

3rd SEMESTER HONOURS(CORE COURSE & SEC)

Session: July 2022 to December 2022

(COURSE CODE: BOTACOR05T, BOTACOR06T,BOTACOR07T, BOTSSEC01M)

SEM III: CORE COURSE V

Morphology and Anatomy of Angiosperms

CODE: BOTACOR05T (4 Credits)

COURSE OUTCOME: **Plant morphology** is the study of the physical form and external structure of plants, whereas **plant anatomy** is the study of the internal structure of plants, mostly at the cellular/microscopic level. In this study plant morphology mainly reflects reproductive structures of angiosperm like flower, inflorescence, fruits and seeds. On the other hand anatomy reveals apical meristem, vascular cambium, wood, and also focuses on adaptive and protective system.

This course will be helpful for the students to acquire a clear knowledge on the external and internal structure of angiosperms along with their different adaptive and protective systems.

On completion of the course, students will be able to:

1. Understand the habit of the angiosperm plant body.
2. Know the vegetative characteristics of the plant.
3. Understand the scope & importance of Anatomy.
4. Know various tissue systems.
5. Understand the normal and anomalous secondary growth in plants and their causes.
6. A parallel practical course will also help to gather a brief knowledge on various techniques used in anatomical study.

THEORY

(BOTACOR05T)

**** The total 60 hours adjusted to 53 hours keeping the syllabus unchanged.**

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR HONS)										
NAME OF THE DEPARTMENT					BOTANY					
HOD		DR. ARUNEEMA BARDHAN								
INITIALS OF FACULTIES		AC	AB	SDG	SS	ABJ				
PERIOD OF SEMESTER			FROM JULY 2022 TO DECEMBER 2022				HONS √		GENERAL	
SEM	3	Core Course		5	CREDIT POINT	4	Course Code	BOTACOR05T		
Name of the Course			Morphology and Anatomy of Angiosperms							
Course Co-ordinator			DR. AYANA CHAKRAROBTY							
TOTAL MARKS		50	TH	√	TUT		PRAC			
TOTAL HOURS		60 HRS (adjusted to 53 HRS)								
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC				1						
NAME OF THE UNIT/MODULE				Inflorescence						
TOTAL HOURS		2 hrs	THEORY	√	TUTORIAL		PRAC			
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)										
SL	TOPIC					HR	TEACHER	MONTH		
1	Inflorescence – Types with examples					1	ABJ	AUG		
2	Concept of advanced and primitive inflorescence types					1	ABJ	AUG		
TOTAL HOURS						2hrs				

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC				2					
NAME OF THE UNIT/MODULE				Flower					
TOTAL HOURS		5 hrs	THEORY	√	TUTORIAL		PRAC		
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)									
SL	TOPIC					HR	TEACHER	MONTH	
1	Flower– Types with examples					1	ABJ	AUG	
2	Aestivation					1	ABJ	SEPT	
3	Floral parts – various types of cohesion and adhesion with examples					1	ABJ	SEPT	
4	Carpel-types, advance and primitive ones and placentations					1	ABJ	SEPT	
5	Doubt clearing class					1	ABJ	SEPT	
TOTAL HOURS						5hrs			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		3				
NAME OF THE UNIT/MODULE		Fruits and Seeds				
TOTAL HOURS	3 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	TOPIC			HR	TEACHER	MONTH
1	Fruits –types with examples			1	ABJ	NOV
2	Seeds –types with examples			1	ABJ	NOV
3	Class Test			1	ABJ	NOV
TOTAL HOURS				3hrs		

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		4				
NAME OF THE UNIT/MODULE		Introduction and scope of Plant Anatomy				
TOTAL HOURS	3 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	TOPIC			HR	TEACHER	MONTH
1	Introduction to scope of Plant Anatomy			1	AC	AUG
2	Applications of plant anatomy in systematics			1	AC	AUG
3	Applications of plant anatomy in forensics and pharmacognosy			1	AC	AUG
TOTAL HOURS				3hrs		

