

# FOOD PRODUCTION PRINCIPLES

Teaching scheme : Theory 02 hrs/ Week ( 70 Hrs.)  
: Practicals 08 hrs/ Week

Examination Scheme : Theory - 100 marks 3 hrs  
: Practicals - 100 marks 5 hrs

## Theory

**Objectives** : The students will develop the knowledge and interest in

- The Basic Principles of food production and Bakery.
- The various commodities used in Indian and Western cookery and bakery.

### 01: Culinary History:

2 hrs. 3 mks.

- Origin of Cookery and Bakery.
- Development and changes due to modernization and improvement in technology.
- Functions of kitchens in Hotels and Restaurants.

### 02: Introduction to Cookery / Bakery.

2 hrs. 3 mks.

- Levels of skills with experience and qualifications
- Attitude and behaviour in the kitchen.
- Uniform, protective clothing and grooming standards.
- Safety procedures, equipments, fire fighting.
- Professional ethics.

### 03: Classical Kitchen Brigade:

3 hrs. 6 mks.

- Detailed classical kitchen brigade of a 5 star hotel.
- Development of the partie system.
- Modern staffing in various category Hotels.
- Duties and responsibilities of all the Chefs.
- Inter- departmental co-ordination.

### 04: Kitchen organization Layout:

3 hrs. 5 mks.

- Basic general location and layout of kitchen of various organization.
- Receiving, Cooking, dispensing and wash up areas.

### 05: Aims & Objects of cooking :

4 hrs. 5 mks.

- Objectives of cooking/Baking.
- Culinary terms
- Classification of raw materials.



- d. Various textures / consistency
- e. Methods of mixing food.

**06: Kitchen/ Bakery Equipments/ Fuels:**

3 hrs.

5 mks.

- a. Various types of heavy, light equipments and tools used in the kitchens/Bakery.
- b. Various types of Heat production equipments.
- c. Various types of Cold Production equipments.
- d. Types of Pots/Pans used in Cookery/Bakery.
- e. Various types of fuels used for heat/cold production equipment with their advantages and disadvantages.

**07: Methods of cooking/Baking food:**

3 hrs.

8 mks.

- a. Boiling/ Poaching.
- b. Steaming.
- c. Frying.
- d. Roasting
- e. Grilling/ Broiling
- f. Baking.
- g. Braising
  - Detailed principles of each of the above method of cooking.
  - Various types of foods suited to each of the above method of cooking.

**08: Identification of Raw Materials:**

3 hrs.

5 mks.

**(i) Fruits and Vegetables:**

- a. Introduction.
- b. Classification – Types
- c. Nutritive Value/ Composition.
- d. Pigments.
- e. Selection Criteria
- f. Storage (Long term/ Short term) with correct temperatures.
- g. Cuts (Classical)
- h. Action of Heat/ Acids/ Alkali
- i. Cookery.

**(ii) Meat Fabrication:**

6 hrs.

10 mks.

- a. Classification
- b. Composition / Structure.
- c. Judging / Grading Meats.
- d. Meat quality
- e. Rigor – mortis



- f. Meat storage and preservation.
- g. Cuts of Beef – its uses and applications in Indian and Western Cookery.
- h. Steaks.
- i. Cuts of Mutton/ Lamb - their uses and applications in Indian and Western cookery.
- j. Cuts of Pork – their uses and applications in Indian and Western Cookery.
- k. Poultry – Classification, types, selection, storage, cuts of chicken and their uses in Indian and Western cook.
- l. Internal temperature / doneness in meat.

**(iii) Fish and shell fish:**

**3 hrs. 8 mks.**

- a. Classification.
- b. Types of fish under each category with examples and their local names.
- c. Fresh water/ Sea water fish
- d. Composition
- e. Selection criteria and storage.
- f. Cuts of fish
- g. Uses and Applications in Indian and Western Cookery.

**(iv) Egg**

**2 hrs. 3 mks.**

- a. Introduction
- b. Sources
- c. Classification/types
- d. Nutritive value, composition.
- e. Structure
- f. Selection criteria
- g. Storage
- h. Uses and methods of cooking in Indian and Western Cookery.
- i. Uses in bakery & confectionary
- j. Foams

**09. COMMODITIES:**

**10 hrs. 5 mks.**

**(i). Flour:**

- a. Source
- b. Classification – types
- c. Structure/ Composition of wheat.
- d. Processing stages.
- e. Action of Heat / Water / Cooking.
- f. Applications and uses in Indian and Western Cookery/Bakery.

**(ii) Fats/ Oils:**



- a. Source – Animals, Vegetable, etc.
- b. Composition – Rendering .
- c. Types - Saturated, unsaturated, Omega -3.
- d. Role of Fats (Lamination / Shortening)
- e. Role of Oils (Cooking, frying).
- f. Advantages and disadvantages of using various types of fats & oils in cookery and Bakery.
- g. Preservation and Storage.

**(iii) Rice, Cereal, Pulses:**

- a. Introduction, Classification, Identification.
- b. Types and their Local Names.
- c. Nutritive Value.
- d. Cooking methods.
- e. Applications and uses in Indian and Western Cookery/Bakery.

**(iv) Flavouring / Seasoning / Herbs, Spices and condiments:**

- a. Classification.
- b. Types
- c. Uses and applications in Indian & Western Cookery and bakery.

**(v) Sugars/ Sweetners**

- a. Types / Sources
- b. Cooking of Sugar.
- c. Use and applications in Indian and Western confectionary.

**(vi). Raising Agents**

- a. Classification.
- b. Role, Types, Uses and applications in Indian and Western Cookery/Bakery.

**10. Stocks**

3 hrs.

6 mks.

- a. Fonds de Cuisine.
- b. Mire – Poix, Matignon, Bouquet Garni, Sachet.
- c. Reductions, infusions.
- d. Thickening agents.
- e. Elements of stocks.
- f. Types – Estouffade, Brown, White Fish stock, etc.
- g. Recipe and methods of preparing each of stock.
- h. Storage
- i. Uses and Applications for preparing various dishes.
- j. Aspics, glazes.



**11. Sauces:**

**3 hrs. 8 mks.**

- Classifications – Hot, Cold, emulsified.
- Leading / Mother sauces.
- Recipe and method of preparation.
- Uses / Applications.
- Derivatives of each mother sauce.
- Chaud – froid, demi-glaze, Jus-lie, Beurre, blanc.

