



BANGLADESH TECHNICAL EDUCATION BOARD
Agargaon, Dhaka-1207.

4-YEARS DIPLOMA IN AGRICULTURE CURRICULUM
COURSE STRUCTURE & SYLLABUS
(PROBIDHAN-2022)

CURRICULUM CODE: 23

THIRD SEMESTER

(Effective from 2021-2022 Academic Sessions)

DIPLOMA IN AGRICULTURE (23)
COURSE STRUCTURE
PROBIDHAN-2022

3rd SEMESTER

Diploma in Agriculture (23)					3rd Semester							
Sl. No.	Subject		Period per Week		Credit	Marks Distribution						Grand Total
	Code	Name	Theory	Practical		Theory Assessment			Practical Assessment			
						Continuous	Final	Total	Continuous	Final	Total	
1	22331	Production Technology of Agronomic Crops-II (কৃষি আর্থিক ফসলের উৎপাদন প্রযুক্তি-২)	3	3	4	60	90	150	25	25	50	200
2	22332	Agricultural Economics (কৃষি অর্থনীতি)	2	3	3	40	60	100	25	25	50	150
3	22333	Soil Science-I (মৃত্তিকা বিজ্ঞান-১)	2	3	3	40	60	100	25	25	50	150
4	22334	Cultivation of Vegetables (সবজী চাষ)	3	3	4	60	90	150	25	25	50	200
5	22335	Agricultural Extension-I (কৃষি সম্প্রসারণ-১)	2	3	3	40	60	100	25	25	50	150
6	22336	Fish Culture Management (মৎস্য চাষ ব্যবস্থাপনা)	2	3	3	40	60	100	25	25	50	150
Total			14	18	20	280	420	700	150	150	300	1,000
Total Period			32									
Theory:Practical (Ratio)			43.8%	56.3%								

BANGLADESH TECHNICAL EDUCATION BOARD**AGARGAON, DHAKA-1207.****DIPLOMA IN AGRICULTURE (23)****SYLLABUS****3rd SEMESTER****(PROBIDHAN-2022)**

SUBJECT CODE	SUBJECT NAME	PERIOD PER WEEK		CREDIT
		T	P	
22331	Production Technology of Agronomic Crops-II (কৃষি তাত্ত্বিক ফসলের উৎপাদন প্রযুক্তি-২)	3	3	4

Rationale	Agronomy is the most important branch of agriculture. Agronomic crops are staple food crops such as rice, jute, cotton, fodder crop, and green manure crops which are produced on a large scale and represent the foundation of food, feed and economics. To get a higher yield it is necessary to learn the modern production technologies of the crops. This course deals with production technology of major agronomic crops.
Learning Outcome (Theoretical)	After undergoing the subject, students will be able to- <ul style="list-style-type: none">• Describe various growing stages of crops (Ch:1)• Illustrate modern cultivation technique of Paddy (Ch:02)• Describe procedure of jute cultivation and processing (Ch:03)• Describe procedure of cotton cultivation and processing (Ch: 04)• Describe procedure of mesta and kenaf cultivation and processing (Ch:05)• Describe procedure of tea cultivation and processing (Ch:06)• Describe procedure of coffee cultivation and processing (Ch:07)• Describe procedure of tobacco cultivation and processing (Ch:08)• Describe procedure of betel leaf cultivation and processing (Ch:09)• Illustrate prospective grain crops of Bangladesh (Ch:10)• Describe fodder crops (Ch:11)• Describe green manuring crops (Ch:12)
Learning Outcome (Practical)	After undergoing the subject, students will be able to <ul style="list-style-type: none">• Observe the growing stage of paddy (Practical: 1)• Practice line, logo and perching in paddy. (Practical: 2)• Practice rationing in Paddy. (Practical: 3)• Demonstrate land preparation, sowing, thinning, fertilizer application, irrigation practice in jute. (Practical: 4)• Exercise ribbon retting of jute. (Practical: 5)• Practice conventional jute retting process. (Practical: 6)• Cultivate dhaincha as a green manure. (Practical: 7)• Identify different types of tea. (Practical: 8)• Identify different types of grasses. (Practical: 9)

DETAILED SYLLABUS (THEORY)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	Growing stages of crops 1.1 Define growing stages of crops 1.2 Describe vegetative growth stages 1.3 Describe reproductive growth stages 1.4 Describe maturity stages 1.5 Illustrate growth stages of rice, wheat and maize.	4	7
2	Modern rice production technique 2.1 List modern technologies for rice production 2.2 Describe modern land preparation techniques of rice 2.3 List the modern planting techniques of rice 2.4 State line, logo and perching in rice field 2.5 Describe synchronized rice cultivation 2.6 Discuss mechanized rice harvesting methods 2.7 State rice ratooning 2.8 State System of Rice Intensification (SRI)	6	15
3	Jute cultivation 3.1 State the economic importance of fiber crops 3.2 List the production technologies of jute 3.3 Illustrate production technologies of jute 3.4 List the intercropping operation of Jute 3.5 Illustrate intercropping operation of Jute 3.6 Discuss conventional jute retting process 3.7 Describe ribbon retting 3.8 Illustrate fiber extraction, cleaning, drying and storage of jute	5	15
4	Cotton cultivation 4.1 List the production technologies of cotton 4.2 Illustrate production technologies of cotton 4.3 List the intercropping operation of cotton 4.4 Illustrate intercropping operation of cotton 4.5 State defoliation, desiccation, topping and collection method of cotton 4.6 Describe ginning and baling 4.7 Illustrate collection and storage procedure of cotton	4	7
5	Mesta and Kenaf cultivation 5.1 List the production technologies for mesta and kenaf 5.2 List the intercropping operation for mesta and kenaf 5.3 Illustrate production technologies of mesta and kenaf 5.4 Illustrate intercropping operation of mesta and kenaf 5.5 Describe harvesting and storage procedure of mesta and kenaf	3	6
6	Tea cultivation 6.1 State the economic importance of beverage crops 6.2 List the production technologies for tea 6.3 Illustrate production technologies of tea 6.4 List the intercropping operation for tea 6.5 Illustrate intercropping operation of tea 6.6 Describe the importance of shade tree in tea garden 6.7 State leaf collection procedure of tea 6.8 Illustrate the steps of tea leaf processing 6.9 Describe the types of tea	4	7

7	Coffee cultivation 7.1 State the perspective of coffee cultivation in Bangladesh 7.2 List the production technologies for coffee 7.3 Illustrate production technologies of coffee 7.4 List the intercultural operation for coffee 7.5 Illustrate intercultural operation of coffee 7.6 Describe the harvesting procedure of coffee cherries 7.7 Illustrate the processing of coffee cherries 7.8 Define drying, milling and extraction of coffee beans 7.9 Define tasting, roasting and grinding of coffee beans	3	6
8	Cultivation of tobacco 8.1 State economic importance of narcotic crops 8.2 List the production technologies for tobacco 8.3 Illustrate production technologies of tobacco 8.4 Discuss removal of terminal bud, topping and primming 8.5 Describe the steps of Curing of tobacco leaf	3	6
9	Betel leaf cultivation 9.1 State economic importance of betel leaf cultivation in Bangladesh 9.2 Describe the latest variety of betel leaf 9.3 Illustrate betel leaf production technology 9.4 Illustrate intercultural operation in betel leaf 9.5 Describe the leaf harvesting procedure of betel leaf 9.6 State the importance of shedding in betel leaf	2	6
10	Prospective grain crop of Bangladesh 10.1 State prospective grain 10.2 Describe the economic importance prospective grain 10.3 List the production technologies for pearl millet, foxtail millet, proso millet and barley 10.4 Illustrate production technology of pearl millet 10.5 Illustrate production technology of foxtail millet 10.6 Describe production technology of proso millet 10.7 Illustrate production technology of barley	5	4
11	Fodder crops 11.1 State fodder crops 11.2 Describe the economic importance fodder crops 11.3 List the production technologies for Napier grass, Para grass, Sudan grass, Cowpea, Sorghum and Maize 11.4 Illustrate production technology of Napier grass 11.5 Illustrate production technology of Para grass 11.6 Illustrate production technology of Sudan grass 11.7 Describe production technology of Cow pea 11.8 Illustrate production technology of Sorghum 11.9 Illustrate production technology of Maize	6	6
12.	Green manuring 12.1 Define green manure 12.2 Describe the importance of green manure in agriculture 12.3 List the production technologies for Dhaincha, cow pea and sun hemp 12.4 Illustrate production technology of Dhaincha 12.5 Describe production technology of cow pea 12.6 Illustrate production technology of sun hemp	3	5
Total		48	90