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		5				
NAME OF THE UNIT/MODULE		Structure and Development of Plant Body				
TOTAL HOURS	5Hrs (Reduced to 4Hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	TOPIC			HR	TEACHER	MONTH
1	Introduction: Internal organization of plant body			1	AC	AUG
2	The three tissue systems			1	AC	AUG
3	Types of cells and tissues			1	AC	AUG
4	Types of cells and tissues... continued.....			1	AC	AUG
5						
TOTAL HOURS				4hrs		

**Total 5 hours allotted for this unit-5 has been adjusted to 4 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			6			
NAME OF THE UNIT/MODULE			Tissues			
TOTAL HOURS	10Hrs -(Reduced to 9Hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	TOPIC			HR	TEACHER	MONTH
1	Introduction; Classification of tissues			1	AC	AUG
2	Simple and complex tissues			1	AC	SEPT
3	Cytodifferentiation of tracheary elements			1	AC	SEPT
4	Cytodifferentiation of sieve elements			1	AC	SEPT
5	Pits, types, occurrence, structure			1	AC	SEPT
6	Plasmodesmata with ultrastructure			1	AC	SEPT
7	Ergastic substances			1	AC	SEPT
8	Hydathodes, cavities, lithocysts and laticifers			1	AC	SEPT
9	Doubt clearing class			1	AC	SEPT
10						
TOTAL HOURS				9hrs		

**Total 10 hours allotted for this unit-6 has been adjusted to 9 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			7			
NAME OF THE UNIT/MODULE			Apical meristems			
TOTAL HOURS	12 Hrs (Reduced to 10Hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	TOPIC			HR	TEACHER	MONTH
1	Introduction			1	AC	SEPT
2	Evolution of the concept of organization of the shoot apex (Apical cell theory and Histogen theory)			1	AC	SEPT
3	Evolution of the concept of organization of the shoot apex (Tunica Corpus theory)			1	AC	SEPT
4	Types of vascular bundles			1	AC	SEPT
5	Structure of dicot and monocot stem			1	AC	NOV
6	Structure of dicot and monocot leaf, Kranz anatomy			1	AC	NOV
7	Organization of root apex (Apical cell theory, Histogen theory, Korper-Kappe theory)			1	AC	NOV
8	Structure of dicot root			1	AC	NOV
9	Quiescent centre; Root cap and structure of monocot root			1	AC	NOV
10	Class test			1	AC	NOV
11						
12						
TOTAL HOURS				10 hrs		

**Total 12 hours allotted for this unit-7 has been adjusted to 10 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			8				
NAME OF THE UNIT/MODULE			Vascular Cambium and Wood				
TOTAL HOURS	12 -Hrs (Reduced to 10Hrs)	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	Introduction; Vascular cambium –structure(of rays and axial parenchyma)			1	AC	NOV	
2	Vascular Cambium - origin and function			1	AC	NOV	
3	seasonal activity of cambium			1	AC	NOV	
4	Secondary growth in root			1	AC	NOV	
5	Secondary growth in stem			1	AC	DEC	
6	Concept of wood – structure and function			1	AC	DEC	
7	Sapwood and heartwood; ring and diffuse porous wood, Early and late wood			1	AC	DEC	
8	Tyloses and Tylosoides, Composition and development of Periderm			1	AC	DEC	
9	Composition and development of Rhytidome and lenticels			1	AC	DEC	
10	Doubt clearing class			1	AC	DEC	
11							
12							
TOTAL HOURS				10hrs			

**Total 12 hours allotted for this unit-8 has been adjusted to 10 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			9				
NAME OF THE UNIT/MODULE			Adaptive and Protective Systems				
TOTAL HOURS	8 hrs (Reduced to 7 hrs)	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	Introduction; Epidermal tissue system, cuticle			1	AC	DEC	
2	Trichomes (uni and multicellular, glandular and non-glandular with examples of each)			1	AC	DEC	
3	Stomata (classification)			1	AC	DEC	
4	Adcrustation and incrustation			1	ABJ	DEC	
5	Anatomical adaptations of xerophytes			1	ABJ	DEC	
6	Anatomical adaptations of hydrophytes			1	ABJ	DEC	
7	Class test			1	ABJ	DEC	
8							
TOTAL HOURS				7hrs			