**12. Soups:**

**3 hrs. 8 mks.**

- Classifications.
- Types with basic recipe of each country.
- Popular soups from each country.
- Garnishes.

**13. Indian Masalas:**

**2 hrs. 2 mks.**

- Types of flavouring and spices used in Indian Cookery.
- Blending of spices (Dry powder masalas)
- Wet masalas.
- Special blends of masalas as per each region of India.

**14. Bakery & Confectionary:**

**15 hrs. 10 mks.**

**i) Fermented Goods**

- What is Bakery and Confectionary.
- Ingredients used and the role and function of each ingredient (Four, egg, sugar, fat, raising agents, etc.)
- Stages in Bread making.

**ii) Receipe Balancing**

- |                                |                            |
|--------------------------------|----------------------------|
| a. Baking time and temperature | b. Faults in Bread making. |
| c. Receipe Balancing           | d. Doughs                  |
| e. Batter                      | f. Pastes.                 |

**iii) Pastry:**

- Classification and types of pastes.
- Short crust puff, flaky, choux and Danish.
- Receipe and detailed methods and steps in preparation of each type with precautions to be taken.
- Applications and uses of each type with examples of classical cookery/Bakery dishes prepared using pastry.



**iv) Confectionary:**

- a. Basic creams – Creme Anglaise, Crème Patissier, Crème a'flan, Crème chantilly.
- b. Icings – toppings, Meringues, Creams (Butter Cream, Pastry Cream)
- c. Receipe, uses and Applications.
- d. Various types of Desserts and Confectionary items using the above.



# FOOD PRODUCTION PRACTICALS

Scheme of work - 08 hrs./Week

## PART – “A”

### Suggested scheme for Practical:-

#### 1<sup>st</sup> Practical:

##### Induction and familiarization

- To familiarize With the kitchen and the place of work stations.
- Lights, fan, plumbing Points, fire lighting equipments etc.
- Demonstration of wearing uniform and its functions.
- Personal grooming/ Hygiene.
- Heavy equipment / Light equipment/ Kitchen tools – uses, functions, cleaning care and maintenance.
- Cleaning materials, detergents, uses and precautions and demonstrations of cleaning and stacking/storing equipment.
- All kitchen tools such as knives, whisks, spatula, piping bag, etc. their uses and Applications to be demonstrated.
- Professional ethics and standard of a chef.

#### 2<sup>nd</sup> Practical:

##### Identification of Raw material: (Dry Provisions)

- To display and explain all the dry provisions used in Indian and Western Cookery under classifications of each such as, types of Rice, Types of Cereals, Pulses, Legumes, their uses, functions
- And how they are cooked. Students must feel and learn to recognize them.
- To display and explain all the Indian Spices, Herbs, Condiments, Seasonings, Aromats, Colouring and flavouring used in Indian and Western cooking.
- To explain the various mediums of cooking such as Butter, Margerine , Ghee, oils, fats – etc. and when and how they are used.

#### 3<sup>rd</sup> Practical:

##### Identification of all Vegetables and Fruits:

- a. Explain them under each classification with the selection, storage and used of each one of them in Indian and Western Cookery.
- b. All vegetables such as Leafy, Roots, bulbs, stems, pods, fruits etc must be shown to them and the uses of each must be explained.
- c. Identification of fruits under each category and explain the selection.



#### **4th Practical :**

- a. To explain the mortar skills, such as Peeling, paring, picking of leafy vegetables, cutting, chopping, shredding, grating, mincing.
- b. To explain in detail the various cuts of vegetables used in Indian, Western and Chinese Cookery.
- c. To explain and demonstrate all the cuts of potatoes like, chateau, Pontneuf, Allumettes, Noisettes, Turning of potatoes, Dice, Julienne, brunoise, grating, Dauphine, Olivettes, French fries, - etc.
- d. Practice and send misen place to Q.F.K.  
(Chopped onion, ginger, garlic, coriander etc.)

#### **5th Practical:**

- a. Explain in detail all the Principles of Cookery using simple vegetables and fruits or Rice / Pasta.
- b. Boiling, poaching, steaming, stewing, Blanching, Bruising, grilling, frying.

#### **6th Practical: onwards**

Demonstration and simple application by students to prepare the following Indian dishes formulated into menu.

Boiled Rice (Draining / Absorption method)

Fried Rice, Pulao,

Dals,

Chappaties

Parathas

Phulkas

Poories

Brown masala

Green masala

White masala

Tandoori masala

Aloo paratha

Hyderabadi masala

Chicken Curry

Goan Fish Curry

Fried Fish

Mutton Biryani

Potato Bhajee

Cucumber

Raita

Vegetable khurmas

Aloo Mutter



Doodhi Channa

Egg Curry

Brinjal Bhurta

Chauli Usal

Beans Foogath

Kheer

Sheera

Gajar ka Halwa

Semiya Payasam

Phirnee

Shahi Tukra

Vegetable cutlets

Pea paneer

Kofta Curry.

## PART – “B”

### 01. Demonstration classes and simple application by students

#### Part A. Basic Western Cuisine

##### i) Vegetables

A. Varieties of Vegetables

B. Classification

C. Cuts of Vegetables:

- Julienne
- Jardiniere
- Mignonette
- Dices
- Cubes
- Macedoine
- Paysanne
- Shred
- Concasse
- Mirepoix

D. Blanching of Tomatoes & Capsicum.

E. Methods of Cooking Vegetables.

- Boiling (Potatoes, Beans, Cauliflower)
- Frying (Aubergine, Potatoes)
- Steaming (Cabbage)
- Baking (Potatoes, turnip)
- Braising (onion, Leaks, Cabbage)



## **ii) Stocks**

Demonstration and preparation of:

- White stock
- Brown stock
- Fish stock

## **iii) Sauces**

Demonstration and preparation of basic mother sauces and 2-3 derivatives of each

- Bechamel ( + cheese sauce, Mornay, mustard sauce, parsley sauce)
- Espagnole (+ lyonnaise Madeira, charcutiere)
- Tomato (+ Creole, Italienne, piquante)
- Veloute (+ supreme, allemande, normande)
- Hollandaise (+paloise, béarnaise)
- Mayonnaise (tartare, cocktail)