DETAILED SYLLABUS (PRACTICAL)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	Observe the growing stages of Paddy 1.1 Select the paddy field 1.2 Collect calendar, highlighter pen, measuring tape/scale 1.3 Maintain the record of the performed job	1	2
2	Practice line, logo and perching method in Paddy field 2.1 Select the paddy field 2.2 Demonstrate the line, logo and perching 2.3 Maintain safety precautions 2.4 Maintain the record of the performed job	2	3
3	Practice ratooning in paddy field 3.1 Select the paddy field 3.2 Demonstrate the ratooning in paddy 3.3 Maintain the record of the performed job.	1	2
4	Demonstrate land preparation, sowing, thinning, fertilizer application, irrigation practice in jute 4.1 Select the land 4.2 Collect jute seed, power tiller, fertilizer, hoe, harrow and irrigation pipe 4.3 Maintain safety precautions 4.4 Maintain the record of the performed job	2	3
5	Exercise ribbon retting of jute 5.1 Select the stem mature jute plant 5.2 Collect fiber extractor, water tank, bamboo and rope. 5.3 Demonstrate the procedure of ribbon retting 5.4 Maintain safety precautions 5.5 Maintain the record of the performed job	2	3
6	Practice conventional jute retting process 6.1 Select the fully mature jute field and water reservoir for retting of jute 6.2 Collect jute reaper and rope for binding 6.3 Demonstrate the procedure 6.4 Maintain safety precautions 6.5 Maintain the record of the performed job	2	3
7	Cultivate Dhaincha as a green manure 7.1 Select the field 7.2 Collect Dhaincha seed, power tiller, irrigation pipe 7.3 Demonstrate the procedure of green manuring 7.4 Maintain safety precautions 7.5 Maintain the record of the performed job	2	3
8	Identify different types of tea 8.1 Collect black tea, green tea, oolong tea, white tea, herbal tea, yellow tea and red tea 8.2 Identify black tea, green tea, oolong tea, white tea, herbal tea, yellow tea and red tea 8.3 Maintain the record of the performed job	2	3

9	Identify leaf of napier grass, sudan grass, maize grass and sorghum 9.1 Collect Napier grass, Para grass Sudan grass, Maize Grass, sorghum 9.2 Identify Napier grass, Para grass, Sudan grass, Maize Grass, sorghum 9.3 Maintain the record of the performed job	2	3
Total		16	25

NECESSARY RESOURCES (TOOLS, EQUIPMENT'S AND MACHINERY):

SI	Item Name	Quantity
01	Calendar, highlighter pen and small measuring tape/scale	As per requirement
02	Measuring tape, perching stick	As per requirement
03	Fertilizer, Rice weeder, Japanese rice weeder, hoe, hand hoe and spade	As per requirement
04	Jute seed, power tiller, fertilizer, hoe, harrow and irrigation pipe	As per requirement
05	Jute fiber extractor, water tank, bamboo and rope	As per requirement
06	Jute reaper, rope and urea fertilizer	As per requirement
07	Dhaincha seed, power tiller and irrigation pipe	As per requirement
08	Black tea, green tea, oolong tea, white tea, herbal tea, yellow tea and red tea	As per requirement
09	Napier grass, Para grass, Sudan grass, Maize Grass and sorghum leaf	As per requirement

RECOMMENDED BOOKS:

SI	Book Name	Writer Name	Publisher Name and Edition
01	Food grains and cash crops of Bangladesh	Md. Abdul Quddus	Bangla Academy, Dhaka.
02	Fundamentals of Agriculture	Md. Abdul Quddus and Md. Nazramnal Islam Talukder	Bangla Academy, Dhaka.
03	Agriculture Depsnama in Distance Education, Grain Conservation-1	Dewan Hossain Ahmed, Md. Mosharraf Hossain and Md. Matiar Rahman	Training Wing, Department of Agricultural Extension, Khamarbari, Dhaka-1215.
04	Agriculture Diploma in Distance Education, Agricultural Theory-1	Asiul Islam and Md. Anwarmnal Haque	Training Wing, Department of Agricultural Extension, Khamarbari, Dhaka.

WEBSITE REFERENCES:

SI	Web Link	Remarks
01	www.youtube.com	Search here with topics
02	www.google.com	Search here with topics

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SUBJECT CODE	SUBJECT NAME	PERIOD PER WEEK		CREDIT
		T	P	C
22332	Agricultural Economics (কৃষি অর্থনীতি)	2	3	3

Rationale	Agricultural economics is an applied field of economics concerned with the application of economic principles in optimizing the production and distribution of agricultural products. It focused on maximizing farm profit with optimum production and resource allocation. A good understanding in agricultural economics will enhance one's knowledge on establishing linkage between agricultural production and market to ensure food security. Besides, one will be capable to develop an efficient farm business model which could contribute to maximizing farm profit as well as sustainable agricultural development. Agricultural economics also influences the formulation of different policies in a country such as food policy, agricultural policy, and environmental policy.
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. State economics and agricultural economics (Ch:01) 2. State concepts of economics (Ch: 02) 3. State demand, supply and law of production (Ch:03) 4. Discuss market structure (Ch:04) 5. Describe agricultural marketing (Ch:05) 6. Describe agricultural finance (Ch:06) 7. Describe land management (Ch:07) 8. Illustrate agricultural farm and industry (Ch:08) 9. Describe the importance of agriculture on the economy of Bangladesh (Ch:09) 10. Describe globalization and agricultural policy (Ch:10)
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to</p> <ul style="list-style-type: none"> • Exercise law of demand, supply and production curve (Practical: 1) • Exercise the demand and supply equilibrium curve (Practical: 2) • Practice diminishing law of marginal utility curve (Practical: 3) • Exercise price determination in the perfect and imperfect market (Practical: 4). • Visit an agricultural product market and submit a report on it (Practical: 5). • Exercise application for agricultural credit (Practical: 6). • Calculate the income and expenditure of farm (Practical: 7). • Exercise productivity of a subsistence and commercial farm (Practical: 8). • Practice effect of land tenure system in agriculture (Practical: 9). • Identify the goals related to agriculture in SDGs (Practical: 10).

DETAILED SYLLABUS (THEORY)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	<p>Economics and Agricultural Economics</p> <ol style="list-style-type: none"> 1.1 Define economics and agricultural economics 1.2 Discuss the scope of economics and importance of agricultural economics 1.3 Differentiate between economics and agricultural economics 1.4 State the relationship between economics and agricultural economics 1.5 List the features of agriculture in Bangladesh 1.6 Describe the effects of climate change in agricultural economics 1.7 List the problems and solutions of agriculture in Bangladesh 1.8 Describe the prospects of agriculture in Bangladesh 	2	4

2	<p>Basic Concepts of Economics</p> <p>2.1 Define goods, wants, utility and wealth 2.2 Classify goods, wants, utility and wealth 2.3 Mention the characteristics of goods, wants, utility and wealth 2.4 Define value and price 2.5 Differentiate among exchange value, use value, and price with value 2.6 Define income, consumption, savings, wages, salary, welfare, organization, capital and investment 2.7. Discuss the classification of income 2.8 Describe the relationship between savings and investment 2.9. Differentiate between capital and investment 2.10 Discuss opportunity cost and the uses of opportunity cost</p>	4	8
3	<p>Demand, Supply and Laws of Production</p> <p>3.1 Define demand and law of demand 3.2 Analyze nature of demand curve towards to the right 3.3 Discuss classification of elasticity of demand and factors influencing demand 3.4 Define supply and law of supply 3.5 Illustrate elasticity of supply and factors influencing supply 3.6 Explain equilibrium of demand and supply 3.7 List the features of supply of agricultural products 3.8 Describe application and limitation of demand and supply in agriculture 3.9 Discuss production and factors of production 3.10 Explain the law of diminishing return and its application in agriculture</p>	5	10
4	<p>Market Structure</p> <p>4.1 Define market and discuss its classification 4.2 Describe preconditions and features of perfect market competition 4.3 Describe preconditions, and features of imperfect market competition 4.4 Compare between perfect market competition and imperfect market competition 4.5 List characteristics, advantages, and disadvantages of monopoly market 4.6 List characteristics, advantages, and disadvantages of oligopoly market 4.7 List characteristics, advantages, and disadvantages of duopoly market 4.8 Compare between monopoly and perfect market competition 4.9 Illustrate techniques of price stabilization of agricultural commodities</p>	3	5
5	<p>Agricultural Marketing</p> <p>5.1 Define agricultural marketing 5.2 Discuss functions of agricultural marketing 5.3 Describe marketing system of different inputs and outputs in agriculture 5.4 Define middleman and discuss importance and limitations of middleman in agricultural marketing 5.5 Explain supply chains of different agricultural commodities 5.6 Discuss agricultural products' collection point, price forecasting, marketed surplus and marketable surplus 5.7 Explain price determination of agricultural products 5.8 Define salesmanship and list qualities of an ideal salesman 5.9 Discuss digital marketing and its potential in agriculture</p>	3	5

