

4-YEAR DIPLOMA IN ENGINEERING PROGRAM

FOOD TECHNOLOGY

SYLLABUS
(COURSE STRUCTURE-2010)

SEVENTH & EIGHTH
SEMESTER

FOOD TECHNOLOGY(69)

7th Semester

Sl. No	Subject code	Name of the subject	T P C			MARKS				
						Theory		Practical		Total
						Cont. assess	Final exam.	Cont. assess	Final exam.	
1.	6971	Food Engineering Operation-2	3	3	4	30	120	25	25	200
2.	6972	Food Process Industries-2	3	3	4	30	120	25	25	200
3.	6973	Food Quality Control	3	3	4	30	120	25	25	200
4.	6974	Bakery & Confectionary Products	3	3	4	30	120	25	25	200
5.	6975	Food Analysis	2	3	3	20	80	25	25	150
6.	6976	Food Engineering Project	0	3	1	-	-	25	25	50
7.	5853	Entrepreneurship	2	0	2	20	80	-	-	100
Total			16	18	22					1100

FOOD TECHNOLOGY(69)

8th Semester

Sl. No	Subject code	Name of the subject	T P C			MARKS				
						Theory		Practical		Total
						Cont. assess	Final exam.	Cont. assess	Final exam.	
1.	6981	INDUSTRIAL TRAINING	-	-	6	-	-	180	120	300
Total					6					300

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SEVENTH SEMESTER

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4-YEAR DIPLOMA IN ENGINEERING PROGRAM

FOOD TECHNOLOGY

SYLLABUS
(COURSE STRUCTURE-2010)

SEVENTH SEMESTER

6971

FOOD ENGINEERING OPERATIONS-II

T P C
3 3 4

AIMS

- To be able to understand the basic concept of food engineering operation.
- To be able to operate the food plants and equipment.
- To be able to maintain food plants and equipment.
- To be able to solve the engineering problems of different food industries.

SHORT DESCRIPTION

Criteria of selection and supply of improved raw materials in food process industry; Importance of cleaning of raw materials prior to processing; Methods of sorting and grading of raw materials in food processing; Principles of size reduction, screening in food industry; crushing and grinding equipment; Mixing and emulsification of food materials; Filtration; expression; Extraction of fats and oils in industry by solvents; Centrifugation and its application in food industry; Dehydration of food; Drying equipment; Heat processing of food; Sterilizing; Pasteurizing and exhausting of containers; Freezing preservation of food; Preservation of food by irradiation.

DETAIL DESCRIPTION

Theory:

- 1 Understand the criteria of selection and supply of improved raw materials in food process industry.
 - 1.1 List 4 main direction in which the suitability and supply of improved raw materials may be insured.
 - 1.2 List five characteristics for which the selection of variety is improved.
 - 1.3 Describe the role of colour characteristics, shape characteristics, flavor characteristics, texture characteristics, maturation characteristics and functional properties in variety selection of raw materials.
 - 1.4 Describe the damage of raw materials caused by:
 - (i) Unsuitable materials handling techniques.
 - (ii) Poor container designs.
 - (iii) Improper transportation system and
 - (iv) Lack of suitable storage condition.
- 2 Understand the importance of cleaning of raw materials prior to processing.
 - 2.1 Define cleaning.
 - 2.2 List the functions of cleaning of raw materials in a food industry.
 - 2.3 Describe with examples, the types of contaminate most frequently encountered in food processing.
 - 2.4 Describe the following dry cleaning methods of raw materials in food industry.
 - (i) Screening.
 - (ii) Abrasion cleaning.
 - (iii) Aspiration cleaning.

- (iv) Magnetic cleaning.
- 2.5 List the equipment used in cleaning methods.
- 2.6 Describe the following wet cleaning methods:
 - (i) Soaking.
 - (ii) Spray washing.
 - (iii) Floating washing.
 - (iv) Ultrasonic cleaning
 - (v) Dewatering.
- 2.7 Describe with flow diagram the combination cleaning for wheat prior to milling.
- 3 Understand the methods of sorting and grading of raw materials in food processing industry.
 - 3.1 Mention four reasons of sorting.
 - 3.2 Describe the following methods of sorting of food raw materials diagrammatically:
 - (i) Weight sorting
 - (ii) Size sorting.
 - (iii) Shape sorting
 - (iv) Colour sorting.
- 4 Understand the method of grading of raw materials in food processing industry.
 - 4.1 List the name of equipment commonly used in sorting raw materials.
 - 4.2 Define grading.
 - 4.3 Distinguish between sorting and grading.
 - 4.4 List nine factors of grading of raw materials which determine the quality of foods.
 - 4.5 Describe manual grading and machine grading.
 - 4.6 Mention their advantages and disadvantages of manual grading and machine grading.
 - 4.7 Discuss the purpose of grading of foods.
- 5 Understand the principles of size reduction & screening and their application in food industry.
 - 5.1 List the reasons of size reduction of solids in food processing operations.
 - 5.2 List the name of forces used in size reduction.
 - 5.3 Explain reduction ratio.
 - 5.4 Describe a typical size reduction flow sheet for solids used in food industry.
 - 5.5 List the size reduction equipment in food processing operations.
- 6 Understand the crushing and grinding equipment.
 - 6.1 Describe crushing rolls and their function.
 - 6.2 Describe the action of a hammer mill.
 - 6.3 Describe a disc mill and its functions.
 - 6.4 Describe a ball mill and its working principle.
 - 6.5 Describe a pueper and its uses.

- 7 Understand the screening and screnading equipment.
 - 7.1 Describe sieves.
 - 7.2 Describe the following screening terminology:
 - (i) Under size.
 - (ii) Over size.
 - (iii) Screen aperture.
 - (iv) Mesh number.
 - (v) Screen interval.
 - (vi) Tyler standard.
 - (vii) British standard.
 - (viii) U S Bureau of standard.
 - 7.3 List different types of industrial screens.
 - 7.4 Discuss factors affecting the efficiency of a screening operation.
- 8 Understand the industrial process of filtration.
 - 8.1 Define filtration.
 - 8.2 Describe different types of filter media and their application in food industry.
 - 8.3 Define filter aids.
 - 8.4 Describe the characteristics of filter aids.
 - 8.5 Describe the construction and working principle of the following filter press diagrammatically:
 - (i) Vertical plate filter press.
 - (ii) Horizontal plate filter press.
 - (iii) Shell and leaf pressure filter.
 - (iv) Rotary drum vacuum filter press.
 - (v) Rotary drum disc filter press.
 - (vi) RO filter.
 - 8.6 Discuss the applications of filtration equipment in the food industry.
- 9 Understand the expression process.
 - 9.1 Mention the necessity of expression.
 - 9.2 List methods of expressing the liquid from the solid liquid matrix.
 - 9.3 List the factors responsible for an efficient expression process.
 - 9.4 Describe the working principle of the following presses diagrammatically:
 - (i) Hydraulic press and cage press.
 - (ii) Roller press
 - (iii) Screw press.
- 10 Understand the extraction of fats and oils in industry by solvents.
 - 10.1 Define solvent extraction.
 - 10.2 List the solvents used for the extraction of edible oils from oils seeds and nuts.
 - 10.3 Discuss the effect of temperature, viscosity and agitation on the rate of extraction of soybean.
 - 10.4 Draw a flow diagram with all unit operations involved in the extraction of soyabeal oil/essential oil.