## **iv) Soups**

Classification of soups

Preparation of basic soups

- consommé, (royale, Carmen, Clermont, ambassadrice, julienne)
- Cream (tomato, spinach, vegetables)
- Puree (lentil, peas, carrot)
- Cut vegetables (scotch Broth, Minestrone)
- Veloute (Crème de volaille princesse, veloute dame blanche/marie-louise)
- National soup (mulligatawny, French onion, oxtail)
- Bisque (Prawn, Shrimp)

## **v) Egg Cookery**

Preparation of varieties of egg dishes

- Boiled (soft and hard)
- Fried (sunny side up, double fried)
- Poaches
- Scrambled
- Omlette (Plain, stuffed)
- En cocotte (eggs benedict)
- Starch (rice, pasta, potato)



## vi) Fish Cookery

- Identification and classification of fish e.g. flat fish (pomfret, Black Pomfret and Sole)
- Round fish (Surmai, Rawas, Mackerel)
- Shellfish (Clams, Mussels, Shrimps, Crabs, Lobsters)
- Cephalopods (Squid, Cuttle, Fish)
- Cuts of Fish e.g., Fillet, Dame, Troncon, Paupiette, Goujons

Preparation of simple fish Dishes such as

- Saumon grille
- Pomfret Meuniere
- Sole Mornay
- Fish Orly
- Fish Colbert
- Fish a l'anglaise

## vii) Poultry

- A. Cuts of Poultry
- B. Preparation and jointing of chicken
- C. Preparation of simple Dishes such as
  - Poulet roti a l'Anglaise
  - Poulet grille diable
  - Poulet sauté chasseur
  - Poulet sauté Maryland

## viii) Meat

- A. Identification of various cuts
- B. Carcass demonstration of Lamb and Pork
- C. Preparation of Basic Cuts such as
  - Lamb and Pork chops
  - Tornado, fillet, Steak and Escalope
  - Roast leg of Lamb
  - Stew



## **PART "C"**

### **BAKERY AND PATISSERIE**

#### **i) Bread making**

- A. Demonstration + Preparation of simple and enriched bread, recipes.  
B. Bread Loaf (White and Brown)  
C. Bread Rolls (Various shapes)  
D. French Bread  
E. Brioche

#### **ii) Simple Cakes**

Demonstration + Preparation of simple and enriched cakes, recipes

- Sponge, Genoise, Fatless, Swiss roll
- Fruit Cake
- Rich Cakes
- Dundae, Madeira.

#### **iii) Pastry**

- A. Demonstration and preparation of dishes using varieties of pastry.  
B. Short Crust – jam tarts, Turnovers  
C. Laminated – Palmiers, khara Biscuits, Danish Pastry, Cream Horns.  
D. Choux Paste – Eclairs, Profiteroles

#### **iv) Simple Cookies**

Demonstration and preparation of simple cookies like Nan Khatai, Golden Goodies, Melting moments, Swiss tart, Tri colour biscuits, Chocolate chip Cookies, Chocolate Cream Fingers, Bachelor Buttons.

#### **v) Hot/Cold Desserts**

- A. Caramel Custard, Bread and Butter Pudding, Queen of Pudding, Souffle – Lemon/Pineapple, Mousse (Chocolate, Coffee), Bavaroise, Diplome Pudding, Apricot Pudding.  
B. Steamed Pudding – Albert Pudding, Cabinet Pudding.



### **REFERENCE BOOKS:**

1. Le Rol A. Polsom  
The Professional Chef (4<sup>th</sup> edition)
2. Paul Hamlyn  
Larousse Gastronomique – Cookery Encyclopedia
3. Wane Gisslen  
Professional Cooking
4. Escoffier  
The Complete Guide to the Art of Modern Cookery
5. Philip E. Thangam  
Modern Cookery (Vol – I ) For Teaching & Trade
6. Frederic H. Semerschmid and John F. Nicolas  
Professional Chef's-Art of Garde Manger (4<sup>th</sup> Edition)
7. Digvijay Singh  
Cooking delights of maharajas
8. Leto m.J. & bode w.k.h.  
The larder chef (food preparation & presentation) (3<sup>rd</sup> edition)
9. Wayne glasslen  
Professional baking
10. Lundberg, Donald E. & Kotsehevar  
Understanding Cookery.
11. W.K.H. Bode  
Classical food preparation and presentation
12. Ceserani, Kinton & Foskett  
Contemporary Cookery
13. Bernald Davis  
Food Commodities
14. Time Life Series  
The Cooking of India
15. Grisslen, Wayne  
Professional Baking
16. Fuller, John  
Chef Manual of Kitchen Management
17. Prashad.



## **FOOD AND BEVERAGE PRINCIPLES**

<b>THEORY</b>	<b>: 70 HOURS</b>
<b>PRACTICAL</b>	<b>: 70 HOURS</b>
<b>PAPER</b>	<b>: 100 MARKS, 3 HOURS</b>
<b>PRACTICAL</b>	<b>: 50 MARKS, 4 HOURS</b>

**OBJECTIVE** : To develop in the student an understanding of the working of the department, importance of the department in the Catering industry, Knowledge of the auxiliary departments, organizational structure and the profile of the food service personnel, knowledge about menus, principles of table laying and service of food and beverage.

### **THEORY**

#### **TOPICS**

##### **1. INTRODUCTION:-**

- The evolution of the catering industry
- Scope of the department in the industry
- Relationship of the Catering Industry to other industries
- Different types of Catering Establishments
- Relationship of the department with Food Production, House Keeping, Maintenance, Security, Accounts and Personnel Department (Human Resource Department)

**(12 HOURS, 15 MARKS)**

##### **2. THE FOOD SERVICE INDUSTRY.**

- Introduction
- Sectors of the food service industry
- Food and beverage service methods (types of service)
- Different types of Restaurants.

**(8 HOURS, 15 MARKS)**

##### **3. STAFF ORGANISATION:-**

###### **A. FOOD AND BEVERAGE DEPARTMENT.**

- Staffing structure of F & B Department of a five star hotel.
- Qualification and profile of the staff
- Duties and responsibilities of the staff member

**(10 HOURS, 12 MARKS)**

###### **B. PROFILE OF FOOD SERVICE PERSONNEL.**

- Attributes of a waiter
- Etiquettes of a food and beverage service personnel in general.