6	Agricultural Finance 6.1 Define money and discuss the function of money 6.2 List the quality and classification of good money 6.3 Define bank and discuss classification of banks 6.4 Explain the function of central bank, commercial bank and specialized bank 6.5 Describe the procedure of opening a bank account 6.6 Explain source, structure and types of agricultural credit in Bangladesh 6.7 Discuss the lending procedure of Bangladesh Krishi Bank(BKB) for agricultural credit 6.8 List the problems faced by farmer for getting agricultural credit and discuss potential solutions. 6.9 Explain role of banking system for the development of agriculture	4	6
7	Land Management 7.1 Define land resources 7.2. Discuss land tenure system in Bangladesh 7.3 Discuss the importance of land resources and tenure system 7.4 List classification of farmer according to land ownership and land size 7.5 Mention land reform law of 1972 and 1984 7.6 List classification of land share cropping system 7.7 Discuss advantages and disadvantages of land share cropping system	2	4
8	Agricultural Farm and Industry 8.1 Define farm and Industry. 8.2 Distinguish between farm and industry. 8.3 Mention the classification, advantages and disadvantages of a farm. 8.4 Illustrate principles of farm management. 8.5 Explain business plan and its elements. 8.6 Define farm budgeting and list its classification. 8.7 Define enterprise costing, gross margin, accounts keeping, marginal revenue, total revenue, total cost, marginal cost 8.8 Illustrate procedures of estimating income and expenditure of farm business. 8.9 List agricultural product processing industries in Bangladesh 8.10 Discuss role of agricultural industries in Bangladesh economy	3	6
9	Importance of agriculture on the economy of Bangladesh 9.1 Discuss basic concepts of national income 9.2 Describe characteristics of GDP, GNP, NNP, disposable income 9.3 Describe role of agriculture on national income and economic development 9.4 Discuss balance budget, surplus budget and deficit budget 9.5 Explain causes of low productivity of Bangladesh 9.6 Discuss ways of increasing productivity in agriculture in Bangladesh	3	6
10.	Globalization and agricultural policy 10.1 Define globalization in aspects of agriculture 10.2 Describe impacts of globalization in crop production 10.3 Define International trade and discuss role of it 10.4 Define free trade, protectionism, tariff, producer subsidy, export subsidy, import quota, exchange rate, terms of trade and trade blocks 10.5 Discuss agreement on agriculture and lessons for developing countries. 10.6 Discuss the role of IMF, World Bank, IDA, IFC, ADB, FAO and WTO in agriculture 10.7 Illustrate National Agriculture Policy, National Seed Policy, National Fertilizer Policy and Credit Policy 10.8 Discuss role of agriculture in SDGs	3	6
Total		32	60

DETAILED SYLLABUS (PRACTICAL)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	EXERCISE LAW OF DEMAND , SUPPLY AND PRODUCTION CURVE 1.1 Collect graph paper, pen, pencil, scale and calculator 1.2 Practice the demand, supply and production curve on graph paper 1.3 Maintain the record of performed job.	2	3
2	EXERCISE THE DEMAND AND SUPPLY EQUILIBRIUM CURVE 2.1 Collect graph paper, pen, pencil, scale and calculator 2.2 Practice the demand and supply equilibrium on graph paper 2.3 Maintain the record of performed job.	1	3
3	PRACTICE DIMINISHING LAW OF MARGINAL UTILITY CURVE 3.1 Collect graph paper, pen, pencil, scale and calculator 3.2 Practice the diminishing law of marginal utility curve on graph paper 3.3 Maintain the record of performed job	2	3
4	EXERCISE ON THE IDENTIFICATION OF SUPPLY CHAIN OF CROPS, VEGETABLE, AND FRUITS 4.1 Collect paper, pen, and calculator 4.2 Collect statistical data 4.3 Practice the drawing of supply chain of crops, vegetable, and fruits on graph paper 4.4 Maintain the record of performed job	2	2
5	VISIT A AGRICULTURAL PRODUCT MARKET AND SUBMIT A REPORT ON IT 5.1 Explore the different resources 5.2 Identify various types of actors 5.3 Prepare a report on it 5.4 Maintain the record of performed job	2	2
6	EXERCISE APPLICATION FOR AGRICULTURAL CREDIT 6.1 Collect necessary documents 6.2 Apply the procedure of loan application 6.3 Maintain the record of performed job	1	3
7	CALCULATE THE INCOME AND EXPENDITURE OF FIRM 7.1 Collect paper, pen, and calculator 7.2 Practice the balance sheet of a farm 7.3 Maintain the record of performed job	1	2
8	EXERCISE PRODUCTIVITY OF A SUBSISTENCE FARM AND A COMMERCIAL FIRM 8.1 Collect paper, pen, and calculator 8.2 Collect necessary data 8.3 Practice productivity of a subsistence firm and a commercial firm 8.4 Maintain the record of performed job	2	2
9	PRACTICE EFFECT OF LAND TENURE SYSTEM IN AGRICULTURE 9.1 Collect paper, pen, and calculator 9.2 Collect necessary data 9.3 Practice effect of land tenure system in agriculture 9.4 Maintain the record of performed job	2	2

10	IDENTIFY THE GOALS RELATED TO AGRICULTURE IN SDGs 10.1 Collect necessary information 10.2 Identify the SDG's goals related to agriculture in Bangladesh 10.3 Maintain the record of performed job	1	3
Total		16	25

NECESSARY RESOURCES (TOOLS, EQUIPMENT'S AND MACHINERY):

SI	Item Name	Quantity
01	Graph paper, pen, pencil, scale and calculator	As per requirement
02	Graph paper, pen, pencil, scale and calculator	As per requirement
03	Graph paper, pen, pencil, scale and calculator	As per requirement
04	paper, pen, and calculator	As per requirement
05	Necessary information	As per requirement
06	Necessary information	As per requirement
07	Paper, pen, and calculator	As per requirement
08	Paper, pen, and calculator	As per requirement
09	Paper, pen, and calculator	As per requirement
10	Information chart	As per requirement

RECOMMENDED BOOKS:

SI	Book Name	Writer Name	Publisher Name & Edition
01	Agricultural Economics	Prof. Dr. Md Abdus Satter Mondal and Prof. Dr. Shamsul Alam Mohon	
02	Micro and Macro Economics	Akmol Mahmud	
03	Principal of Economics	Sukesh Chandra Joarder	
04	Micro Economics and Macro Economics	MonotoshChakrabarty	
05	Text Book on Economics for Class XI and XII		

WEBSITE REFERENCES:

SI	Web Link	Remarks
01	www.youtube.com	Search here with topics
02	www.google.com	Search here with topics

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3. Jasmin Akter, Instructor, ATI, Sher-e-Bangla Nagar, Dhaka.
4. Shah Golam Azam, Instructor, Momenshahi Agricultural education & Training Institute, Mymensing
5. Engr. Md. Shakhawat Hasan, Deputy Inspector (Diploma), BTEB, Dhaka.