- 10.5 Describe a batch extraction unit diagrammatically.
- 10.6 Describe a semi continuous and a continuous extraction unit diagrammatically.
- 11 Understand the centrifugation and its application in food industry.
 - 11.1 Define centrifugation.
 - 11.2 Factor effects of centrifugation.
 - 11.3 Explain the theory of centrifugal separation of two immobile liquids and a solid liquid system with diagram.
 - 11.4 Describe the construction and working principle of disc bowl centrifuge and basket centrifuge.
 - 11.5 List 10 centrifugal equipment with their application in food industry.
- 12 Understand the dehydration of food.
 - 12.1 Define food dehydration.
 - 12.2 Classify food dehydration methods.
 - 12.3 Define equilibrium moisture content, free moisture, relative humidity and equilibrium humidity.
 - 12.4 Explain the following terms of drying cycle:
 - (i) Setting down period.
 - (ii) Constant rate period.
 - (iii) Falling rate period.
 - 12.5 Describe case hardening, critical moisture content, dehydration ratio and rehydration ratio.
 - 12.6 List different types of dryers used in food dehydration.
- 13 Understand the drying equipment.
 - 13.1 Describe a kiln drier.
 - 13.2 Describe a tunnel dryer.
 - 13.3 Describe a fluidized bed dryer.
 - 13.4 Describe a spray dryer and its working principle.
 - 13.5 Describe a spray dryer.
 - 13.6 Describe a conveyor dryer.
 - 13.7 Describe a pneumatic dryer.
 - 13.8 Describe a drum dryer.
- 14 Understand the heat processing of foods.
 - 14.1 Define heat processing of food.
 - 14.2 Explain the terms cooking, blanching, pasteurization and sterilization.
 - 14.3 Describe the factors affecting thermal resistance.
 - 14.4 Describe the method of balancing of food.
 - 14.5 Describe the method of pasteurization.
 - 14.6 Describe the method of sterilization.

- 15 Understand the sterilizing, pasteurizing and exhausting containers.
 - 15.1 Describe different types of containers.
 - 15.2 Describe the closing of containers (can) by a double seaming machine diagrammatically.
 - 15.3 Describe the general considerations of heat sterilization of food in containers above 100°C .
 - 15.4 Describe the working principle of a continuous rotary sterilizer diagrammatically.
 - 15.5 Describe the working principle of a batch and a continuous pasteurization unit diagrammatically.
 - 15.6 Describe the method of exhausting of container.

- 16 Understand the freezing preservation of food.
 - 16.1 Define freezing.
 - 16.2 Describe the principles of freezing.
 - 16.3 List different types of freezer used in food industry.
 - 16.4 Describe freezing point, freezing time and effective freezing time.
 - 16.5 Describe the methods of air freezing, plate freezing, liquid immersion freezing and cryogenic freezing.
 - 16.6 Describe the freezing method for various classes of food.
 - 16.7 Describe frozen storage.
 - 16.8 Describe the method of thawing.
 - 16.9 Describe plate freezer, blast freezer and immersion freezer.

Practical:

- 1 Determine the reduction ratio and the effects of feed rate on particle size during milling by ball mill and hammer mill.

- 2 Separate the crush materials by using a sieve shaker.

- 3 Determine the rate of filtration at a given constant pressure difference in a vertical plate and frame filter press using CaCO_3 water slurry/Sugar syrup/mustard oil.

- 4 Separate solids form liquid by using a basket centrifuge..

- 5 Determine the overall heat transfer co-efficient of a concentric tube heat exchanger.

- 6 Determine the dehydration and re-hydration ration of potato slices dried by using a shelf drier.

- 7 Prepare reconstituted milk from non fat dry milk powder, butter oil and water using a pressure homogenize and mixer.
- 8 Extract oil from oil seeds by using an extraction unit
- 9 Sterilize canned fruits / vegetables by using an autoclave
10. The closing of containers (can) by a double seaming machine.

REFERENCE BOOKS

1. Food Engineering Operations

by J. B Brennan, J. R. Butters, N. D. Cowwell & A. E. V Lilly.

2. Principles of Food Science Part – II (Practical Principle of Food Preservation)

by Marens Kaerl, Owes R. Fennema & Daryl B Lund.

3. Chemical Engineering Vol I & II

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by Coulson & J. F Richardson.

4. Chemical Engineering Vol III

by Richardson & Peacock.

5. Chemical Engineering Vol –IV

by J. R. Backhust and J. H. Harker

6. Chemical Engineering Hand Book

by Perry.

7. Unit Operations of Chemical Engineering (Vol I & Vol- II)

by P. Chattapadhyoy.

8. Unit Operations of Chemical Engineering

by W. L. McCable & J. C. Smith

9. Introduction to Chemical Engineering

by Badger and Banchemo.

10. Elementary Chemical Engineering

by Peter

11. Engineering for Dairy and Food Products.

by Arthur W. Farral.

12. Food Processing Plants Vol – I & II

AIMS

- To be able to understand the basic concept of food processing.
- To be able to understand fish products, meat products, paltry products and spices.
- To be able to produce different fish products meat products, paltry products and spices.

SHORT DESCRIPTION

Handling of fish, Transport of fish, Smoking of fish, Curing of fish by salt. Drying of fish Canning of fish, Fish meal and oil, Meat and meat product. Poultry and poultry product, Egg products, Milk and storage methods of milk; Milk products..

DETAIL DESCRIPTION

Theory:

1 Understand the handling of fish at catching place.

- 1.1 Define handling of fish.
- 1.2 Describe the method of handling of fish.
- 1.3 Describe the method of stowing.
- 1.4 Describe an ideal fish room.
- 1.5 Describe fish boxes for handling fish.
- 1.6 Describe the method of cooling fish before transportation.

2 Understand the transport of fish.

- 2.1 Describe the modern rail fish van used for rail transportation.
- 2.2 Describe the modern road vehicle used for fish transportation.
- 2.3 Describe the method of wrapping and pre-packaging of fish for transportation.
- 2.4 Mention the causes of deterioration of fish.
- 2.5 Describe the necessity of clean handling of fish.