**(4 HOURS, 10 MARKS)**



#### **4. FOOD AND BEVERAGE SERVICE AREAS AND EQUIPMENT.**

- a. Introduction to auxiliary departments
  - 1. Still Room
  - 2. Silver Room or Plate Room
  - 3. Wash Up
  - 4. Hot Plate
  - 5. Spare linen store
  - 6. Dispense Bar
  - 7. Automatic Vending
  - 8. Lighting and colour
  - 9. Furniture – table chair and sideboard dimensions, specification and material used
  - 10. Linen
  - 11. China
  - 12. Table ware
  - 13. Glassware

**(12 HOURS, 16 MARKS)**

#### **5. CHEESE:- (As a project, covering cover, service & accompaniment as theory)**

- a. Introduction
- b. Types of Cheese
- c. English and European Cheese
- d. Cover, Service and accompaniments

**(2 HOURS, 5 MARKS)**

#### **6. BEVERAGES:-**

- a. Classification
- b. Tea – types of teas available
- c. Coffee – types of coffee available
- d. Other non – alcoholic beverages (mineral, sparkling, still waters, aerated waters)

**(8 HOURS, 12 MARKS)**

#### **7. TOBACCO:-**

- a. Processing of tobacco.
- b. Quality of cigars and cigarettes
- c. Storage and Service

**(8 HOURS, 10 MARKS)**

#### **8. METHODS OF PAYMENT.**

- a. Cash Settlement, Room Charge, Credit card/ Debit Card, Company Account, Non chargeable K.O.T.
- b. K.O.T Bill control system
- c. Making a bill
- d. Sales summary

**(6 HOURS, 5 MARKS)**



## **HOUSEKEEPING PRINCIPLES**

THEORY : 70 HOURS

PRACTICAL: 70 HOURS

PAPER : 100 MARKS, 3 HOURS

PRACTICAL: 30 MARKS, 3 HOURS

### **PRACTICALS:-**

#### **TOPICS.**

##### **1. INTRODUCTION TO RESTAURANT EQUIPMENT.**

- a. Uses of each equipment.
- b. Introduction to Sideboard (Dummy Waiter)/ Dumb Waiter.  
(Diagram and uses)
- c. Tray Jack (Diagram and uses)

##### **2. INTRODUCTION TO BAR EQUIPMENT AND GLASSWARE.**

- a. Bar Layout
- b. Front bar, back bar, under bar.
- c. Different bar equipments.
- d. Different bar glassware
- e. Bar Measures.
- f. Current Tax structure in alcoholic and non alcoholic beverages.

##### **3. PREPARATION FOR SERVICE.**

- a. Mise – en – place.
- b. Mise – en – scene.

##### **4. RESTAURANT SERVICE:-**

###### **a. TABLE LAYING AND A LA CARTE SET UP.**

1. Introduction.
2. Compiling A la Carte menu's.
3. How to place a table cloth on a table.
4. How to hold a salver/ Bussing tray.
5. Size of a cover.
6. Rules for Laying a table
7. Rules for waiting at a table.

###### **b. SERVICE IN THE RESTAURANTS.**

- a. Sequence of service
- b. How to write a K.O.T and uses of the 3 Copies
- c. Different types of K.O.T's
- d. How to welcome and escort a guest to the table and seating the guest.
- e. How to present the menu.
- f. Order taking and service of beverages
- g. Order taking and service of food. (From Entrée and Pre – Plated service)
- g. How to clear an Ashtray and Detailing of the table.

##### **5. ACCOMPANIMENTS:-**

- a. General accompaniments and cover for classical menu and dishes.



## **6. THE MENU.**

- a. Origin of the Menu
- b. Compiling of Table D'hote Menu, Carte de jour, Plat de jour
- c. French Classical Menu service sequence.

## **7. BREAKFAST SERVICE:-**

- a. Introduction
- b. English Breakfast – Courses and Cover
- c. Continental Breakfast - Courses and Cover
- d. Buffet Breakfast

## **8. HIGH TEA SERVICE**

- a. Introduction
- b. Menu and cover for full afternoon service
- c. Menu and cover for high tea

## **9. HOT BEVERAGES.**

- a. Service of Tea / Coffee
- b. Setting up of Trays.

## **REFERENCES:-**

- ❖ Food and Beverage Service
  - Dennis Lillicrap, John Cousins and Robert Smith.
- ❖ Food and Beverage Service Training Manual.
  - Sudhir Andrews.
- ❖ Food and Beverage Service
  - Vijay R Thakur.
- ❖ Food and Beverage Service
  - Vijay Dhawan
- ❖ The Waiter
  - John Fuller & A. J. Currie
- ❖ Food & Beverage service
  - Bobby George
- ❖ Professional Food & Beverage Service Management
  - Brian Verghese



## HOUSEKEEPING PRINCIPLES

**THEORY : 70 HOURS**

**PRACTICAL: 70 HOURS**

**PAPER: 100 MARKS, 3 HOURS**

**PRACTICAL: 50 MARKS, 3 HOURS**

**PROGRESSIVE ASSESEMENT:- THEORY: 25, PRACTICALS: 25**

SR.NO	TOPIC	HOURS	MARKS
1.	<b>INTRODUCTION TO HOUSEKEEPING</b>	06	10
	a) The role of housekeeping in hospitality operations, guests satisfaction and repeat business. b) Importance of housekeeping department. c) Areas of responsibility d) Inter-departmental relationship		
2	<b>HIERARCHY OF HOUSEKEEPING DEPARTMENT</b>	09	14
	a) Hierarchy of Large, Medium, and Small hotels. b) Duties and responsibilities of housekeeping staff. c) Layout of the Housekeeping department d) Personality traits of Housekeeping management personnel.		
3	<b>CLEANING AGENTS</b>	12	16
	a) Classification b) Selection c) Uses, care and storage d) Use of eco-friendly products		
4	<b>CLEANING EQUIPMENT</b>	09	12
	a) Classification b) Selection c) Uses and care		
5	<b>CLEANING ROUTINE OF THE HOUSEKEEPING DEPARTMENT.</b>	10	12
	a) Hygiene and safe cleaning b) Procedure for room cleaning and public area c) Types of cleaning- daily, spring,. Special, public areas, evening and second service. d) Frequency of cleaning daily, periodic, special		
6	<b>KEY CONTROL</b>	08	12
	a) Types of keys		
7	<b>LOST AND FOUND</b>	07	10
	a) Gate pass b) Lost and found register		
8	<b>STANDARD SUPPLIES IN GUEST ROOM</b>	03	10
	a) Standard rooms b) VIP rooms c) Guest special request		
9	<b>MAIDS CART</b>	06	04
	a) Placement b) Types of supplies		