**Total 8 hours allotted for this unit-8 has been adjusted to 7 hours.

LESSON PLAN FOR SEMESTER: III

PRACTICAL

Core Course V

Morphology and Anatomy of Angiosperms (BOTACOR05P)

(CREDIT: 2)

*** The allotted total 60 hours for the **Practical course** has been adjusted to 54 hours keeping the course content unchanged.

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR HONS)										
NAME OF THE DEPARTMENT					BOTANY					
HOD		DR. ARUNEEMA BARDHAN								
INITIALS OF FACULTIES		AC	AB	SDG	SS	ABJ				
PERIOD OF SEMESTER		FROM JULY 2022 TO DECEMBER 2022					HONS √		GENERAL	
SEM	3	Core Course		5			CREDIT POINT	2	Course Code	BOTACOR05P
Name of the Course				Morphology and Anatomy of Angiosperms Practical						
Course Co-ordinator				DR. AYANA CHAKRABORTY						
TOTAL MARKS	25		TH		TUT			PRAC	√	
TOTAL HOURS	60 Hrs									
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC				PRACTICAL						
NAME OF THE UNIT/MODULE				Morphology and Anatomy of Angiosperms Practical						
TOTAL HOURS	60 HRS (Adjusted to 54 Hours)	THEORY		TUTORIAL			PRAC	√		
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)										
SL	TOPIC					HR	TEACHER	MONTH		
	Unit 1. Study of anatomical details of the following through permanent slides/temporary stain mounts/ macerations/museum specimens/ photographs									
1.	Study of Apical meristem of root, shoot and vascular cambium (permanent slides/temporary stain mounts)					2	AC	AUG		
2.	Study of Distribution and types of parenchyma, collenchyma and sclerenchyma (through permanent slides/temporary stain mounts)					2	AC	AUG		
3.	Study of Distribution and types of collenchyma and sclerenchyma (through permanent slides/temporary stain mounts)					2	AC	AUG		
4.	Study of Xylem: Tracheary elements- tracheids, vessel elements; thickenings; perforation plates; Xylem fibres(through permanent slides/temporary stain mounts)					2	AC	AUG		
5.	Study of Xylem: perforation plates; Xylem fibres(through permanent slides)					2	AC	AUG		
6.	Study of Wood: ring porous; diffuse porous; tyloses					2	AC	SEPT		
7.	Study of Wood: heart and sapwood (through permanent slides)							SEPT		
8.	Study of Phloem: Sieve tubes-sieve plates; companion cells; phloem fibres(through permanent slides)					2	AC	SEPT		
9.	Study of Epidermal system: cell types (through permanent slides)					2	AC	SEPT		

10.	Study of Epidermal system: stomata types (through permanent slides)	2	AC	SEPT
11.	Study of trichomes: non-glandular and glandular (through permanent slides)	2	AC	SEPT
12.	Study of Periderm; lenticels; C4 leaves (Kranz anatomy) (through permanent slides)	2	AC	SEPT
13.	Study of C4 leaves (Kranz anatomy) (through permanent slides)	2	AC	SEPT
14.	Study of Secretory tissues: cavities, laticysts and laticifers(through permanent slides)	2	AC	SEPT
	Unit 2: Workout and preparation of permanent slides by following double staining method			
15.	Double staining methods	2	AC	NOV
16.	Study of Root anatomy (monocot – Orchid through temporary preparation and permanent slides)	2	AC	NOV
17.	Study of Root anatomy dicot (Sunflower) through temporary preparation and permanent slides	2	AC	NOV
18.	Study of Stem anatomy (monocot- maize) through temporary preparation and permanent slides	2	AC	NOV
19.	Study of Stem anatomy (dicot – <i>Cucurbita</i>) - primary and secondary growth through temporary preparation and permanent slides	2	AC	NOV
20.	Study of Leaf: isobilateral (Tube rose) through temporary preparation and permanent slides	2	AC	NOV
21.	Study of Leaf: dorsiventral (Mango) through temporary preparation and permanent slides	2	ABJ	DEC
22.	Study of Adaptive anatomy: xerophytes (<i>Nerium</i> leaf) through temporary preparation and permanent slides	2	ABJ	DEC
23.	Study of Adaptive anatomy: hydrophytes (<i>Nymphaea</i> petiole) through temporary preparation and permanent slides	2	ABJ	DEC
24.	Practice class	2	AC	DEC
25.	Practice class	2	AC	DEC
26.	Practice class	2	AC	DEC
27.	Practice class	2	AC	DEC
	TOTAL	54 HRS		