3 Understand the smoking of fish.

- 3.1 Define smoking of fish.
- 3.2 Describe the modern method of smoking of fish.
- 3.3 List the equipment used in smoking.
- 3.4 Describe the advantages and disadvantages of smoking of fish.

4 Understand the preservation of fish by salt curing.

- 4.1 Define salt curing of fish.
- 4.2 Describe the principle of salt curing.
- 4.3 Describe the method of salt curing of fish.
- 4.4 Describe the spoilage of salted fish.
- 4.5 Describe the method of prevention of spoilage of salted fish.

5 Understand the drying of fish.

- 5.1 Describe the dehydration of fish.
- 5.2 Describe the method of drying fish.
- 5.3 Describe the factors affected the drying fish
- 5.4 Describe the method of vacuum contact drying of fish.
- 5.5 Describe the method of freeze drying of fish.

6 Understand the canning of fish.

- 6.1 Define canning of fish.
- 6.2 Describe the necessary treatment of fish before canning.
- 6.3 Describe the method of exhausting of can.
- 6.4 Describe the method of obtaining a vacuum in can.

6.5 Describe the method of fish canning by can closing machine/seaming machine.

7 Understand the fish meal and fish oil.

- 7.1 List the raw materials for fish meal.
- 7.2 Describe the methods of preparation of fish meal.
- 7.3 Mention the composition of fish meal.
- 7.4 Describe the uses of fish meal.
- 7.5 Describe the sources of fish meal.
- 7.6 Describe the method of preparation of fish oil.
- 7.7 Describe the uses of fish oil.

8 Understand the meat and meat products.

- 8.1 Describe the sources of meat.
- 8.2 Describe the composition of meat.
- 8.3 Describe the reasons of contamination of meat.
- 8.4 Describe the causes of spoilage of meat.
- 8.5 Describe the necessity of premarket inspection.
- 8.6 Describe the slaughtering methods of animal.
- 8.7 Describe the principle of post market examination.

9 Understand the preservation of meat.

- 9.1 Describe the method of preservation of meat by freezing.
- 9.2 Describe the method of preservation of meat by canning.
- 9.3 Describe the method of preservation of meat by freeze drying method.
- 9.4 Describe the curing and smoking of meat.

10 Understand different meat product.

- 10.1 Describe the necessity of cooking meat.
- 10.2 Describe corned beef.
- 10.3 Describe stew, boiling, steaming, roasting and frying of meat.

11 Understand the poultry products.

- 11.1 Describe the sources of contamination of poultry products.
- 11.2 Describe the techniques of poultry dressing.
- 11.3 Describe the method of preparation of poultry.
- 11.4 Describe the grading of poultry.

12 Understand the storage of poultry.

- 12.1 Describe the method of storage of poultry.
- 12.2 Describe freezer burn of poultry.
- 12.3 Describe the changes in quality of frozen poultry during storage.
- 12.4 Describe still air freezing, blast freezing, liquid freezing and freezing with liquid gases.

13 Understand the canning poultry products.

- 13.1 Define canning of poultry products.
- 13.2 Describe the method of canning poultry products.
- 13.3 Describe the dehydrated chicken soup.

14 Understand the freeze drying of poultry meat.

- 14.1 Define freeze drying.
- 14.2 Describe the advantages of freeze drying poultry meat.
- 14.3 Describe the processing of freeze drying.
- 14.4 Describe the preparation and handling of poultry for freeze drying.
- 14.5 Describe the problems in freeze drying poultry meat.

15 Understand the poultry meat preservation by radiation.

- 15.1 Describe the sources of radiation for food preservation.
- 15.2 Describe the methods of preservation of poultry meat by radiation.
- 15.3 Describe the advantages and disadvantages of preservation of poultry meat by radiation.

16 Understand the cooking and barbecuing poultry.

- 16.1 List different methods of cooking poultry meat.
- 16.2 Describe the method of frying poultry meat.
- 16.3 Describe the broiling cooking method for poultry meat.
- 16.4 Describe the method of preparing roasted chicken.
- 16.5 Describe the method of barbecuing poultry.

17 Understand the egg products and egg preservation.

- 17.1 Describe the structure of egg.
- 17.2 Describe the function egg white.
- 17.3 Baking effect of egg.
- 17.4 Describe the chemical composition of egg.
- 17.5 Describe the method of transportation of egg.
- 17.6 Describe spoilage of egg.
- 17.7 Describe the methods of preservation of egg.
- 17.8 Describe the method of preparing powdered egg.

18 Understand the milk & storage methods of milk.

- 18.1 Define milk.
- 18.2 Describe the characteristics of milk.
- 18.3 Mention the composition of milk.
- 18.4 Describe the methods of storage of milk.
- 18.5 Describe two general method of pasteurization of milk.
- 18.6 Describe BSTI required specification of milk and milk products.
- 18.7 Describe the process of manufacturing sterilized milk.
- 18.8 Describe the method of manufacturing of skim milk.
- 18.9 Describe the methods of preparation of evaporated milk.
- 18.10 Describe the methods of manufacture of sweetent condensed milk.

19 Understand the milk products.

- 19.1 Describe the methods of preservation of toned milk.
- 19.2 Explain the factors which effect on packaging of skim milk and whole milk powder.
- 19.3. Describe the manufacturing method of yogurt.
- 19.4. Describe the method of preservation of yoghurt.
- 19.5 Define butter and ghee.
- 19.6 Describe the method of manufacture of butter.
- 19.7 Mention the method of manufacture of ghee.
- 19.8 Describe the manufacturing process of Swiss cheese, cottage cheese, caudal cheese and Dhaka cheese.
- 19.9 Describe ice cream manufacturing process.
- 19.10 Describe the quality control of different ice cream.
- 19.11 Prepare different types of sweetmeat.

Practical:

1. Curing of fish by salt.

2. Prepare fish Cutlet.
3. Prepare canned fish/meat.
4. Prepare dry fish/meat
5. Prepare poultry pickle.
6. Prepare chicken roast.
7. Prepare chicken soup.
8. Prepare egg pudding.
9. Prepare yogurt from whole milk.
10. Prepare butter & ghee.
11. Prepare different types of cheese.
12. Prepare different types of ice cream.
13. Visit ice cream industries.
14. Visit a milk powder manufacturing industries.
15. Prepare different types of sweetmeat.

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1. Fish Processing and Handling -by Burger, Cutting & Ioven.
2. Food Process Industries -by S. C. Duld.
3. Industrial Fishery Technology -by Manrice E. Stausby
4. Principles of Food Packaging -by R. Hicks.
5. Food Science and Technology -by Magnus Pyke.
6. Food Science Chemistry and Experimental Foods -by Dr. M. Swaminathan
7. The Technology of Food Preservation -by Norman W Desrosier.
8. Food Processing Plants (Vol I & II) -by Slade
9. Principles of Dairy Processing -by Wanner J. N.
10. Encyclopedias of Food Technology -by Johnson and Peterson.
১১. দুগ্ধ বিজ্ঞান - ডঃ মোঃ আবদুল হামিদ মিল্লা
১২. খাদ্য ও দিনকাল, মোঃ ইদ্রিস

6973 FOOD QUALITY CONTROL

T P C
3 3 4

AIMS

- To be able to understand the food laws, food standards and food quality control systems.
- To be able to acquaint with modern methods of food analysis.
- To be able to acquaint with food quality control equipment.
- To be able to perform experiments on food quality control.