### Practicals

- 1) Glass polishing
- 2) Metal polishing (silver copper brass and steel)
- 3) Polishing of hard surfaces (Ceramics, wood marble and granite)
- 4) Cleaning of fans and tube lights
- 5) Bed making
- 6) Toilet cleaning
- 7) Telephone
- 8) Guest room inspection

### REFERENCE BOOKS

- 1) Housekeeping manual – Sudhir Andrews
- 2) Housekeeping for Hotels, Motels, Hospitals, Clubs & Schools – Grace Brigham
- 3) Supervisory Housekeeping – Jean Kimbell



**HOURS:**

THEORY: 70 HOURS

PRACTICAL : 70 HOURS

**PA**

THEORY: 25

PRACTICAL :25

**MARKS:**

THEORY : 100

PRACTICAL: 50

FRONT OFFICE PRINCIPLES	HOURS	MARKS
<b>1] Introduction to Hospitality Industry</b> A. Evolution of Hospitality Industry B. Classification of Hotels <ul style="list-style-type: none"> <li>a. Size</li> <li>b. Star</li> <li>c. Location and clientele</li> <li>d. Supplementary Accommodation</li> </ul>	2	4
<b>2] Introduction to Front Office Department</b> A. Various Sections of the Front Office Department B. Functions & Importance of Front Office C. Rules OF the House For Front Office Staff D. Layout of Front Office Department E. Front Office Equipments & Furniture	6	10
<b>3] Organization &amp; Staffing</b> A. Staff Organization of Front Office Department [Small & Large] B. Job Description & Specification of Front Office Staff <ul style="list-style-type: none"> <li>▪ Front Office Manager</li> <li>▪ Lobby Manager</li> <li>▪ Receptionist</li> <li>▪ Bell Captain</li> <li>▪ Bell Boy</li> <li>▪ Telephone Operator</li> <li>▪ Doorman</li> </ul> C. Qualities Of A Good Front Office Employee	10	14
<b>4] Tariff Structure</b> A. Basis Of Charging B. Types of Tariffs C. Room Tariff Cards & Special Rates D. Types of Food Plans [American, Modified American, European, English, Bermuda]	6	6
<b>5] Bell Desk</b> A. Bell desk & its Functions B. Procedures & records	5	8
<b>6] Reservations</b> A. Importance & Functions of Reservation B. Modes of Reservation <ul style="list-style-type: none"> <li>▪ Written</li> <li>▪ Oral</li> <li>▪ Visual</li> </ul>	18	22



<p>C. Sources of Reservation</p> <ul style="list-style-type: none"> <li>▪ FIT</li> <li>▪ Other sources of reservations (Direct, Reservation Network system and Agencies)</li> </ul> <p>D. Reservation Charts</p> <ul style="list-style-type: none"> <li>▪ Density Chart</li> <li>▪ Conventional / Advance Letting Chart</li> <li>▪ Forecast Board</li> </ul> <p>E. Types of Reservations</p> <ul style="list-style-type: none"> <li>▪ Guaranteed Reservation</li> <li>▪ Non- Guaranteed Reservation</li> </ul> <p>F. Cancellations, Amendments</p>	5	8
<p><b>7] Guest Cycle</b></p> <p>A. Introduction</p> <p>B. Pre-Arrival</p> <p>C. Arrival</p> <p>D. Stay</p> <p>E. Departure &amp; After Departure</p>	10	14
<p><b>8] Check-in Of New Arrivals</b></p> <p>A. Checklist For Welcoming Guest</p> <p>B. Basic Check-in Activities</p> <p>C. Preparation for Guest Arrival</p> <p>D. Registration</p> <ul style="list-style-type: none"> <li>▪ Guest with Reservations</li> <li>▪ Walk – In Guest</li> </ul> <p>E. Room Assignment &amp; Room Rate</p> <p>F. Mode of Payments</p>	2	A
<p><b>9] Front Office Co-ordination with other Departments</b></p> <ul style="list-style-type: none"> <li>▪ Housekeeping</li> <li>▪ Food &amp; beverage</li> <li>▪ Food Production</li> <li>▪ Maintenance</li> <li>▪ Accounts</li> <li>▪ Purchasing</li> <li>▪ Stores</li> </ul>	6	10
<p><b>10] Front Office Responsibilities</b></p> <p>A. Message &amp; Mail Handling</p> <p>B. Guest History</p> <p>C. Scanty Baggage</p> <p>D. Complaint Handling</p> <p>E. Black List</p>		



## **PRACTICALS**

### **1] To understand the role of Receptionist & to perform basic Front office Task.**

- Welcoming Of Guest
- Telephone Handling
- Message/Paging & Complaint Handling
- Handling of room keys

### **2] Reservation**

- Walk-in Guest
- Reservation over the telephone
- Filling of various booking charts

### **3] Registration**

- Reserved Guest
- Walk- in Guest

### **4] Bell-Desk Procedures**

- Guest Arrival
- Guest Departure
- Left Luggage

### **5] Compilation of Information on**

- Places of Interest
- Historical Monuments
- Cultural & religious places
- Caves & waterfalls
- Countries, capitals & currencies [national & international]
- Airlines & their codes [domestic & international]
- Abbreviations & Glossary

## **REFERENCE BOOKS**

- 1] Hotel Front Office Training Manual – Sudhir Andrews.
- 2] Principals of Hotel Front Office Operations – Sue Baker, Pam Bradley & Jeremy.
- 3] Front Office Management – S.K. Bhatnagar.
- 4] Goa For All Seasons – Goa Travel & Tourism Club.