SUBJECT CODE	SUBJECT NAME	PERIOD PER WEEK		CREDIT
		T	P	C
22333	Soil Science-1 (মৃত্তিকা বিজ্ঞান-১)	2	3	3

Rationale	Soil science is a very important discipline of agricultural science. This course is designed to provide students knowledge on concept of soil, its formation, physical, chemical properties, soil classification, soil water, soil microorganisms, soil conservation and the mechanisms that regulate the plant nutrients availability and uptake by crops. This course will develop students' knowledge & analytical skills. Students can solve various soil related agricultural problems by applying latest technologies.
Learning Outcomes (Theoretical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. Describe fundamental concepts of soil, branches of soil science and major components of soil (Ch:1) 2. Explain rocks and minerals, soil forming factors, soil profile and processes for soil formation (Ch:2) 3. Illustrate physical properties of soil and their impacts on soil fertility and productivity (Ch: 3) 4. Explain soil reaction, liming and their effect on plant nutrition (Ch: 4) 5. Describe soil water, air, temperature and their impact in agriculture (Ch: 5, 7) 6. Show different types of soil classification, erosion and conservation (Ch: 6, 8) 7. Explain sources and availability of essential plant nutrient elements (Ch: 9) 8. Describe soil microorganisms and BNF on soil fertility and crop productivity (Ch:10)
Learning Outcomes (Practical)	<p>After undergoing the subject, students will be able to</p> <ul style="list-style-type: none"> • Collect and prepare soil and water samples for analysis (Expt. 1) • Determine soil pH, texture, bulk density and consistency (Expt. 3,6,7) • Identify soil color, fertilizer, manure and nodules of leguminous plant (Expt. 2,5,8) • Determine soil moisture by using gravimetric method (Expt. 9,10) • Demonstrate master horizons of soil profile (Expt. 4)

DETAILED SYLLABUS (THEORY)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	<p>Concept of Soil</p> <ol style="list-style-type: none"> 1.1 Define soil 1.2 Describe scope of soil science 1.3 State the branches of soil science 1.4 Illustrate the major components of soil 	2	4
2	<p>Soil Genesis</p> <ol style="list-style-type: none"> 2.1 Define rock and mineral 2.2 Mention the name of soil forming minerals 2.3 Describe properties of soil forming minerals 2.4 Enumerate different types of rocks 2.5 Explain the properties of different types of rocks 2.6 Discuss weathering processes of rocks and minerals 2.7 Describe different soil forming factors and processes 2.8 Draw and label an ideal soil profile 	4	8

3	Physical Properties of Soil 3.1 Define soil particles 3.2 Classify soil particles 3.3 Narrate different soil textural classes and properties 3.4 Define soil structure 3.5 Describe causes of soil structure formation 3.6 Describe soil structural types and grades 3.7 Discuss particle density, bulk density and porosity 3.8 Define soil color 3.9 Explain the causes of soil color 3.10 Describe soil consistency and plough pan formation	4	8
4	Chemical Properties of Soil 4.1 Define soil pH 4.2 Mention grading of soils according to pH values 4.3 Describe causes of soil acidity and alkalinity 4.4 Mention suitable pH range for major crops 4.5 Discuss buffering capacity of soil 4.6 List liming materials 4.7 Describe the effects of lime for improving soil properties	4	6
5	Soil Air and Soil Temperature 5.1 Discuss the importance of soil temperature 5.2 Describe factors affecting soil temperature 5.3 Illustrate soil temperature management processes in the crop field 5.4 Mention the composition of soil air 5.5 Explain factors affecting soil air and its importance	2	4
6	Soil Classification 6.1 Describe systems of Bangladesh soil classification 6.2 Explain classification of soil taxonomy 6.3 Write down the equivalents of Bangladesh soils according to USDA soil taxonomy 6.4 Explain the physical and chemical properties of floodplain, terrace and hill soils 6.5 Describe general soil types of Bangladesh	3	4
7	Soil Water 7.1 Classify soil water 7.2 Describe classes and importance of soil water 7.3 Draw and label soil water cycle 7.4 Explain factors affecting soil water retention 7.5 Describe the processes of soil water movement 7.6 Define soil water potential	3	6
8	Soil Erosion and Conservation 8.1 Define soil erosion 8.2 Describe different types of soil erosion 8.3 Mention universal soil loss equation 8.4 Discuss soil conservation 8.5 Enumerate the purposes of soil conservation 8.6 Explain the techniques of soil conservation	3	6

9	Soil Fertility Management 9.1 Mention essential plant nutrient elements 9.2 Mention the criteria, sources and available forms of essential plant nutrient 9.3 Describe sources, mineralization, immobilization and denitrification of N 9.4 Write down the strategies for reducing nitrogen losses from soil 9.5 Explain the sources of P, K & S in soil 9.6 Explain the fixation of P and K in soil 9.7 Enumerate the sources, oxidation-reduction processes of S in soil 9.8 Mention the sources of zinc and boron in soil 9.9 Illustrate the factors affecting availability of zinc and boron in soil	4	8
10	Soil Microorganisms 10.1. Show the occurrence of microorganisms in soil 10.2 Classify soil microorganisms 10.3 Narrate the functions of soil microorganisms in soil 10.4 Describe symbiotic and non-symbiotic nitrogen fixation 10.5 Illustrate Legume- Rhizobium symbiosis and Azolla -Anabaena symbiosis 10.6 Name different types of bio-fertilizer 10.7 Describe the role of bio-fertilizer in soil fertility improvement	3	6
Total		32	60

DETAILED SYLLABUS (PRACTICAL)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	Collect and preserve soil and water samples 1.1 Collect soil and water samples for analysis 1.2 Prepare soil and water samples for analysis 1.3 Preserve soil and water samples for subsequent analysis 1.4 Record the information's on collected water and soil samples 1.5 Maintain the record of performed task	2	2.5
2	Examine nodule in leguminous crop 2.1 Identify leguminous crop nodule 2.2 Examine leguminous crop nodules by considering different characteristics 2.3 Demonstrate methods of nodule collection and identification 2.4 Maintain the record of performed task	1	2.5
3	Determine soil and water pH 3.1 Demonstrate the methodology of pH determination 3.2 Determine soil and water pH 3.3 Apply soil pH value in crop management 3.4 Maintain the record of performed task	1	2.5
4	Study of soil profile 4.1 Draw and level an ideal soil profile 4.2 Demonstrate master horizons of soil profile in the field 4.3 Examine physical and chemical properties of soils of master horizons 4.4 Maintain the record of performed task	2	2.5
5	Determine soil color by Munsell's color chart 5.1 Demonstrate the method of soil color determination 5.2 Determine soil colors using Munsell's color chart 5.3 Apply soil color information in soil classification 5.4 Maintain the record of performed task	2	2.5

6	Determine bulk density of soil 6.1 Determine bulk density of soil 6.2 Apply bulk density value in crop production 6.3 Interpret the data of bulk density 6.4 Maintain the record of performed task	2	2.5
7	Determine soil consistency and soil texture 7.1 Assess soil texture in the field by finger feel method 7.2 Demonstrate the process of soil texture determination 7.3 Determine the soil consistency 7.4 Maintain the record of performed task	2	2.5
8	Identify fertilizer, manure and biofertilizer 8.1 Identify different fertilizers, manure and biofertilizer 8.2 Apply fertilizers, manure and biofertilizer in crop production 8.3 Maintain the record of performed task	2	2.5
9	Determine of soil moisture by gravimetric method 9.1 Determine soil moisture by gravimetric method 9.2 Calculate volume basis soil moisture content by using bulk density of soil 9.3 Maintain the record of performed task	1	2.5
10	Determine soil moisture at field capacity condition 10.1 Demonstrate soil moisture condition in crop field at field capacity level 10.2 Determine soil moisture by gravimetric method 10.3 Maintain the record of performed task	1	2.5
Total		16	25

NECESSARY RESOURCES (TOOLS, EQUIPMENT'S AND MACHINERY):

Sl	Item Name	Quantity
01	Auger, spade, mortar and pestle, sieve, core sampler, hammer, measuring tape, Petridis, Munsell's color chart, glass electrode pH meter, aluminum dish, electric oven, weighing balance, Apron. Gumboot, Hand gloves.	

Required Chemicals:

Sl	Item Name (Consumables Materials)	Quantity
01	Hydrochloric acid, fertilizers, manure and bio-fertilizer.	