SHORT DESCRIPTION

Quality control of food; Food laws and Safety; Food standard organizations; Role of moisture in quality control of foods; Methods of determination of carbohydrates & protein in food; Methods of determination of chemical preservation in food; Hygienic condition in food processing plant ; Quality attributers of foods; Food pigments; Food color and food flavour; Textural properties of foods; Sensory evaluation of foods.

DETAIL DESCRIPTION

Theory:

1 Understand the quality control of food.

- 1.1 Define food quality and food quality control.
- 1.2 Describe the importance of food quality control.
- 1.3 List the responsibilities of a quality control department.
- 1.4 Describe inspection planning for raw materials, intermediate products and finished products in a food industry.
- 1.5 Describe the importance /purpose of quality control in food industry.
- 1.6 Describe the quality control aspects in food industry.

2 Understand the food laws and food safety.

- 2.1 Define food laws and Food safety.
- 2.2 Describe national food laws, food Standard, Codex Alimentation and EEC food laws.
- 2.3 Define National food principle 2013.
- 2.4 Role of National food principle 2013 for prevent of food adulteration & Development of quality food product in Bangladesh.
- 2.5 Describe the significance of food laws and safety to consumers.
- 2.6 Describe adulterants.
- 2.7 List of common adulterants used in different foods.
- 2.8 Effects of food adulterants in Bangladesh
- 2.9 Determine the percent of adulterants in food.

3. Understand Food Standard/ Organization.

- 3.1 Define ISO.
- 3.2 Explain the certificating process of ISO.
- 3.3 Define HACCP.
- 3.4 Explain the seven principle of HACCP.
- 3.5 Carrying out the hazard analysis
- 3.6 Role of BSTI to prevent food adulteration
- 3.7 Process of BSTI license for food process industry.
- 3.8 Describe the food laws related to BSTI standard.
- 3.9 Briefly describe GMP, GLP, GHP, FAO, WHO.

4 Understand the role of moisture in quality control of foods.

- 4.1 Explain moisture.
- 4.2 Effects of moisture in self life of food product
- 4.3 List the methods of moisture measurement in foods.
- 4.4 Describe the methods of determination of moisture in foods by using moisture analyzers, drying oven and Bidwell & Starling distillation apparatus.

5 Understand the methods of determination of carbohydrates & protein in foods.

- 5.1 Define carbohydrate & protein
- 5.2 Role of carbohydrate & protein in human body
- 5.3 List different methods of analysis of carbohydrates.
- 5.4 State the principles of volumetric methods of analysis of carbohydrates.
- 5.5 Explain the reactions involved in the determination of reducing and non-reducing sugars by Lane and Eynon method.
- 5.6 Explain the principles involved in the determination of dextrose and other sugars by iodometric method
- 5.7 Describe the methods of estimation of sugar from foods.
- 5.8 Classification of protein.
- 5.9 Explain different types of protein.
- 5.10 Explain the different methods to determine the percent of protein present in sample product.

6 Understand the methods of determination of chemical preservatives in foods.

- 6.1 Define chemical preservatives.
- 6.2 Explain E Number & GRAS list.
- 6.3 Name important chemical preservatives used for the preservation of foods.
- 6.4 Explain free and bound sulphur dioxide (SO₂).
- 6.5 Describe the analytical methods of measuring SO₂ present in chemically preserved foods (Monier Williams method.)
- 6.6 Describe the direct titration methods of estimation of Benzoic acid.

7 Understand the hygienic condition in food processing plant.

- 7.1 Define hygiene, sanitation & sanitizer.
- 7.2 Describe the required sanitation in food processing plant.
- 7.3 Define CIP.
- 7.4 Describe the cleaning & disinfection methods for food plant and equipment.
- 7.5 Define ETP plant.
- 7.6 Explain the importance of ETP Plant for food processing industry.
- 7.7 Describe the structure of ETP plant for a sample food processing industry.

8 Understand the quality attributes of foods.

- 8.1 List different quality attributes of foods.
- 8.2 Explain colour of foods.
- 8.3 Mention gloss of foods.
- 8.4 List different pigments used in food.
- 8.5 List different food colour used in foods.
- 8.6 Describe the sensitivity of the tongue.
- 8.7 Describe the test sensitivity.
- 8.8 Describe the test sensitivity of the tongue.

9 Understand the food pigments, food colour and food flavour.

- 9.1 Define food pigments, food colour and food flavour.

- 9.2 Discuss the importance of colour in foods.
- 9.3 Differentiate between natural & synthetic colour.
- 9.4 Effects of synthetic colour & flavour in human body
- 9.5 Discuss the flavour enhancement.
- 9.6 Discuss the advantages and disadvantages of natural and synthetic flavour.
- 9.7 Differentiate between flavour and off-flavour.

10 Understand the texture properties of foods.

- 10.1 Define food texture.
- 10.2 Describe the textural characteristics of food.
- 10.3 List the instruments used to perform different physical tests for specific sensory reactions.
- 10.4 Describe the principle of measurement of texture.

11 Understand the sensory evaluation of foods.

- 11.1 Define organoleptic test of foods.
- 11.2 State the aims of sensory evaluation of food.
- 11.3 Describe how sensory evaluation is organised in determining food quality.
- 11.4 Describe the requirements for the sensory evaluation of foods.
- 11.5 List the names of taste method used for the sensory evaluation of food.
- 11.6 Describe Duo/Trio, Triangle and Rank methods of sensory evaluation.

12 Understand the food plant design

- 12.1 Define Food plant design
- 12.2 Explain the building design for food processing industry
- 12.3 Explain the factors for site selection in food process industry
- 12.4 Explain the criteria for a good food processing plant lay out
- 12.5 Discuss the structure for food processing plant.
- 12.6 Describe the seven principle of sanitary design.

Practical:

1. Prepare normal solutions of acids, bases and salts.
2. Perform acid-base titration for standardization of the solution.
3. Determine the percent of moisture content.
4. Measure total soluble solids (TSS).
5. Measure reducing sugars present in a given sweet preserve by Lane and Eynon titration method.
6. Measure and calculate the citric/ Amino acid present in a given preserve food by volumetric method / paper chromatography method.
7. Measure and calculate protein present in the sample.
8. Determine sulphur di oxide (SO_2) present in chemically preserved food by monier williams Method.
09. Estimation of benzoic acid by direct titration Method.
10. Perform a sensory evaluation for determining food
11. Determine the Hardness of water by EDTA Method.
12. Determine the P^{H} Value of water.
13. Determine the Vitamin 'C' presents in food.
14. Determine the fat percent presents in milk by Gerber Method.
15. Determine the percent of oil in seed by soxhlet apparatus Method.

