the no. of units needed.
5. Add up the ingredients costs to get the total recipe cost.
6. Divide the total cost by the no. of portions served to get the cost per portion.

CHAPTER 4 : <u>FOOD COST CONTROL</u>

* Causes of High Food Cost
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Cost is generally defined as a reduction of value of an asset for the purpose of securing benefit, however in F & B business it means the price to the hotel or restaurant of goods & service when the goods are consumed or the service rendered.

Food represents the largest expense in most hotels; therefore it is essential to know what is happening with this expense. The food & beverage in specific & hotel industry in general lends it self to control because it is an instant business & all the items sold are countable. In additional, all the items handled in the hotel & restaurant is portable & consumable by the staff. Therefore by maintaining & analyzing the F & B business the owner or the manager could early monitor & analyses the business & weak links can be identified & pilferage could be stopped.

SOME OF THE CAUSES OF HIGH FOOD COST:

1-Menu planning:

- No consideration of the time of day , day of the week , holidays, low house counts etc
- Too many or too few items on the menu
- Monotonous menu
- No balance between high & low cost items for high average check
- Poor pricing of menu
- No consideration for the amount of labour which would be required to work on the menu
- No consideration on type of equipment that would be required for process the items on the menu

2-Purchasing:

- Too many raw items purchased at one time
- No detailed specification governing quality weights, types etc.
- No competitive purchasing policy
- Poor relationship with the suppliers
- No audit of invoices & payments
- Theft by the receiving man
- No cost budget for purchasing

3-Receiving:

- No check on price, quality or quantity
- No systems to obtain the credit for damaged goods
- No check on receiving policies

- No proper equipment eg. Weighing scale etc.
- No record maintained for the goods received
- Perishable goods left out for too long

4-Storing:

- No proper storage systems followed for perishable items
- Storage at wrong temperature
- No daily inspection of food
- Poor sanitation
- Theft in storeroom
- No periodic report maintained of dead stock
- No physical inventory held
- No policy of one man responsible for store

5-Issuing:

- No controls or record of food issued
- No authorized requisitions & issues.
- Careless pricing of issues
- No forced issues of dead stock

6-Preparing:

- Lack of equipments for portioning eg. Slices, carving, trimming.
- Excessive trim of vegetables & meat
- No check on raw yield
- No use of end products for production of low cost meal

7-Service:

- No standard portion size
- No Standard serving dishes
- No care of left overs
- No record of food living the kitchen
- Carelessness- spillage, waste etc.

8-Sales:

- Cashier theft
- Waiter theft
- Carelessness with walk outs
- No food popularity index
- No sales records to detect the trends
- Poor promotion & advertising

Controls Techniques:

Controls may be defined as a process by means of which managers attempt to direct , regulate & restrain the actions of people in order to achieve desired goals of the establishment- financial success, preservation of sound environment etc.

We are dealing with vegetables, fruits, and meats etc. which constituents the raw materials. At each stage of operation it is necessary to institute control techniques. These techniques & devices depend on the nature of the difficulty to be controlled, the situation & the style of the individual making the selection.

Some of the control techniques may be discussed as follows:

1- **Establishing Standards**:

Standards may be defined as rules or measures established for making comparisons & judgments. In F & B standards are used for successful control over operations.

There are 4 basic standards that could be incorporated into food production

1- Standard portion
2- Standard recipe
3- Standard yield
4- Standard purchase specification.

2- Establishing procedures:

Procedure is methods employed to prepare a product or perform a job. Standard procedures are those that have been established as the correct methods, routine & techniques for day-to-day operation of the F & B business.

Ordering & purchasing procedure are standardized to ensure that the raw material is acquired in needed quantities and qualities at a favorable price and at appropriate time. Standardized receiving procedure are adopted to ensure that that product received is of the proper standard.

So is the standard storing procedure maintained so that each item is stored according to the given temperature to avoid spoilage and pilferage.

3- Setting examples and correcting & observing employees action:

The behavior of the individual employee in the F & B operations tends to be influenced by the leader. Thus by instructing personnel in the particulars of how their job is done & performed is very necessary. This instruction reflects the standards & procedure. The manager's behavior in performing any task will influence the manner of the employee. It is necessary for the manager to constantly observe & correct his staff at all times, The staff would go on doing the mistake repeatedly if it is not stopped for the very first time. They get into the attitude of taking the management for granted.

4- Records & Reports:

In large hotels it is not possible for the manger to keep an eye on his or her staff at all times, in such cases he can abstract information from records & reports. These reports are like form of sale statements & ratios & some specific & more timely reports like daily , weekly, monthly reports.