**PRINCIPLES OF ACCOUNTANCY**

MARKS 100

PA 25

**HOURS**

THEORY: 70

PROPOSED SYLLABUS	HOURS	MARKS
<b>1. INTRODUCTION TO ACCOUNTING</b> A. Meaning and Definition B. Types and Classification C. Systems of accounting D. Parties interested in Accounting information	4	08
<b>2. PRIMARY BOOKS (JOURNAL)</b> A. Meaning and Definition B. Format of Journal C. Rules of Debit and Credit D. Journalising the transactions E. Problems	08	08
<b>3. SECONDARY BOOK (LEDGER)</b> A. Meaning and uses B. Format C. Posting D. Problems	08	08
<b>4. SUBSIDIARY BOOKS</b> A. Need and Uses B. Classification a. Purchase Book b. Purchase Returns c. Sales Returns d. Sales Book e. Journal Proper f. Problems	06	08
<b>5. BANK RECONCILIATION STATEMENT</b> A. Meaning B. Reasons for difference in Pass Book and Cash Book Balances C. Preparation of Bank Reconciliation Statement. (Balance as per cash book and pass book ) D. Problems	06	08
<b>6. BILLS OF EXCHANGE</b> A. Cheques B. Bills of Exchange C. Parties to a Bill of Exchange	04	08



<b>7. CASH BOOK</b> A. Meaning B. Advantages C. Simple, Double and Triple Column Cash Book D. Petty Cash Book E. Problems	10	16
<b>8. FOOD COSTING</b> A. Elements of cost B. Cost Identification and percentage analysis of cost elements C. Gross Profit, After Wage profit and Net Profit and their percentages D. Problems	04	08
<b>9. TRIAL BALANCE</b> A. Meaning B. Methods C. Advantages D. Limitations E. Problems	04	08
<b>10. FINAL ACCOUNTS</b> A. Meaning B. Procedure for preparation of final accounts C. Difference between Trading Accounts, Profit and Loss Accounts and Balance Sheet D. Adjustments (only Four) a. Closing Stock b. Pre-paid Expenses c. Outstanding Expenses d. Depreciation e. Reserve for doubtful debts E. Problems	16	20

**Reference Books:**

1. Book Keeping and Accountancy By Chopde and Chaudhari
2. Food cost control by Richard Kotas
3. Advanced Accountancy by Shukla Grewal
4. Advanced Accountancy by S N Maheshwari
5. Modern Accountancy by Mukherjee Hanif



### CATERING SCIENCE

**THEORY: 35 HOURS**

**PAPER : 50 MARKS (2HRS)**

**PROGRESSIVE ASSESSMENT : 25 MARKS**

PROPOSED SYLLABUS	HOURS	MARKS
1. Hygiene A. Importance B. Personal hygiene skin, hair, feet clothing exercise	2	4
2. Hygiene storage conditions A. Care of food, dry food storage, low temperature storage ,ventilation of stores B. Storage of perishable, semi perishable and non-perishable foods C. Factors affecting spoilage and prevention of spoilage of food D. Cross contamination	6	8
3. Pollution A. Air, water, soil, pesticides, radiation and noise pollution, measures to control	2	3
4. Adulteration of food A. Food adulterants B. Test to detect	2	3
5. Microbiology A. Classification of bacteria, yeast, fungi, viruses B. Factors affecting their growth & Multiplication C. Beneficial effects of Micro organisms D. Control of microbial growth in foods - use of Preservatives, Moisture, Vacuum, Irradiation	5	8
6. Food Poisoning A. Food Infection and Intoxication B. Harmful effects of bacteria B. Food borne diseases - Causative organism and mode of infection D. Precautions to be taken by food handlers	4	4
7. Nutrition Definition - Food, diet, nutrition, nutrient, malnutrition, food groups, balance diet, BMR.	2	2
8. Proteins A. Composition, classification, sources, functions, daily requirement, excess and deficiency, supplementation of amino acid	2	3



9. Fats A. Composition, classification, sources, functions, daily requirements, excess and deficiency, importance of cholesterol rancidity, hydro generation of fats.	2	3
10. Carbohydrates A. Composition, classification, sources, functions, daily requirements, excess and deficiency, artificial sweetness	2	3
11. Water A. Functions, sources, dietary sources, edema and dehydration	2	3
12. Minerals A. Functions, sources, deficiency, daily requirements of Ca, P, Fe, I, NaCl, F, K.	2	3
13. Vitamins A. Sources, major functions, daily requirements, excess, deficiency of fat soluble Vitamins A, D, E and K and water soluble Vitamins C and B complex	2	3

#### REFERENCE BOOKS

1. The Theory of Catering --- Hodder and Stoughton
2. Food processing and Preservation -- B. Sivasankar
3. Food Microbiology – William Frazier, Dennis C. Westhoff
4. Principles of Nutrition and Dietetics – Dr. M. Swaminathan
5. Fundamentals of Foods and Nutrition – Sumati R. Mudambi



**COMMUNICATION SKILLS I**

Hours : 70

Marks: 100

PA : 25

SR.NO.	TOPIC	HOURS	MARKS
1.	BUSINESS COMMUNICATION A. Need B. Purpose C. Nature D. Models E. Barriers to communication Overcoming the barriers	6	10
2.	LISTENING ON THE JOB A. Definition B. Levels and types of listening C. Listening barriers D. Guidelines for effective listening E. Listening computerization and note taking	8	10
3.	EFFECTIVE SPEAKING A. Restaurant and Hotel English B. Polite and effective enquiries and responses C. Addressing a group D. Essential qualities of a good speaker E. Audience analysis F. Defining the purpose of a speech, organizing the ideas and delivering the speech.	14	20
4.	NON VERBAL COMMUNICATION A. Definition, its importance and its inevitability B. Kinesics: Body movements, facial expressions, posture, eye contact etc. C. Protemies: The communication use of space D. Paralanguage: Vocal behaviour and its impact on verbal communication E. Communicate use of artifacts – furniture, plants, colours, architects etc.	14	20
5.	SPEECH IMPROVEMENT A. Pronunciation, stress, accent B. Important of speech in hotels C. Common phonetic difficulties D. Connective drills exercises E. Introduction to frequently used foreign sounds	12	15



6.	<b>USING THE TELEPHONE</b> A. The nature of telephone activity in the hotel industry B. The need for developing telephone skills C. Developing telephone skills	6	10
7.	<b>PRACTICALS</b> A. Essays – Comprehension of Passages B. Writing a biodata for interviews, letter of application and resignation C. Using the telephone – to develop telephone skills.	10	15

### REFERENCES

1. **Communication by William Raymond**
2. **Human Communication 1994 sage publication London, By Burgoon Michal**
3. **Outline of Composition Book By Hill L. A.**
4. **Developing Communication skills 1994 cambridge university press, by K. Mohan and M. Bannerjee**
5. **Living English Structure by Stannard Allan**
6. **Teaching of Structure, words and patterns by Horsy A.S.**
7. **Developing Communication Skills by K. Mohan & M. Bannerjee.**
8. **High School English Grammar & Composition by Wren & Martin**
9. **Strengthening your English by Bhatnagar Horsburgh.**
10. **Business English & Communication by Lyn Clark & Zimmer**
11. **Effective Communicator by John Adair.**
12. **Communicating effectively by Lani Arredondo**