REFERENCE BOOKS

1. Quality Control in the Food Industry (Vol- I & Vol II) by S. M. Hechschrfer.
2. Head Book of Analysis and Quality Control for Fruits and Vegetables by S. Ranganams.
3. Food Science, Chemistry and Experimental Foods by Dr. M. Swaminathan.
4. A Head Book of Edible Oils and Fats by Golum Mowla, N. M Sheikh and A. M. S. Sarwan Kamal.
5. The Technology of Food Preservation by Norman W. Desrosier.
6. Modern Cereal Chemistry by Kent Jonch and Anus.
7. **Principles of Dairy Processing** by Wanner & W.

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8. Quality Control for the Food Industry (Vol – 1) by Amihud Kramer & Bernard A. Twigg.
 9. HACCP Practical approach (Second edition) Sara Mortimore & Carol Wallace
 10. HACCP User's Manual by Donald A. Corlett, Jr
 11. Food Plant Design (Food Engineering systems) by Alan Ingram

6974 BAKERY AND CONFECTIONERY PRODUCTS	T	P	C
	3	3	4

AIMS

- To be able to develop the knowledge & skill of manufacturing the bakery and confectionery products.
- To be able to understand the raw materials needed in manufacturing bakery and confectionery products.
- To be able to develop knowledge & skill on bakery machinery & equipment.

SHORT DESCRIPTION

Raw materials for bakery products; Manufacturing of bread; Bread making processes; Recipes for bread making; French bread, whole wheat bread and date nut bread; Manufacturing of biscuits; Recipes for various types of biscuits; Manufacturing of cookies; Manufacturing of fried pies; Manufacturing of cakes; Manufacturing of hard and soft rolls; Manufacturing of pizza; Manufacture of snakes; Manufacturing of chocolates and candies; Bakery machinery and equipment.

DETAIL DESCRIPTION

Theory:

1. Understand the raw materials of bakery products.
 - 1.1 List the raw materials for bakery products.
 - 1.2 Describe wheat varieties.
 - 1.3 Describe working mechanism of shortening agents, emulsifying agents and antioxidants.
 - 1.4 Describe the leavening agents and its working mechanism.
 - 1.5 Describe milk products used in bakery products.
 - 1.6 Describe the sweeteners used in bakery products.
 - 1.7 Describe the function of eggs in bakery and confectionery products.
 - 1.8 Describe the function of fruits and nuts in bakery products.
 - 1.9 Describe the flavors, colors and other minor ingredients used in bakery products.
2. **Understand the bakery machinery and equipment.**
 - 2.1 State the classification of bakery equipment.
 - 2.2 Describe the weighting equipment.
 - 2.3 Mention the criteria for selection of mixing equipment.
 - 2.4 Describe a horizontal dough mixture.
 - 2.5 Describe a vertical planetary mixture.
 - 2.6 Explain divider, rounder, intermediate proofer, molder and slicer used in manufacture of bakery and confectionary products.
 - 2.7 Describe a tunnel oven used in a bakery industry.
3. **Understand the manufacturing of bread.**
 - 3.1 List the raw materials used in manufacturing of bread.

- 3.2 Describe the characteristics of bread flour and yeast.
- 3.3 Describe the method of preparation of bread by straight-dough method.
- 3.4 Describe the method of preparation of bread by sponge dough method.
- 3.5 Describe the proofing and baking of bread.
- 3.6 Describe the auto manufacturing process of bread with flow diagram.
- 3.7 Describe the manufacturing process of dry bread.
- 3.8 State the advantage and disadvantages between straight dough and sponge dough methods.
- 3.9 Discuss common defects in bread.
- 3.10 Describe the manufacture of long self life bread.

4. Understand the bread making process including recipe.

- 4.1 Describe the manufacturing process of milk bread with recipe.
- 4.2 Describe the manufacture of France bread, fruit bread with recipe.
- 4.3 Describe the manufacture of whole wheat bread.
- 4.4 Define buns and its manufacturing process.
- 4.5 Describe quality of bread.
- 4.6 Describe the method of cooling, slicing and wrapping of bread.

5. Understand the manufacturing of biscuit.

- 5.1 Describe biscuits.
- 5.2 Describe the raw materials for biscuit manufacturing.
- 5.3 Mention the classifications of biscuits.

5.4 Describe the auto manufacturing process of biscuit.

5.5 Mention the baking temperature effects in biscuits manufacturing.

6. Understand the hard dough biscuit making process including recipe.

- 6.1 Describe the characteristics of flour, fat and yeast for hard dough biscuits.
- 6.2 Describe the manufacture of hard dough biscuits with flow diagram.
 - 6.3 Describe the manufacture of Marie biscuit.
 - 6.4 Describe the manufacture of chocolate Marie biscuit.
 - 6.5 Describe the manufacture of sugar coated coconut biscuit.
 - 6.6 Describe the manufacturing of saltiest biscuit.
 - 6.7 Describe the manufacturing of cheese crackers, milk crackers, species crackers and vegetable crackers.
- 6.8 Mention the defects of hard dough biscuits.

7. Understand the soft dough biscuit making process including recipe.

- 7.1 Describe the characteristics of flour and fat for soft dough biscuits.
- 7.2 Describe the manufacture of soft dough biscuits with flow diagram.
 - 7.3 Describe the manufacture of milk butter biscuit.
 - 7.4 Describe the manufacture of digestive biscuit.

- 7.5 Describe the manufacture of fruity orange, pine apple biscuit.
- 7.6 Describe the manufacturing of cardamom biscuit.
- 7.7 Describe the manufacturing of cream.
- 7.8 Describe the manufacturing of cream sandwich type biscuit.

8. Understand the manufacturing of cookies.

- 8.1 List basic ingredients of cookies
- 8.2 List the banding materials for cookies.
- 8.3 Describe the spread of the cookies.
- 8.4 Describe the equipment used for the manufacturing of cookies.
- 8.5 Describe the processing of sugar wafers.
- 8.6 Describe the coating for cookies.
- 8.7 Describe the recipes of coatings for cookies enrobing.

9. Understand the manufacturing of cakes.

- 9.1 Describe cakes.
- 9.2 Name the cakes raw materials and their properties.
- 9.3 Describe the single stage mixing used for cake processing.
- 9.4 Describe two stages mixing for cake processing.
- 9.5 Describe creaming method for cake processing.
- 9.6 Describe blending method for cake processing.
- 9.7 Describe sugar and water method for cake processing.
- 9.8 Describe the manufacturing of long self life clustered cake
- 9.9 Describe the manufacture of plain cake, fruit cake, sponge cake, cream cake, with recipe.
- 9.10 Describe the common faults in cakes and its remedies.