RECOMMENDED BOOKS:

Sl	Book Name	Writer Name	Publisher Name & Edition
01	The nature and properties of soils	Nyle C. Brady Ray R. Weil	Pearson publications Sixteenth Edition
02	Introductory Soil Science	Dilip Kumar Das	Kalyani Publishers Fourth Edition
03	Adhunik Mrittika Biggan	Prof. Dr.Md. Sadrul Amin	Mowla Brothers

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SUBJECT CODE	SUBJECT NAME	PERIOD PER WEEK		CREDIT
22334	Cultivation of Vegetables (সবজী চাষ)	T	P	C
		3	3	4

Rationale	Vegetable production is a part of horticulture that deals with growing, storing, processing, and marketing vegetables. It includes cultivar selection, seedbed preparation, seed sowing and transplanted vegetable crop. It also encompasses vegetable crop management and care, as well as traditional and non-traditional vegetable crop cultivation. Thus, this course is designed to provide concepts of traditional and nontraditional vegetable cultivation.
Learning Outcome (Theoretical)	<p>After undergoing the subject students will be able to</p> <ul style="list-style-type: none"> Explain the value, classification and production system of vegetables Describe the seedbed selection, preparation, and sterilization operations Illustrate the fundamental elements of vegetable crop cultivation Outline the production techniques of brinjal, tomato, chili, and potato Describe the production technology of Cole crops Explain the technologies used to grow carrots, radish, and turnips Describe the production technology of cucurbits Comprehend the technology of beans and okra production Describe the procedure for growing leafy vegetables. Illustrate the production systems of summer tomato, mushrooms, zucchini, lettuce and capsicum Comprehend taro production techniques. State the procedures used in the production of vegetable seeds.
Learning Outcome (Practical)	<p>After undergoing the subject students will be able to</p> <ul style="list-style-type: none"> Identify and categorize veggies based on the season Create a vegetable seed album Practice seedbed preparation, sterilization, seed sowing, seedling care and plantation techniques Perform harvest, store, and process of brinjal and tomato seeds Apply the traditional methods for potato storage Determine the seed rate for vegetable production Apply fertilizers in the vegetable fields Create a homestead vegetable garden using BARI-invented techniques Practice the different vegetative propagation techniques Demonstrate the strategies for growing a seasonal vegetable Practice the hand pollination technique for vegetable cultivation

DETAILED SYLLABUS (THEORY)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	<p>Introduction to Vegetable Crops</p> <p>1.1 Describe branches of Horticulture.</p> <p>1.2 Classify vegetable crops.</p> <p>1.3 Narrate the morphology and nomenclature of vegetable crops.</p> <p>1.4 List the traditional and non-traditional vegetables in Bangladesh.</p> <p>1.5 Discuss the present status of vegetable production in Bangladesh.</p>	3	6

2	<p>Production and Economic Importance of Vegetable</p> <p>2.1 Describe the scope and importance of vegetable crops</p> <p>2.2 Illustrate the role of vegetables in food and nutrition</p> <p>2.3 Mention the problems and solution of vegetable production in Bangladesh</p> <p>2.4 State the medicinal value of vegetable crops</p>	4	5
3	<p>Vegetable Seedling Production</p> <p>3.1 Define seed bed.</p> <p>3.2 Mention the types of seed bed for vegetable production.</p> <p>3.3 Describe site selection, seed bed preparation and sterilization of vegetable seed production</p> <p>3.4 Describe seed purity, germination (%) and calculate the seed rate for vegetable cultivation</p> <p>3.5 State the seed sowing, care of seedling and hardening of seedling</p> <p>3.6 State the characteristics of good seedlings</p> <p>3.7 Describe the techniques of seedling uprooting and transplanting</p> <p>3.8 Describe the vegetative propagation of vegetable</p>	4	7
4	<p>Vegetable Cultivation</p> <p>4.1 Mention the site selection criteria for vegetable cultivation</p> <p>4.2 Mention the techniques of land preparation for vegetable cultivation</p> <p>4.3 Describe fertilizer management for vegetable cultivation</p> <p>4.4 Describe irrigation and drainage systems for vegetable cultivation</p> <p>4.5 State the intercultural operation in vegetable</p> <p>4.6 Define vegetable crop rotation</p> <p>4.7 Describe intercropping cultivation system</p> <p>4.8 Describe harvesting, sorting, grading, packaging, processing and marketing system of vegetable</p>	3	7
5	<p>Brinjal, Tomato, Chili and Potato cultivation</p> <p>5.1 Describe the suitable climate and soil for brinjal, chili, potato and tomato cultivation</p> <p>5.2 Mention the suitable cultivars and appropriate cultivation season for brinjal, chili, potato and tomato cultivation</p> <p>5.3 Describe the land preparation and fertilizer application procedure for brinjal, chili, potato and tomato cultivation</p> <p>5.4 State the seed sowing or transplanting and intercultural operations for brinjal, chili, potato and tomato cultivation</p> <p>5.5 Illustrate the irrigation and drainage system for brinjal, chili, potato and tomato cultivation</p> <p>5.6 Describe the harvesting, postharvest management, marketing and storage of selected for brinjal, chili, potato and tomato cultivation</p>	4	7
6	<p>Cauliflower, Cabbage, Broccoli and Kohlrabi Cultivation</p> <p>6.1 Describe the suitable climate and soil for cauliflower, cabbage, broccoli and kohlrabi cultivation</p> <p>6.2 Mention the suitable cultivars and appropriate cultivation season for cauliflower, cabbage, broccoli and kohlrabi cultivation</p> <p>6.3 Describe the land preparation and fertilizer application procedure for cauliflower, cabbage, broccoli and kohlrabi cultivation</p> <p>6.4 State the seed sowing or transplanting and intercultural operations for cauliflower, cabbage, broccoli and kohlrabi cultivation</p> <p>6.5 Illustrate the irrigation and drainage system for cauliflower, cabbage, broccoli and kohlrabi cultivation</p> <p>6.6 Describe the maturity indices of Cole crops for cauliflower, cabbage, broccoli</p>	3	7

	and kohlrabi cultivation 6.7 Describe the harvesting procedure and postharvest management of cauliflower, cabbage, broccoli and kohlrabi cultivation		
7	Radish, Carrot and Turnip Cultivation 7.1 Describe the suitable climate and soil for radish, carrot and turnip cultivation 7.2 Mention the suitable cultivars and appropriate cultivation season for radish, carrot and turnip cultivation 7.3 Describe the land preparation and fertilizer application procedure for radish, carrot and turnip cultivation 7.4 State the seed sowing and intercultural operations for radish, carrot and turnip cultivation 7.5 Illustrate the irrigation and drainage system for radish, carrot and turnip cultivation 7.6 Describe the harvesting and postharvest management for radish, carrot and turnip cultivation	3	6
8	Cucurbits (Monoecious) Vegetable Cultivation (Bottle gourd, Sweet gourd, Bitter gourd, Cucumber, Ridge gourd, and Snake gourd) 8.1 Describe the suitable climate and soil for Bottle gourd, Sweet gourd, Bitter gourd, Cucumber, Ridge gourd, and Snake gourd 8.2 Mention the suitable cultivars and appropriate cultivation season for Bottle gourd, Sweet gourd, Bitter gourd, Cucumber, Ridge gourd, and Snake gourd 8.3 Describe the pit preparation and fertilizer application for Bottle gourd, Sweet gourd, Bitter gourd, Cucumber, Ridge gourd, and Snake gourd 8.4 State the seed sowing or transplanting and intercultural operations 8.5 Describe the application of Integrated Pest Management (IPM) for control pest and diseases for Bottle gourd, Sweet gourd, Bitter gourd, Cucumber, Ridge gourd, and Snake gourd 8.6 Illustrate the irrigation and drainage system for Bottle gourd, Sweet gourd, Bitter gourd, Cucumber, Ridge gourd, and Snake gourd 8.7 Describe the harvesting and postharvest management for Bottle gourd, Sweet gourd, Bitter gourd, Cucumber, Ridge gourd, and Snake gourd	5	7
9	Cucurbits (Dioecious) Vegetable Cultivation (Pointed gourd and Teasel gourd) 9.1 Describe the suitable climate and soil for pointed gourd and teasel gourd cultivation 9.2 Mention the suitable cultivars and appropriate cultivation season for pointed gourd and teasel gourd cultivation 9.3 Describe the pit preparation and fertilizer application for pointed gourd and teasel gourd 9.4 State the seed/tuber sowing and intercultural operations for pointed gourd and teasel gourd cultivation 9.5 Describe the application of Integrated Pest Management (IPM) for control pest and diseases of for pointed gourd and teasel gourd 9.6 Describe the hand pollination practices 9.7 Illustrate the irrigation and drainage system for pointed gourd and teasel gourd 9.8 Describe the harvesting method and postharvest management for pointed gourd and teasel gourd	2	5
10	Beans (Country bean and Long yard bean) and Okra cultivation 10.1 Describe the suitable climate and soil for country bean and long yard bean and okra cultivation 10.2 Mention the suitable cultivars and appropriate cultivation season for country bean and long yard bean and okra cultivation	3	6