## COMPUTER APPLICATION-I

### No of Hours

**Theory : 35 Hours**

**Practical: 105 Hours**

**Practical : 100 Marks**

**Progressive Assessment: 50 Marks (Practical)**

S. No.	Topic	Hours		Marks
		Theory	Practical	
1.	<b>Computer Fundamentals</b>			
	A. Information Concepts & Processing i. Definitions ii. Need, Quality and Value of Information iii. Data Processing Concepts	2		
	B. Elements of a Computer System i. Characteristics of Computers ii. Classification of Computers iii Components of a Computer	06		
	C. Hardware features & uses i. Data Entry Devices a.) Keyboard b.) Mouse c.) Light pen d.) Joystick e.) Digitizers f.) Optical Character Reader g.) Magnetic Character Ink Recognition Code h.) Voice Input System i.) Machine Vision System ii. Data Output Devices a.) VDU b.) Display adaptors c.) Printer d.) Plotter e.) Graphics Output on paper f.) Computer Aided Microfilm	06		
	D. Software Concepts i. System Software ii. Application Software iii. Compilers and Interpreters	04		



2.	<b>OPERATING SYSTEMS/ ENVIRONMENTS</b>	05	18	20
	A. Basics of MS-DOS a) Internal commands b) External Commands			
	B. WINDOWS OPERATIONS a) Creating folders b) Creating shortcuts c) Copying Files/ folders d) Renaming Files/ folders e) Deleting Files f) Exploring Windows g) Quick Menus		07	
3.	<b>WORD PROCESSING ( PRACTICAL)</b>			
	A. WORD PROCESSING B. FORMATTING A DOCUMENT C. SPECIAL EFFECTS D. CUT, COPY AND PASTE FUNCTION E. USING MS WORD TOOLS F. TABLES G. GRAPHICS H. PRINT OPTIONS		15	20
4.	<b>INTRODUCTION TO INFORMATION TECHNOLOGY</b> A .Objectives B. What is I.T. - Definition. C. Data, Instruction & Information D. Types of Information Computing Models a.) File/ Server Technology i.) LAN ii.) WAN b.) Client/ Server Technology. i.) Database Server. ii.) Client Application. iii.) A Network	04		
5.	<b>Internet</b> A. <b>Electronic-Mail</b> a) To set up an e-mail A/c b) Creating a message mail c) To receive a mail d) To Send a mail e) To Draft f) To send it to thrash	04	20	20



	<p>B. What can Internet do for us?</p> <ul style="list-style-type: none"> <li>a) E-Mail</li> <li>b) World Wide Web</li> <li>c) Browser</li> <li>d) Access to Hyperlinked database on server</li> <li>e) File Transfer Protocol (FTP)</li> <li>f) VERONICA ( Very Easy Rodent Oriented Network Index to Computer Archives)</li> <li>g) Telnet Sites</li> <li>h) Gopher- voice recording library</li> <li>i) Communication on Internet- Chatting</li> <li>j) Sale/Purchase of Items on internet</li> <li>k) Booking, Travel Sites</li> <li>l) E Funds</li> <li>m) Search Engines</li> </ul>			
6.	<p>A. Linux</p> <ul style="list-style-type: none"> <li>a. Kernel &amp; Shell</li> <li>b. Commands <ul style="list-style-type: none"> <li>i. man</li> <li>ii. pwd</li> <li>iii. cd</li> <li>iv. ls</li> <li>v. cat</li> <li>vi. mkdir</li> <li>vii. rmdir</li> <li>viii. chmod</li> <li>ix. cp</li> <li>x. rm</li> <li>xi. more</li> <li>xii. wc</li> <li>xiii. cmp</li> <li>xiv. diff</li> <li>xv. banner</li> <li>xvi. cal</li> <li>xvii. who</li> <li>xviii. tty</li> <li>xix. sty</li> </ul> </li> </ul> <p>B. Advantages of Networking</p> <ul style="list-style-type: none"> <li>a. Inter Communication</li> <li>b. Sharing of files</li> <li>c. Sharing Hardware</li> <li>d. Send messages across the work station.</li> <li>e. Protect confidential files using Security system</li> </ul>	4	20	20



7.	<b>Spreadsheets</b>	25	20
	<b>A. Introduction to Spreadsheet</b>		
	i.) Capabilities- How to use Excel ii.) Starting Excel iii.) Parts of the Excel screen iv.) Moving around the work sheet/ Navigating v.) Menus vi.) Getting to know the mouse pointer shapes		
	i.) Creating a worksheet ii.) Entering Data in a worksheet iii.) Creating Simple formulas iv.) Formatting data for decimal points v.) Using Auto fill vi.) Blocking data vii.) Saving a worksheet viii.) Quitting the application		
	<b>B. Formatting an existing Worksheet</b> i.) Selection of cells for formatting ii.) Trimming tables with Auto Format iii.) Formatting cells for a. Currency b. Comma c. Percent d. Decimal e. Date/ time iv.) Changing Columns width & row height v.) Aligning the text a. Top to bottom b. Text wrap c. Re- ordering orientation vi.) Using Borders		