5- Preparing & following budget:

A budget is a realistic expression of business goals & objectives expressed in financial term stated in rupees it is a forecast of sales activity & an estimate of costs.

Large hotels establish overall financial budget for the operation of entire business, including a number of specific budget for the operations- such as sales budget, cash budget, capital budget etc. `budget is prepared on the figures from the past, anticipation , business enviorment, state policy, weather etc. New operations can take help of market analysis & experienced concerned staff. The records of financial performance are compared to the budget & significant differences if any, are noted for the purpose of corrective action.

FOOD AND BEVERAGE COST:

Food cost may be defined as the ratio of food consumed compared to the revenue received for food sales.

The food cost percentage is a tool to measure the efficiency of a food operation/kitchen, this percentage may vary as much as 5 % from month to month.

The cost of food consumed needs to be adjusted for employees & promotional meals & for transfers to or from other departments. The food cost may be calculated on a weekly , daily, monthly basis depending on the food inventory. Some hotels produce some estimates of a daily food cost, which is verified at the time whenever a complete inventory is taken, necessary adjustment could be made at that given time.

The relationship between sales & cost may be expressed as cost % or the ratio of sales to cost

The formula for calculating this % could be as follows:

$$\frac{\textbf{Cost}}{\textbf{Sales}} = \textbf{cost \%}$$

$$\frac{\textbf{Food cost}}{\textbf{Food sales}} = \textbf{Food cost \%}$$

$$\frac{\textbf{Beverage cost}}{\textbf{Beverage sales}} = \textbf{Beverage \%}$$

<u>Objective of Food control:</u>

1- Detailed analysis of the income & expense of F & B
   - sales analysis of F & B items by analyzing:
     - F & B sales
     - The sales mix
     - .Average spending power
     - Number of customers served
   - Cost analysis of F & B costs:
   - Calculation of F & B costs
   - Portion control
   - Labour cost
   - calculation of gross profit
   - calculation of net profit

2- to establish standard operating procedures (S O P) for the operations
3- fixing menu pricing & quotation for special function
4- to prevent wastage of raw material , time, labour etc.
5- prevention of fraud by staff & customers
6- preparation & submission of management report & information & corrective & remedial measure for improvement.

CHAPTER 5 : <u>BUDGETING</u>

* Definition
* Purpose
* Types
* When are Budgets Prepared?
* The Budget cycle
* Budgetary Control

A budget has been defined as a statement in monetary or quantitative terms, reflecting the policy of a business & determining business operations in respect of a particular trading period.

Budgeting is used by most firms to aid in controlling costs & to ensure that costs are kept in line with forecast revenues.
Budgeting is planning. In order to make meaningful decisions about the future, a manager must look ahead. One way to look ahead is to prepare budget or forecasts. A forecast may be very simple. For a restaurant owner, a budget may be no more than looking ahead of tomorrow, estimating how many customers will eat in the restaurant & purchasing food & supplies to accommodate this need. On the other hand, in a larger organization, a budget may entail forecasts up to five years ahead (such as for furniture & equipment purchases) as well as day to day budget (such as staff scheduling). Budgets are not always expressed in monetary terms. They could involve numbers of customers to be served, number of rooms to be occupied, number of employees requires or some other until rather than dollars.

<u>PURPOSE:</u>

The main purpose of budgeting could be summarized as follows:

1. To provide organized estimates of future revenues, expenses, manpower requirement, or equipment needs, with estimates broken down by time period / department.
2. To provide a co ordinate management policy both long term & short term expressed primarily in accounting terms.
3. To provide a method of control so that actual results can be evaluated against budget plans & adjustment, if necessary can be made.

<u>TYPES OF BUDGETS:</u>

1. **Long Term**
2. **Short Term**
3. **Capital Budget**
4. **Operating Budget**
5. **Department Budget**
6. **Master Budget**

7. **Fixed Budget**
8. **Flexible Budget**

1- **Long term**: a long term or strategic budget is generally for a period of one tear to five years ahead. Such budgets concerns major plans for the organizations (expansion, creations, financing, purchasing etc), from such a long term phase evolves the policies concerning the day to day operations of the business. This gives rise to short term budgets.

2- **Short term budgets:** budgets could be for a day , a week, a quarter or a year. Such budgets use the resources of middle management to meet the long term plan or objectives of the organizations.

3- **Capital budget:** this relates to items that appear on the balance sheet. A three month cash budget for a restaurant would be a capital budget. A five year replacement schedule for hotel room furnishing would also be a capital budget.