10. Understand the manufacturing of pizza, hard and soft rolls.

- 10.1 State hard and soft rolls.
- 10.2 Mention recipe for Vienna (Kaiser) rolls.
- 10.3 Describe the process of manufacture of hamburger
- 10.4 State pizza.
- 10.5 Mention different types of pizza.
- 10.6 State the methods of preparing pizza crust.
- 10.7 Mention recipe for making pizza.
- 10.8 Describe the manufacturing process of pizza.

11. Understand the manufacturing of chocolates.

- 11.1 Define chocolates.
- 11.2 List the raw materials for making chocolates.
- 11.3 List the equipment necessary for making chocolate.
- 11.4 Describe the manufacturing methods of chocolate.
- 11.5 Describe the packaging process of chocolates.
- 11.6 Define types of candies.
- 11.7 Describe manufacturing of bubble gum, milk candy, fruit candy and lolly pops.

12. Understand different types of fried snake foods.

- 12.1 Define snakes.

- 12.2 List the name of different types of snakes.
- 12.3 Describe the manufacture of Potato crackers with flow diagram.
- 12.4 Describe the manufacture of extruders' with flow diagram.
- 12.5 Describe the manufacture of chanachur.
- 12.6 Describe the manufacture of fried green peanuts and dale.

Practical:

- 1. Prepare Milk Bread following all the important steps.
- 2. Prepare good quality whole wheat bread using standard recipe.
- 3. Prepare Digestive biscuit.
- 4. Prepare Coconut biscuit.
- 5. Prepare Marie biscuit.
- 6. Prepare Plane cake.
- 7. Prepare Fruit cake.
- 8. Prepare Sponge cake.
- 9. Prepare Cream cake.
- 10. Prepare Vienna Rolls.
- 11. Prepare Bath buns.
- 12. Prepare Pizza.
- 13. Prepare chanature and Potato chips.
- 14. Prepare different types of Candy.
- 15. Prepare different types of chocolates.

REFERENCE BOOKS

- 1. Hand Book of Bakery Products - by S. M. Arora & Sisir Kumar
nath.
- 2. Chocolate, Cocoa and Confectionery Science and Technology
- by Bernard W. Minifie.
- 3. Cereals as Food and Feed - by Samuel A. Matz.
- 4. Technology of Cereals -by N. L. Kent

6975 FOOD ANALYSIS

T P C
2 3 3

AIMS

- To be able to develop knowledge and attitude of food analysis.
- To be able to understand the principle involved for the estimation and detection of different constituents of food.
- To be able to perform experiments of food analysis.

SHORT DESCRIPTION

Food analysis, Volumetric analysis, Composition of food, Nutritional analysis of food; Analysis of Fats and Oils, vitamin and mineral, Chlorinating of water; Quality test of water, Analysis of fruits and vegetables; Quality test in baking industry; Analysis of dairy products, Buffer solution and indicators.

DETAIL DESCRIPTION

Theory:

1. Understand the food analysis and Laboratory rules

- 1.1 Define food analysis.
- 1.2 Describe the different types of food analysis.
- 1.3 List the general laboratory rules of food analysis.
- 1.4 List the apparatus and appliances for food analysis in a laboratory.

2. Understand preparation of samples

- 2.1 Define samples.
- 2.2 Describe the sampling techniques (statistical sampling, manual sampling, and continuous sampling, sampling errors).
- 2.3 Describe the Grinding Dry & moist materials.
- 2.4 Describe the controlling Oxidative and microbial attack of sample.

3. Understand methods and instrumentation

- 3.1 List of analytical instrumentation
- 3.2 Describe calibration and validation of testing Instruments.
- 3.3 Describe the working procedure pH meter, spectrophotometer, moisture analysis balance.
- 3.4 Describe the working procedure of Gas-Liquid chromatography.

4. Understand Buffer solution and indicator.

- 4.1 Define buffer solution.
- 4.2 Explain buffer capacity.
- 4.3 Explain the mechanism of buffer solution.
- 4.4 List the pH range of five buffer solution.
- 4.5 Define indicator.
- 4.6 List the different types of indicators.
- 4.7 Explain the pH-range and colour of five indicators.

5. Understand volumetric analysis.

- 5.1 Define volumetric analysis.
- 5.2 Explain the terms: Acidimetry, Alkalimetry, Normal solution and Normality, Equivalent weight, Titration, End point and Neutralization.
- 5.3 Explain the preparation of N/10 NaOH solution.

- 5.4 Explain the preparation of 0.1N H₂SO₄ solution.
- 5.5 Explain the standardization of acid base solution.

6. Understand the analysis of fats and oils in food.

- 6.1 Describe the major contribution of fats and oils in nutrition.
- 6.2 Describe the testing procedure of Free Fatty acid.
- 6.3 Describe the testing procedure of melting point of Fat.
- 6.4 Describe the principles involved in the determination of fat by Gerber's method.
- 6.5 Describe the qualitative test for rancidity of oil.

7. Understand the Vitamins and Minerals in food :

- 7.1 Define Vitamin and Mineral.
- 7.2 Describe the Principle of estimation of Vitamin 'A' by calorimetric method.
- 7.3 Describe the Principle involved in the estimation of vitamin 'C' present in food by titration method.
- 7.4 Describe the testing procedure of Ash.
- 7.5 Describe the principle involved for the estimation of Ca, P, Cu, Zn and Iron.
- 7.6 Mention the necessity of determination of vitamin and mineral in food.

8. Understand the chlorination of water.

- 8.1 Define chlorination.
- 8.2 List the name of different chlorine compounds used for the disaffection of water.
- 8.3 Describe the precautions of dosages (uses) and storage of chlorine and hypo chlorites.
- 8.4 Describe the mechanism of water purification by chlorine.
- 8.5 Mention the advantages and disadvantages of chlorination.

9. Understand the Quality test of water.

- 9.1 Define quality test of water.
- 9.2 Define the following terms: i) Safe water ii) Pure and Impure water iii) Mineral water iv) contaminated water v) Polluted and drinking water
- 9.3 Briefly describe the purification of water.
- 9.4 Describe the criteria for water quality.
- 9.5 Describe WHO standards for drinking water quality.

10. Understand the methods of analysis of fruits and vegetables.

- 10.1 List the names of acids present in fruits and vegetables.
- 10.2 Describe the conditions required for the cold storage of fruits and vegetables.
- 10.3 Describe the canning of fruits and vegetables.
- 10.4 Describe the cutout examination of canned fruits and vegetables.
- 10.5 Importance of canned food analysis.
- 10.6 Describe the analytical methods of acid, ° Brix, pectin in fruits & vegetables.