	<p>C. Going through changes</p> <ul style="list-style-type: none"> <li>i.) Opening workbook files for editing</li> <li>ii.) Undoing the mistakes</li> <li>iii.) Moving and Copying with Drag &amp; Drop</li> <li>iv.) Copying the formulas</li> <li>v.) Moving and Copying with Cut, Copy and Paste</li> <li>vi.) Deleting cell entries</li> <li>vii.) Deleting columns and rows in a worksheet</li> <li>viii.) Inserting columns and rows in a worksheet</li> <li>ix.) Spell checking the worksheet</li> </ul>			
	<p>D. Printing the worksheet</p> <ul style="list-style-type: none"> <li>i.) Previewing pages before printing</li> <li>ii.) Printing from Standard Toolbar</li> <li>iii.) Printing a part of the worksheet</li> <li>iv.) Changing the orientation of the printing <ul style="list-style-type: none"> <li>a. Printing the whole worksheet on a single page</li> </ul> </li> <li>v.) Adding a header and footer to a report</li> <li>vi.) Inserting Page breaks in a report</li> <li>vii.) Printing the formulas in the worksheet</li> </ul>			
	<p>E. Additional Features of the worksheet</p> <ul style="list-style-type: none"> <li>i.) Splitting worksheet window into two/ four panes</li> <li>ii.) Freezing rows &amp; columns on-screen for worksheet title</li> <li>iii.) Attaching comments to the cells</li> <li>iv.) Finding and replacing data in a worksheet</li> <li>v.) Protecting a worksheet</li> <li>vi.) Function commands</li> </ul>			
	<p>F. Maintaining multiple worksheets</p> <ul style="list-style-type: none"> <li>i.) Moving within the worksheets</li> <li>ii.) Adding more sheets to a workbook</li> <li>iii.) Deleting Sheets from a workbook</li> <li>iv.) Naming Sheet tabs</li> <li>v.) Copying or moving sheets from one worksheet to another</li> </ul>			



	G. Creating Graphics/ charts			
	i Using Chart wizard			
	ii Changing the Chart with the Chart toolbar			
	iii Formatting the Chart's axes.			
	iv Adding a text box to chart.			
	v Changing the orientation of a 3-D chart			
	vi Using Drawing tools to add graphics to chart and worksheet			
	vii Printing a chart along with the rest of the worksheet			
	H. Excel's Database Facilities			
	i Setting up a database			
	ii Sorting records in the database			
	iii Filter			
	a.) Auto Fill			
	b.) Advanced Filter			
	iv Logical Functions			
	v Text Functions			

References:

1. Introduction to Computer Science by Satish Jain
2. Fundamentals of Computers by Rajaraman
3. Introduction to Computers by N. Subramanian
4. Computer Fundamentals by Ram
5. First Course on Computer Studies by Hunt & Shelly
6. PC Software by R. K. Taxali
7. Master Word 2000 visually by O'Hara
8. Windows 98 by Maran graphics
9. Teach Yourself by Moin Stephen
10. First Course in Computers by Sanjay Saxena
11. Exploring the Unix system by Stephen Kochin



## ENVIRONMENTAL STUDIES

HOURS : 70

MARKS: 100

PA : 25

PROPOSED SYLLABUS	HOURS	MARKS
1. Multidisciplinary Nature of Environmental studies Definition, Scope and Importance, Need for Public awareness	02	02
2. Natural Resources A. Renewable and non renewable resources: Natural resources and associated problems. a. Forest Resources: Use and overexploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forest and tribal people. b. Water Resources: Use and over utilisation of surface and ground water, floods, drought, conflicts over water, dams benefit and problems. c. Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d. Food Resources: World Food problems, Changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer and pesticides problems, water, logging, salinity, case studies. e. Energy Resources: Growing energy needs, renewable and non renewable energy resources, use of alternate energy sources, case studies. f. Land Resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. B. Role of an individual in conservation of natural resources. C. Equitable use of resources for sustainable life styles.	12	15
3. Ecosystems. A. Concept on an eco system B. Structure and functions of an eco system C. Producers, consumers and decomposers. D. Energy flow in the eco system. E. Ecological succession. F. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following eco system. a. Forest ecosystem b. Grassland ecosystem c. Dessert ecosystem d. Aquatic ecosystem( ponds, streams, lakes, rivers, oceans and estuaries)	08	12



<p>4. Biodiversity and its Conservation</p> <p>A. Introduction – Definition: genetic, species, and ecosystem diversity.</p> <p>B. Biogeographical classification of India.</p> <p>C. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.</p> <p>D. Biodiversity at global, national and local levels. India has a mega- diversity nation.</p> <p>A. Hot spots of biodiversity.</p> <p>B. Threats to biodiversity: habitat loss, poaching of wild life, man wild life conflicts,</p> <p>C. Endangered and endemic species of India.</p> <p>D. Conversation of biodiversity: In suit and Ex suit conservation of biodiversity.</p>	08	12
<p>5. Environmental Pollution</p> <p>Definition</p> <p>A. Causes, Effects And Control Measures Of :</p> <p>A. Air Pollution</p> <p>b. Water Pollution</p> <p>c. Soil Pollution</p> <p>d. Marine Pollution</p> <p>e. Noise Pollution,</p> <p>f. Thermal Pollution</p> <p>g. Nuclear Hazards,</p> <p>B. Solid Waste Management :Causes, effects, and control measures of urban and industrial wastes.</p> <p>C. Role of an individual in prevention of pollution.</p> <p>D. Pollution case studies</p> <p>E. Disaster management : floods, earthquake, cyclone and landslides</p>	08	12
<p>6. Social issues and the Environment</p> <p>A. From unsustainable to sustainable development</p> <p>B. Urban problems related to energy</p> <p>C. Water conservation, rain water harvesting, watershed management.</p> <p>D. Resettlement and rehabilitation of people, its problems and concerns. Case studies.</p> <p>E. Environmental ethics: Issues and possible solutions.</p> <p>F. Climate change, global warming, acid rain, ozone layer depletion nuclear accidents and holocaust. Case studies.</p> <p>G. Wasteland reclamation</p> <p>H. Consumerism and waste products</p> <p>I. Environment Protection Act.</p> <p>J. Air (prevention and Control of pollution) Act</p> <p>K. Water (prevention and control of pollution) Act</p> <p>L. Wildlife Protection act</p>	10	12



M. Forest Conservation Act N. Issues involved in enforcement of environmental legislation. O. Public Awareness.		
7.. Human Population and the Environment A. Population growth, variation among nations. B. Population explosion – Family Welfare programme C. Environment and human health D. Human Rights E. Value Education F. HIV / AIDS G. Women and Child Welfare H. Role of Information Technology in Environment and human health. I. Case Studies	06	10
8 .Field Work E. Visit to a local area to document environmental assets- river / forest/ grassland / hill/ mountain. F. Visit to a local polluted site – Urban / Rural / Industrial / Agricultural. G. Study of common plants, insects, birds. H. Study of simple ecosystems – pond, river, hill slopes, etc. ( Field equal to 5 lecture hours)	16	25

#### REFERENCE BOOKS

1. Introduction to Environmental Science by Y. Anjaneyulu (B.S. Publications)
2. Down to Earth, Centre for science & Environment.
3. Survey of the Environment, The Hindu