	<p>10.3 Describe the pit/bed preparation and fertilizer application for country bean and long yard bean and okra cultivation</p> <p>10.4 State the seed sowing or transplanting and intercultural operations for country bean and long yard bean and okra cultivation</p> <p>10.5 Illustrate the irrigation and drainage system for country bean and long yard bean and okra</p> <p>10.6 Describe the harvesting, and postharvest management for country bean and long yard bean and okra</p>		
11	<p>Green amaranth, Red amaranth, Indian spinach, Bengali spinach and Kangkong cultivation</p> <p>11.1 Describe the suitable climate and soil for Green amaranth, Red amaranth, Indian spinach, Spinach and Kangkong cultivation</p> <p>11.2. Mention the suitable cultivars and appropriate cultivation season for Green amaranth, Red amaranth, Indian spinach, Spinach and Kangkong cultivation</p> <p>11.3 Describe the land preparation and fertilizer application for Green amaranth, Red amaranth, Indian spinach, Spinach and Kangkong</p> <p>11.4 State the seed sowing and intercultural operations for Green amaranth, Red amaranth, Indian spinach, Spinach and Kangkong</p> <p>11.5 Illustrate the irrigation and drainage system for Green amaranth, Red amaranth, Indian spinach, Spinach and Kangkong</p> <p>11.6 Describe the harvesting, and postharvest management for Green amaranth, Red amaranth, Indian spinach, Spinach and Kangkong</p>	3	6
12	<p>Capsicum, Lettuce, Squash (Zucchini) and Summer tomato cultivation</p> <p>12.1 Describe the suitable climate and soil for Capsicum, Lettuce, Squash (Zucchini) and Summer tomato cultivation</p> <p>12.2 Mention the suitable cultivars and appropriate cultivation season for Capsicum, Lettuce, Squash (Zucchini) and Summer tomato</p> <p>12.3 Describe the land preparation and fertilizer application for Capsicum, Lettuce, Squash (Zucchini) and summer tomato cultivation</p> <p>12.4 State the seed sowing/transplanting and intercultural operations for Capsicum, Lettuce, Squash (Zucchini) and summer tomato cultivation</p> <p>12.5 Illustrate the irrigation and drainage system for Capsicum, Lettuce, Squash (Zucchini) and Summer tomato</p> <p>12.6 Describe the harvesting, and postharvest management for Capsicum, Lettuce, Squash (Zucchini) and Summer tomato</p>	3	6
13	<p>Taro Cultivation</p> <p>13.1 Describe the variety, nomenclature, morphology and classification of Taro</p> <p>13.2 Describe the suitable climate and soil for Taro cultivation</p> <p>13.3 Mention the suitable cultivars and appropriate cultivation season for Taro</p> <p>13.4 Describe the land preparation and fertilizer application for Taro cultivation</p> <p>13.5 State the Seed (corn) sowing and intercultural operations for Taro cultivation</p> <p>13.6 Illustrate the irrigation and drainage system for Taro cultivation</p> <p>13.7 Describe the harvesting, and postharvest management for Taro</p>	2	5
14	<p>Mushroom Cultivation</p> <p>14.1 Define mushroom farming and cultivation</p> <p>14.2 Describe the nutritional benefits of mushroom</p> <p>14.3 Mention the different types of mushroom farming</p> <p>14.4. Describe the compost preparation</p> <p>14.5 Describe the spawn preparation</p> <p>14.6 Describe the casing of mushroom</p>	3	5

	14.7 Mention the pinning of mushroom 14.8 State the intercultural operations of mushroom 14.9 Describe the mushroom harvesting, processing and marketing system.		
15	Vegetable Seed Production 15.1 Mention the present status, demand and supply of vegetable seed in Bangladesh 15.2. Explain the physiological and quality parameters of vegetable seeds 15.3. Illustrate the seed production technology of Cauliflower, Radish and Brinjal 15.4. State the vegetables seed collection procedure, processing and storage 15.5. Illustrate the seed policy and seed industries	3	5
	Total	48	90

DETAILED SYLLABUS (PRACTICAL)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	Make a vegetable seed album 1.1. Collect vegetable seeds 1.1 Make a seed album for identification purposes 1.2 Draw a vegetable calendar based on their season	2	2
2	Sterilize seedbed as well as main fields of vegetable crops 2.1 Practices of various sterilization techniques 2.2 Demonstrate the sterilized seed bed as well as main field 2.3 Draw and label the total procedure on note book.	1	2
3	Perform seedbed preparation of vegetable crops 3.1 Practice seed bed preparation 3.2 Draw and label an ideal seedbed 3.3 Demonstrate a vegetable seedbed 3.4 Draw and label the total procedure on note book.	2	3
4	Perform seed sowing and seedling transplanting techniques. 4.1 Practice different seed sowing techniques 4.2 Practice uprooting system of seedling 4.3 Practice different transplanting techniques for vegetable cultivation 4.4 Demonstrate the process in a vegetable field 4.2 Draw and label the total procedure on note book.	1	2
5	Perform Brinjal, Bottle gourd and Tomato seed collection 5.1 Practice the seed collection process of brinjal and tomato 5.2 Demonstrate the processes stated above 5.3 Draw and label the total procedure on note book.	3	3
6	Determine the seed rate for vegetable cultivation. 6.1 Calculate the seed rate in hector 6.2 Practices seed rate calculation on different land size 6.3 Write the calculation on practical notebook	1	3
7	Practice the application of fertilizer in the vegetable fields. 7.1 Practice the different fertilizer application techniques 7.2 Demonstrate the basal dose application during field preparation 7.3 Demonstrate top dressing of fertilizer on the basis of growth periods 7.4 Draw and label the different application techniques on note book	1	2
8	Make a homestead vegetable garden using BARI-invented techniques. 8.1 Draw 'Kalikapur model' and show the crops 8.2 Draw 'Goyeshpur model' and show the crops 8.3 Draw 'Attkopalia model' and show the crops	2	3

9	Practice the different vegetative propagation techniques 9.1 Visit a vegetable farm 9.2. Collect the sample on basis of roots, stems, leaves, bulbs, cutting, grafting, layering, crown division 9.3 Record the observation 9.4 Present the observation in a notebook.	1	2
10	Demonstrate the approaches for growing a seasonal vegetable. 10.1 Practice seed to seed cultivation of a vegetable crop 10.2 Keep record the observation 10.3 Present the observation in a notebook.	2	3
Total		16	25

NECESSARY RESOURCES (TOOLS, EQUIPMENT'S AND MACHINERY)

SI	Item Name	Quantity
1.	Seed, Art paper, color pen, pencil, Scotch tape, vegetable calendar etc.	As per need
2.	Suitable field, sterilizer, water, Spade, Polythene sheet etc.	As per need
3.	Suitable field, measuring tape, water, Spade, Ladder, wooden hammer etc.	As per need
4.	Seed, Seedling, measuring tape, water, Spade, Ladder, hoe etc.	As per need
5.	Ripe seed fruit of vegetable, Knife, water, butler, bowl, polythene sheet	As per need
6.	Paper, Pen, Calculator etc.	As per need
7.	Suitable crop field, Fertilizer dose rate, Fertilizer, bowl, hoe, watering cane etc.	As per need
8.	Paper, Pencil, Scale, Eraser etc.	As per need
9.	Budding knife, Rootstock, Scion, tape, thread, polythene sheet etc.	As per need
10.	Seed, Suitable field, spade, hoe, tape, wooden hammer, ladder, water, fertilizer, pesticides etc.	As per need

RECOMMENDED BOOKS:

SI	Book Name	Writer Name	Publisher Name and Edition
01	Fundamentals of Vegetable Production	M. K. Rana	New India Publishing Agency
02	Modern Technology in Vegetable Production	Pranab Hazra	New India Publishing Agency
03	<i>Principles of Vegetable Cultivation</i>	Liberty Hyde Bailey	Discovery Publishing House

WEBSITE REFERENCES:

SI	Web Link	Remarks
01	www.youtube.com	Search here with topics
02	www.google.com	Search here with topics
03	www.vegetables.com	Search here with topics

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SUBJECT CODE	SUBJECT NAME	PERIOD PER WEEK		CREDIT
22335	Agriculture Extension-I (কৃষি সম্প্রসারণ-১)	T	P	C
		2	3	3