11. Understand quality test in baking industry.

- 11.1 Understand quality test in baking.
- 11.2 Describe the quality test of flour.
- 11.3 Describe the chemical test for flour testing.
- 11.4 Describe the moisture content determination in flour.
- 11.5 Describe the protein determination in flour.
- 11.6 Describe the ash determination in Biscuit.

11.7 Describe the method of determining moisture content in bakery product.

11.8 Describe the testing parameter of powder milk.

12. Understand the importance analysis of dairy products.

12.1 Describe the method of determination of acidity in milk.

12.2 Describe the principle of determination of lactose by gravimetric/ polarometric method.

12.3 Describe the method of determination of protein in milk by titration method.

12.4 Describe the factors effecting the composition of milk.

12.5 List the names of the material used as adulterants in milk.

12.6 Describe the composition of different types condensed milk.

12.7 List the compositions of ice cream.

Practical:

1. Prepare a standard solution and standardization by solution.
2. Determine citric acid present in food by volumetric method.
3. Determine protein from a sample of food by kjeldahl method/ Titration method.
4. Determine the Saponification value and saponification equivalent of fats.
5. Determine the acid value of a sample of oil and fat.
6. Determine the iodine value of a sample of oil and fat.
7. Determine the percentage of oils in food (seeds) by Soxhlet apparatus.
8. Determine the percentage of fat present in a sample of food by Gerber method.
9. Perform rancidity test of oils.
10. Determine the total hardness present in a sample of water.
11. Determine the free chlorine present in a sample of water.
12. Determine the arsenic and estimation of Minerals of a sample of water / food.
13. Determine the quantity of sugar present in a sample of food by Fehling test.
14. Determine the Moisture content of food by drying oven & bid-well starling apparatus
15. Determine the total ash in food (flour).
16. Determine the percentage of vitamin-c present in a sample of fruit juice
17. Determine the lactic acid presents in milk.

REFERENCE BOOKS

1. The Technology of Food Preservation. by Norman W. Desrosier.
2. Food Processing Plants (Vol- I & II) by Slade.
3. A Hand Book of Edible Oil and Fats by Golam Mowla, N. M. Shliuh & A. S. M. Sarwan Ahmed.
4. Principles of Dairy Processing by Wanner J. N.
5. Encyclopedia of Food Technology by Jahnsen and Peterson.
6. Hand Book of Bakery Products.by S. M. Arora and Sisir Kumar Nath.
7. Hand Book of Analysis and Quality Control for Fruit and Vegetables Products by S. Ranganams.
8. Food Science Chemistry and Experimental Foods by Dr. M. Swamirathan.
9. Food Science and Technology by Magnus Pyke.
10. Physical Principles of Food Preservation by Marcus Karel, Owen Fennama and Daryl B. Lund.
11. Industry Food Chemistry by Garand I. D.
12. Hand Book of Food Additives by Furia T. E.

13. Outlines of Dairy Technology by Sukumol Dey.
 14. Pearson's Chemical Analysis of Food by Harold Egan, Ronald S. Kirk.
 15. Quality Control for the Food Industry (Vol-I) by Amihud Kramer and Bernard A. Twigg.
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১৯. দুগ্ধ বিজ্ঞান - ডঃ মোহাম্মদ আব্দুল হামিদ মিয়া।

6976 FOOD ENGINEERING PROJECT

T P C
0 3 1

AIMS

- To be able to perform the job of project work.
- To be able to use equipment, tools, instruments and resources required in food technology project.
- To be able to control the product quality of food products.
- To be able to perform experiment for the detection of micribials in the laboratory.
- To be able to develop knowledge and skill of preparing different types of food products.
- To be able to prepare a report of a food project.

SHORT DESCRIPTION

1. Selection of the project.
2. List of the project.
3. Initial report of the project.
4. Experiment / construction of the project.
5. The result or outcome of the project.
6. Final report of the project.

DETAIL DESCRIPTION

1 Select a suitable project in consultation with the guide teachers.

LIST OF THE PROJECT

2 Make a list of some project as follows (example only).

- 2.1 Preparation of tomato sauce, tomato juice, tomato paste, whole tomato in juice and quality control of the products.
- 2.2 Preparation of pineapple juice, pineapple sqash, pineapple nectar, pineapple slices in syrup.
- 2.3 Preparation of hot mango chutney, mango pickle, mango pulp, mango juice, mango nectar.
- 2.4 Preparation of jackfruit pickles, jackfruit jam, jackfruit bulbs is syrup, jackfruit nectar, jackfruit jelly.
- 2.5 Preparation of the guava jelly, mixed fruit jam, orange juice, orange jelly, orange squash, orange nectar.
- 2.6 Preparation of thick yoghurt, stirring yoghurt, Bulgarian yoghurt, Guava cheese, fresh cream cheese.
- 2.7 Preparation of confectionery biscuits, cakes, bread and pastry.
- 2.8 Preparation of red rose syrup, fruit caudy, ginger caudy, synthetic vinegar, spiced vinegar, kamranga jelly, preserved cauliflower preserved peas, preserved cabbage.
- 2.9 Making of solar drier / oven / toaster / incubator.
- 2.10 Preparation and preservation of different culture media of bacteria.
- 2.11 Culturing of bacteria in different culture media from different sources.
- 2.12 Isolation and study of pure culture from mixed culture of different strains of bacteria.

INITIAL REPORT OF THE PROJECT

3 Perform the preparation of initial report of the project.

- 3.1 Apply the process engineering principles in writing the initial report of the project.
- 3.2 List the tools, instruments and equipment required for the project.

- 3.3 Prepare the list of raw materials required for the project with quantity and specifications.
- 3.4 Perform different works of the project in time.

EXPERIMENT / CONSTRUCTION OF THE PROJECT

4 Perform the experimentation / construction of the project.

- 4.1 Design the assigned job.
- 4.2 Construct the experimental set up on the components of the job.
- 4.3 Assemble the components of the job.
- 4.4 Perform the experiment related to the project.
- 4.5 Display tidiness in handling tools, instruments and equipment properly.
- 4.6 Choose safe procedures when working in the laboratory / workshop.

PROJECT PROFILE OF THE PROJECT

5 Write a project profile of a cottage food industry.

- 5.1 Write a complete project profile of a cottage food processing and food preservation industry.
- 5.2 Make a list of the equipment required to establish the project.
- 5.3 Mention the importance of study of liability of the project.
- 5.4 Estimate the project cost and product cost.

THE RESULT / OUTCOME OF THE PROJECT

6 Synthesize the outputs of the project.

- 6.1 Compute the outcome / result of the project.
- 6.2 Illustrate the outputs / results of the project.
- 6.3 Connect necessary books and publications.