4- **Operating budget:** this concerns the ongoing projection of revenue & expense items, or items that affect the income statement. **E.g.** a forecast of revenue for a restaurant for a month would be an operating budget. Similarly in multi department hotel, the forecast of total payroll expense for the year would be operating budget.

5- **Department budget:** separate dept. budgets are only prepared in establishments with two or more departments. They would show the forecast revenue & direct expenses for each dept. alternatively, if a department does not directly generate revenue e.g. The maintenance department of a hotel. This budget is prepared showing anticipated expenses in detail. Generally such department's budgets are prepared for up to a year-month by month.

6- **Master budget:** a master budget is the most comprehensive of all budgets. Generally a master budget is prepared for a year's period & would include a balance sheet for a year hence & all departmental income & expense statements for the next year's period.

7- **Fixed budget:** is based on a certain level of activity or revenue. Expense estimates are based on this level revenue. No attempts are made to introduce higher or lower level of revenue, & thus different expenses amounts are in the budget. The disadvantage of such a budget is that if the actual level differs from budgeted level, because there are no plans covering this possibility, expenses can only than be adjusted for short run guesswork.

8- **Flexible /variable budget:** is prepared for several level of activity. Adjustments are easily done whenever required. it is possible for a particular expense item to remain fixed. E.g. a budget might be prepared for a restaurant based on a number of level of revenue. Expenses are calculated based on each different level. However advertising expenses might be left the same regardless of the actual level of revenue. In other words regardless of the volume of sales, a definite, fixed amount is budgeted to be spent on this expense.

WHEN ARE BUDGETS PREPARED?

Long range budgets for up to 5 years forward are generally prepared annually. Such budgets are revised for the next period (up to 5 years) .
Short term budget are prepared annually, for the most part with monthly projection. Each month budgets for the remaining months of the year should be revised to adjust for any changed circumstances. Department managers should involve in such revisions as well as the budget committee for overall co-ordination.
Weekly or daily short range budgets are usually handled internally by the department heads or other supervisory staff. E.g the housekeeper would arrange the room- attendant staffing schedule (which affects the payroll budget) on a daily basis based on the anticipated rooms occupancy day to day.

DIFFERENT STEPS OF BUDGETING:

The budget cycle is a five part process:

1. **Establishing attainable goals or objective.**
2. **Planning to achieve these goals or objective:**
3. **Comparing actual results with those planned, & analyzing the difference**
4. **As a result of step three take corrective measures.**
5. **Improving effectiveness of budget.**

1. Establishing attainable goals or objective:

In setting goals the most desirable situation must be tempered with realism. In other words it there are any factors present that limits revenue to a certain maximum level, these factors must be considered.

2- Planning to achieve these goals or objective:

Once the objective is determined plans must be laid to achieve them. E.g At the department level , a restaurant manager must have highly skilled staff to handle the anticipated volume of business. A chef or purchase manger must buy sufficient food to meet the requirement with right standard quality

3- Comparing actual results with those planned, & analyzing the difference:

This is probably the most important & advantageous step in budget cycles which gives us the following question to think on:

- **a-** Are higher prices keeping our customer away?
- **b-** Is the competitive restaurant opened near by affecting our business?
- **c-** Is our staff unable to handle the work load ?
- **d-** Is our sales marketing targeting the right market?

These are few examples of types of question that can be asked & for which the answers should be soughted by analyzing budgeted figures and actual results available.

4-**<u>As a result of step three take corrective measures.</u>**

The next step is to take corrective measures if required. The cause of difference could be result of a circumstance that no one could foresee or predict. If it has been found that that the loss in the business is due to some reason, & if the reason are quiet obvious it is better to act on those measure & take corrective action on the same.

5- **<u>Improve the effectiveness of budgeting:</u>**

This is the final step in the five step budget cycle. All those involved in budgeting should be made aware of the constant need to improve the budgeting process. The information provided from analyzing variance between actual & budgeted figures will be helpful, by improving accuracy in budgeting; the effectiveness of the entire organization is increased.

<u>BUDGETARY CONTROL:</u>

A budget has been defined as a statement in monetary or quantitative terms, reflecting the policy of a business & determining business operations in respect of a particular trading period.

These budgets may be used to affect control with the following objectives in mind:

1- to set a target against which the actual performance of the business can be measured.

2- To make the best use of the resources.

3- To co-ordinate the activities of the management team & the various department within the operations.

4- To regulate the spending of money within the confines of income.

5- To establish clear lines of responsibility.

Such control is used extensively in the industrial & institutional sectors, whereby the funds available for operating the facilities are prescribed by a budget, while in other sectors; budget may also be devised to set target sales figures.

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