Rationale	Agriculture extension plays a crucial role in boosting agricultural productivity, increasing food security, improving rural livelihoods, and promoting agriculture as an engine of pro-poor economic growth. Therefore, this course is designed to provide basic knowledge on objectives, principles, scopes and phases of agriculture extension, agriculture extension-related Government Organizations (GOs) and Non-Government Organizations (NGOs), the difference between extension education and general education, laws and theories of learning, pros and cons of various extension methods, teaching aids, group activities, motivation, and personality.
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. State the objectives and principles of agriculture extension 2. Describe agriculture extension-related organizations with functions 3. State the vision, mission, and activities of DAE 4. Compare extension education and general education 5. Narrate the laws and theories of learning 6. Classify the agriculture extension methods 7. Mention the advantages and limitations of different visual aids 8. List the advantages and limitations of Buzz Group and Brain Storming 9. Describe the motivation cycle 10. State the characteristics and elements of personality
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to</p> <ol style="list-style-type: none"> 1. Identify agriculture service provider organizations 2. Prepare a poster to draw the attention of the farmers 3. Apply the Flip Chart 4. Prepare charts and graphs 5. Prepare a leaflet based on the agricultural issue 6. Conduct interviews for data collection 7. Prepare and use the fortnight program 8. Demonstrate method and result regarding agricultural technology 9. Conduct group discussions related to agriculture 10. Prepare a training schedule

DETAILED SYLLABUS (THEORY)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	Concept of Agriculture Extension 1.1 Define agriculture extension 1.2 Describe the history of agriculture extension 1.3 State the objectives of agriculture extension 1.4 Mention the role of agriculture extension in agricultural development 1.5 Mention the principles of agriculture extension 1.6 Point out the scopes of agriculture extension 1.7 List the phases of agriculture extension	3	6
2	Organizations related to Agriculture Extension 2.1 List the government agricultural extension organizations involved in crop, livestock and fisheries 2.2 List the agriculture-related educational organizations 2.3 Mention the function of agriculture related educational organizations 2.4 Name the agriculture research organizations and their functions 2.5 Mention the name and function of agriculture input distribution organizations 2.6 Mention the name and functions of NGOs related to agricultural development	3	6
3	Department of Agricultural Extension (DAE) 3.1 Write down the vision and mission of DAE 3.2 State citizen charter of DAE 3.3 Mention organogram of DAE head office and list different wings 3.4 Mention organogram and functions of DAE at regional and district level 3.5 Mention organogram and functions of upazila agriculture office and union level	3	6
4	Education 4.1 Define education and learning 4.2 Compare education and learning 4.3 Classify education 4.4 Define general education 4.5 Differentiate between extension education and general education.	3	6
5	Learning Methods 5.1 State the objectives of learning 5.2 Mention the laws of learning 5.3 Interpret the theories of learning	3	6
6	Agriculture Extension Methods 6.1 Describe agriculture extension methods 6.2 Classify agriculture extension methods 6.3 Describe Personal Contact, Group Contact and Mass Media Contact 6.4 Point out the advantages and limitations of different extension methods	4	6
7	Teaching Aids 7.1 Define Teaching Aids 7.2 Describe various teaching aids 7.3 Explain the importance of different visual aids 7.4 Point out the advantages and limitations of different visual aids	3	6

8	Personal Meeting, Buzz Group and Brain Storming 8.1 Define interview schedule and checklist 8.2 Mention the uses of interview schedule and checklist 8.3 Narrate the method of buzz group and brain storming 8.4 Point out the advantages and limitations of buzz group and brain storming 8.5 Describe the procedure to prepare case study materials and conduction	4	6
9	Motivation 9.1 Define Motivation 9.2 Classify Motivation 9.3 Describe the motivational cycle with graphical presentations 9.4 List the features of motivation	3	6
10	Personality 10.1 Define Personality 10.2 Classify Personalities 10.3 Describe Characteristics of Personality 10.4 List the Elements of Personality	3	6
Total		32	60

DETAILED SYLLABUS (PRACTICAL)

Sl.	Experiment name with the procedure	Class (3 Period)	Continuous Marks
1	Visit Agriculture Service Provider Organizations 1.1 Identify agriculture service provider organizations 1.2. List the activities of agriculture service provider organizations 1.3 Maintain the record of performed task	2	2.5
2	Prepare and Practice Poster 2.1 Prepare Poster 2.2 Identify follow-up activities of poster presentation 2.3 Maintain the record of performed task	2	2.5
3	Practice Flip-Chart 3.1 Collect a Flip-Chart 3.2 Practice Flip Chart 3.3 Maintain the record of performed task	1	2.5
4	Prepare and present Charts and Graphs 4.1 Prepare Charts and Graphs 4.2 Present Charts and Graphs 4.3 Maintain the Record of Performed Task	2	2.5
5	Prepare Leaflet 5.1 Prepare a Leaflet 5.2 Maintain the Record of Performed Task	2	2.5
6	Perform Interview and Data Collection 6.1 Perform Interview 6.2 Identify Various Data Collection Instruments 6.3 Maintain the Record of Performed Task	2	2.5
7	Exercise on Fortnight Program Preparation 7.1 Prepare a Fortnight work schedule 7.2 Maintain the record of performed task	1	2.5

8	Conduct Method and Result Demonstration 8.1 Conduct method demonstration 8.2 Conduct result demonstration 8.3 Maintain the record of performed task	1	2.5
9	Practice Agricultural Group Discussion Conduction 9.1 Perform group discussion 9.2 Maintain the record of performed task	2	2.5
10	Prepare Training Schedule 10.1 Prepare a training schedule for farmers 10.2 Maintain the record of performed task	1	2.5
Total		16	25

NECESSARY RESOURCES (TOOLS AND EQUIPMENT'S)

SI	Item Name	Quantity
01	Chair-Table, White Paper, Color Paper, Art Paper, Graph paper, Poster paper, Pen, Pencil, Color pencil, Scale, Sharpener, Eraser, Zac pin.	As per need

Reference Books:

1. Anonymous, 1996, New Agricultural Extension Policy (NAEP) Ministry of Agriculture, Government of the Peoples' Republic of Bangladesh, Dhaka.
2. Anonymous, 1999, Agricultural extension, Manual, Department of Agriculture Extension, Ministry of Agriculture, Government of the Peoples' Republic of Bangladesh, Dhaka.
3. Dahama, O.P, 1979, Extension and Rural Welfare. Ram Prasad and Son. Agra 282003, India.
4. Kashem, M.A 2004. Fundamentals of Agricultural extension, Published by: Mrs. S Kashem, BAU, Mymensingh.
5. Swanson, B.E.R.P Bentz and A.J Sofranco. 1997. Improving Agricultural Extension: A Reference Manual, Fao, Rome.
6. Roy, J.L.1991. Extension Communication and Management Naya Prokash, 206 Bidhan Saranil, Calcutta 70000, India.
7. Wentiline, T.1993. Planning for Effective Training: A guide to curriculum development FAO of UN, Rome.
8. Bhuiyan M.H., M.A.M. Miah, M.G.R. Akanda and M. A. Bashar. 2014. Agricultural Extension Education, g-Science publications, Dhaka.

Website references:

www.google.com
www.dae.gov.bd

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SUBJECT CODE	SUBJECT NAME	PERIOD PER WEEK		CREDIT
22336	Fish Culture Management (মৎস্য চাষ ব্যবস্থাপনা)	T	P	C
		2	3	3

Rationale	Fisheries is an important branch of agriculture. This course is designed to introduce the basic concepts of fisheries, different types of fish culture methods, fish breeding, fish fry transportation, fish disease and fish acts. The program is aimed to enrich the knowledge of diploma-level students on various aspects of fisheries resources and culture systems.
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to</p> <ul style="list-style-type: none"> • Explain the ponds for fish culture (Ch:02) • Describe the of fish culture methods in different waterbodies (Ch:03) • Explain special management in fish culture (Ch:04) • State the different types of integrated fish culture (Ch: 05) • Explain the fish breeding techniques (Ch:06) • Describe the packaging and transportation of fish fry (Ch: 07). • Describe the different types of fish diseases and control measures (Ch: 08) • Mention the causes of declination of open water fish production and mitigation measures (Ch: 09) • Explain the different fish acts (Ch: 10)
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to</p> <ul style="list-style-type: none"> • Identify the external organs of fish (practical: 1) • Identify the fish fry and fingerlings (practical: 2) • Identify an ideal pond and a nursery pond (practical: 3) • Determine the natural food in pond by different methods (practical: 4) • Apply lime & fertilizer to the pond (practical: 5) • Identify predator and unwanted fish (practical: 6) • Apply fish feed in pond (practical: 7) • Demonstrate the fish breeding techniques (practical: 8) • Demonstrate the fry and fingerlings transportation systems (practical: 9) • Identify the diseased fish (practical: 10)