FINAL REPORT OF THE PROJECT

7 Evaluate the trail report of the project.

- 7.1 Conclude the outcome / results of the assigned project.
- 7.2 Write the final report on the project.

REFERENCE BOOKS

1. The Technology of Food Preservation. by Norman W. Desrosier.
2. Processing of Fruits, Vegetables and Others Food Products (Processed Food Industries) by SBP Boards of Consultants and Engineers.
3. Food Processing Plants (Vol- I & II) by Slade.
4. A Hand Book of Edible Oil and Fats by Golam Mowla, N. M. Shliuh & A. S. M. Sarwan Ahmed.
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9. Principles of Food Packaging. by R. Allis.
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 16. Industry Food Chemistry by Garand I. D.
 17. Food Facts and Principles by Maray N. S. and Shadak Shawarny
 18. Hand Book of Food Additives by Furia T. E.
 19. Food Additives by Tayles.
 20. Catering Science and Technology by Magunns Pyke.
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 22. Outlines of Dairy Technology by Sukumol Dey.
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 28. Fish Handling and Processing by G. H. O. Burgess, C. L. Cutting J. A Lovern and J. J. Waterman.
 29. Quality Control for the Food Industry (Vol-I) by Amihud Kramer and Bernard A. Twigg.
 30. Poultry Products Technology by George J. Mountney.
 31. Food Science and Technology by Magnus Pyke.
 32. Hand Book of Edible Oils and Fats.by Golum Mowlab N. M Sheikb and A. M. Sarwan Kamal.
 33. The Chemistry and Technology of Cereals on Food and Feed by Samuel A. Matz.
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5853

ENTREPRENEURSHIP

T P C

2 0 2

AIMS

- To be able to understand the concept of entrepreneurship & entrepreneur.
- To be able to understand the concept of environment for entrepreneurship.
- To be able to understand the sources of venture ideas in Bangladesh.
- To be able to understand the project selection.
- To be able to understand business planning.

- To be able to understand the case study

SHORT DESCRIPTION

Concepts of entrepreneurship & entrepreneur; Entrepreneurship & economic development; Environment for entrepreneurship; Entrepreneurship in the theories of economic growth; Sources of ventures ideas in Bangladesh; Evaluation of venture ideas; Financial planning; Project selection; Self employment; Entrepreneurial motivation; Business plan; Sources of assistance & industrial sanctioning procedure. Insurance ; case study.

DETAIL DESCRIPTION

Theory :

1 Understand the basic concept of entrepreneurship & entrepreneur.

- 1.1 Define entrepreneurship & entrepreneur.
- 1.2 Discuss the characteristics and qualities of entrepreneur.
- 1.3 Mention the classification of entrepreneur.
- 1.4 Discuss the case entrepreneurship and mass entrepreneurship.
- 1.5 Discuss the necessity of entrepreneurship as a career.
- 1.6 Discuss the function of entrepreneur in developing countries.
- 1.7 Discuss the prospect of entrepreneurship development in Bangladesh.

2 Understand the concept of entrepreneurship and economic development.

- 2.1 Define economic development.
- 2.2 Discuss that the economic development is a process.
- 2.3 Describe the entrepreneurship as a factor of economic development.
- 2.4 Discuss the capital accumulation or rate of savings.
- 2.5 Discuss the role of entrepreneur in the technological development and their introduction into production Process.
- 2.6 Discuss the entrepreneur in the discovery of new sources of resources.
- 2.7 Discuss the entrepreneur in the discovery of new product.
- 2.8 Discuss the discovery of new markets.

3 Understand the concept of entrepreneurship in the theories of economic growth.

- 3.1 Define entrepreneurship in the theories of economic growth.
- 3.2 Discuss the theory of need for achievement of Devid MacClelland.
- 3.3 Discuss the Malthusian theory of population and economic growth.
- 3.4 Discuss the labour theory of production and limit to growth.
- 3.5 Discuss the Keynesian theory of employment and output.
- 3.6 Discuss the stage theory of growth.
- 3.7 Discuss the Schumpeterian theory of economic development.

3.8 Discuss the entrepreneurship motive in economic development.

4 Understand the sources of venture ideas in Bangladesh.

4.1 Define sources of venture ideas in Bangladesh.

4.2 Discuss different types of sources of venture ideas in Bangladesh.

4.3 Discuss informal sources of venture ideas in Bangladesh.

5 Understand the evaluation of venture ideas.

5.1 Define evaluation of venture ideas.

5.2 Discuss the factors that influence the selection of venture ideas.

5.3 Discuss the evaluating financial aspects of business.

5.4 Discuss the determinants of the firm size.

6 Understand the concept of project selection and financial planning.

6.1 Define project.

6.2 Discuss the idea of project.

6.3 Describe the guide lines for project ideas.

6.4 Discuss the sources of project ideas.

6.5 Discuss the evaluation of project ideas.

6.6 Describe the technical aspect of project.

6.7 Define financial planning.

6.8 Discuss the long term financial plan.

6.9 Discuss the short term financial plan.

7 Understand the concept of self employment.

7.1 Define self employment.

7.2 Describe different types of employment.

7.3 Describe the importance of business as a profession.

7.4 Discuss the reasons for success and failure in business.

7.5 Discuss the self assessment of entrepreneurial qualities.

8 Understand the concept of entrepreneurial motivation.

8.1 Define entrepreneurial motivation.

8.2 Discuss the achievement motivation theory.

8.3 Describe the means of improving achievement motivation.

8.4 Discuss the background of high need achievement.

8.5 Describe the problems associated with high need achievement.

9 Understand the business plan and the concept of the environment for entrepreneurship.

9.1 Define business plan.

9.2 Describe the importance of business plan.

9.3 Discuss the contents of business plan.

9.4 Describe the business plan proforma.

9.5 Define environment of business.

9.6 Describe the factors which effect environment on entrepreneurship

9.7 Discuss the aspects of business environment

10 Understand the concept of sources of assistance & industrial sanctioning procedure.

10.1 Define sources of assistance.

10.2 Describe different types of sources of assistance.

10.3 Describe entrepreneurship development cycle.

- 10.4 Discuss the aid of sources.
- 10.5 Discuss the industrial policy.
- 10.6 Describe the technique of industrial policy.
- 10.7 Define foreign aid.

11 Understand the insurance and premium.

- 11.1 Define insurance and premium
- 11.2 Describe the essential conditions of insurance contract.
- 11.3 Discuss various types of insurance.
- 11.4 Distinguish between life insurance and general insurance.

12 Understand the concept of case studies.

- 12.1 Define case study.
- 12.2 Discuss the objectives of case study.
- 12.3 Describe the method of case analysis.
- 12.4 Discuss the importance of case study.
- 12.5 Mention the advantages and disadvantages of case study