DETAILED SYLLABUS (THEORY)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1.	<p>Basic Concepts of Fisheries</p> <p>1.1 Define fish and fish culture</p> <p>1.2 Define fish culture management</p> <p>1.3 Describe the sources of fisheries resources</p> <p>1.4 Mention the importance of fish culture</p> <p>1.5 List the name of indigenous and exotic fish species in Bangladesh</p> <p>1.6 List the culturable fish species in Bangladesh</p> <p>1.7 State the characteristics of culturable fishes</p>	2	4

2	Ponds for Fish Culture 2.1 Define pond 2.2 State the different types of pond 2.3 State the characteristics of an ideal pond 2.4 Mention the properties of soil and water of a fish culture pond 2.5 Explain different steps of pond preparation 2.6 Describe the detection methods of natural food in pond 2.7 Describe different types of artificial fish feed 2.8 Mention the uses of artificial fish feed 2.9 Describe the application method and uses of lime and fertilizer during the culture period 2.10 Point out the techniques of fry and fingerling release.	4	6
3	Fish Culture 3.1 Define monoculture and polyculture 3.2 Explain the polyculture systems of carps 3.3 Describe the culture system of Thai Pungus & Tilapia 3.4 Mention the culture systems of Koi, Shing and Magur 3.5 Explain the culture methods of Pabda, Gulsha and Tengra 3.6 State the rearing system of fish fry in nursery pond 3.7 Describe the fish culture in floodplain 3.8 Describe the fish culture system in seasonal ponds 3.9 Describe the fish marketing channel 3.10 Calculate the cost-benefit analysis of fish culture	4	8
4	Special Management in Fish Culture 4.1 Define Special Management of Fish Culture 4.2 Describe the fish culture techniques in Pen and Canal 4.3 Explain the activities of Beel nursery in open water bodies 4.4 State the fish culture system in floating cage 4.5 Distinguish between pen and cage culture 4.6 State Bio floc fish culture system	4	6
5	Integrated Fish Culture 5.1 Define Integrated fish culture 5.2 List out different integrated fish culture systems 5.3 Describe the method of rice-cum fish culture 5.4 Explain the rice cum shrimp culture 5.5 Explain the culture system of vegetables on pond dike 5.6 Describe the culture system of Papaya, Amrapali and Banana on pond dike.	3	6
6	Fish Breeding 6.1 Define brood fish, fish breeding and hatchery 6.2 Explain the natural fish breeding system in Halda river 6.3 State the fish fry collection techniques from Halda river 6.4 Describe the management system of brood fish 6.5 List of different types of hormones used in fish hatchery 6.6 Describe the induced fish breeding techniques in hatchery 6.7 Explain the fish stripping method 6.8 Discuss the egg hatching process 6.9 State the hatchling management in hatchery 6.10 Distinguish between natural and induced fish breeding	4	8
7	Packaging and Transportation of Fish Fry 7.1 Define packaging and fry transportation 7.2 State the methods of fish fry and fingerling transportation 7.3 Explain the traditional (Bucket/Drum) method of fry transportation 7.4 Describe the modern (Oxygen Bag) technique of fry transportation 7.5 Point out the precautions of fish fry transportation	2	4

8	Fish Diseases and Control 8.1 Define fish disease 8.2 Describe different types of fish diseases 8.3 State the relationship among host, pathogen and environment 8.4 Differentiate between healthy and diseased fish 8.5 Describe different types of fish diseases 8.6 Explain the signs and symptoms of fish diseases 8.7 Explain the prevention and control measures of fish diseases 8.8 State the steps to keep the pond free from diseases	4	8
9.	Declination of Fish Production in Open Water bodies and Mitigation 9.1 State the natural and man-made causes for declining fish production 9.2 Explain the mitigation measures of declining fish production 9.3 State the effects of climate change on aquaculture 9.4 List out the endangered fish species 9.5 Define fish sanctuary 9.6 State the importance of fish sanctuary	2	4
10.	Fish Acts 10.1 Mention the importance of fish conservation acts 10.2 Point out the sections of fish acts including latest amendments 10.3 State the fish feed acts 10.4 Mention the sections of fish hatchery acts 10.5 Explain the rules and regulations for using drugs and chemicals in aquaculture	3	6
Total		32	60

DETAILED SYLLABUS (PRACTICAL)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	Observe the External Organs of Fish 1.1 Identify the collected fish species 1.2 Identify different external organs of sampled fish 1.3 Draw the picture of fish 1.4 Label the different external organs of fish 1.5 Maintain the record of performed jobs	2	2.5
2	Identify Fish Fingerlings 2.1 Identify the collected fish fingerlings 2.2 Draw the picture of sampled fish fingerlings 2.3 Maintain the record of identifying characteristics of the fish	1	2.5
3	Visit Ideal Pond and Nursery Pond 3.1 Observe an ideal pond 3.2 Identify the characteristics of the ideal pond 3.3 Observe the nursery pond 3.4 Identify the characteristics of the Nursery pond 3.5 Maintain the record of performed Jobs.	2	2.5
4	Determine Natural Food in Pond by different methods 4.1 Detect natural food in fish pond by hand method 4.2 Detect natural food in fish pond using secchi disk 4.3 Detect natural food in fish pond by glass method 4.4 Maintain the record of performed jobs	2	2.5

5	Apply Lime & Fertilizer to the Pond 5.1 Collect lime and fertilizer 5.2 Calculate the amount of lime and fertilizer 5.3 Weigh the required amount of lime or fertilizer 5.4 Apply of lime or fertilizer 5.5 Maintain the record of performed jobs	2	2.5
6	Identify Predator and Unwanted Fish 6.1 Identify the predator and unwanted fish 6.2 Draw the picture of collected fish 6.3 Identify the characteristics of the demonstrated fish 6.4 Maintain the record of performed jobs	1	2.5
7	Apply Fish Feed 7.1 Identify ingredients of fish feed 7.2 Calculate the amount of each ingredient 7.3 Weigh the required amount of each ingredient 7.4 Prepare fish feed using weighted ingredients 7.5 Apply the prepared fish feed in the cultured pond 7.6 Maintain the record of performed jobs	2	2.5
8	Visit Fish Hatchery 8.1 Arrange a field trip to a nearest fish hatchery 8.2 Observe the physical structure of the hatchery 8.3 Visit to the brood, rearing and nursery ponds 8.4 Observe the fish breeding steps 8.5 Maintain the record of performed jobs	1	2.5
9	Transport Fish Fry and Fingerlings 9.1 Demonstrate fry packaging 9.2 Demonstrate fingerling packaging 9.3 Observe the transport system of fry and fingerling 9.5 Maintain the record of performed jobs	1	2.5
10	Identify diseased fish 10.1 Collect the diseased fish 10.2 Identify the fish disease 10.3 Draw and label the diseased fish 10.4 Record the organoleptic features of the fish	2	2.5
	Total	16	25

NECESSARY RESOURCES (TOOLS, EQUIPMENT'S AND MACHINERY):

SI	Item Name	Quantity
01	Required fish species, fish fry, fish fingerling, measuring tape, dissecting box, slides, needles, wax tray, hand gloves, apron, pencil, paper, eraser, sharpener, pointer, marker, highlighter, lime, fertilizer, fish feed ingredients, tissue box, distilled water, jar, drum/chari, polythene bag, secchi disk, glass, plankton net.	

Required Chemicals:

SI	Item Name (Consumables Materials)	Quantity
01	Formalin, alcohol.	

RECOMMENDED BOOKS:

SI	Book Name	Writer Name	Publisher Name & Edition
01	Fresh water fishes in Bangladesh	DoF	Dept. of Fisheries, Bangladesh 1 st edition
02	Fish culture and management technology	BFRI	BFRI
03	Fish disease and environment friendly management	Dr. Md. Muniruzzaman	Pranto Prokashon, 1 st edition, Banglabazar, Dhaka
04	Fish disease and health care	Dr. Md. Muniruzzaman	BTEB Text Book

WEBSITE REFERENCES:

SI	Web Link	Remarks
1.	www.google.com	Search here with topics
2.	www.scholar.google.com	Search here with topics
3.	www.youtube.com	Search here with topics

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