*** Total 60 Hours adjusted to 54 hours according to class availability keeping the course content unchanged.

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SEM III: CORE COURSE VI

Economic Botany

CODE: BOTACOR06T (4 Credits)

COURSEOUTCOME: Economic Botany is the study of sustainable uses of plants for our regular civilized life. People have been using plants for thousands of years. Plants are extremely important in human life throughout the world. People depend upon plants to satisfy such basic human needs as food, clothing, shelter, and health care. These needs are growing rapidly because of a growing world population, increasing incomes, and urbanization.

This course will be helpful for the students to acquire a clear knowledge on the use of plants in a broad field with many applications and use of plants as food, fodder, medicine, industrial and daily uses.

On completion of the course, students will be able to:

1. Understand the role plants in human welfare.
2. Gain knowledge about various plants of economic use.
3. Know importance of plants & plant products.
4. Understand the chemical contents of the plant products.
5. Know about the utility of plant resources.

THEORY

(BOTACOR06T)

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR HONS)										
NAME OF THE DEPARTMENT					BOTANY					
HOD		DR. ARUNEEMA BARDHAN								
INITIALS OF FACULTIES		DAY	AC	AB	SDG	SS	ABJ			
PERIOD OF SEMESTER		FROM JULY 2022 TO DECEMBER 2022					HONS		GENERAL	
							√			
SEM	3	Core Course		6	CREDIT POINT	4	Course Code	BOTACOR06T		
Name of the Course		Economic Botany								
Course Co-ordinator		DR. ARUNEEMA BARDHAN								
TOTAL MARKS	50	TH	√	TUT		PRAC				
TOTAL HOURS	60 Hrs									
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC										
			1							
NAME OF THE UNIT/MODULE			Origin of Cultivated Plants							
TOTAL HOURS	6 hrs	THEORY	√	TUTORIAL		PRAC				
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)										
SL	TOPIC					HR	TEACHER	MONTH		
1	Introduction					1	ABJ	AUG		
2	Concept of centres of origin					1	ABJ	AUG		
3	Importance of centres of origin with reference to Vavilov's work					1	ABJ	AUG		
4	Examples of major plant introductions					1	ABJ	AUG		
5	Crop domestication and loss of genetic diversity.					1	ABJ	AUG		
6	Doubt clearing class					1	ABJ	AUG		
TOTAL HOURS						6 hrs				

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC									
			2						
NAME OF THE UNIT/MODULE			Cereals						
TOTAL HOURS	6 hrs	THEORY	√	TUTORIAL		PRAC			
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)									
SL	TOPIC					HR	TEACHER	MONTH	
1	Wheat - origin, morphology					1	ABJ	SEPT	
2	Wheat - cultivation & uses					1	ABJ	SEPT	
3	Rice- origin, morphology					1	ABJ	SEPT	
4	Rice- cultivation & uses					1	ABJ	SEPT	
5	Brief account on millets					1	ABJ	SEPT	
6	Class test					1	ABJ	SEPT	
TOTAL HOURS						6 hrs			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			3				
NAME OF THE UNIT/MODULE			Legumes				
TOTAL HOURS	6 hrs	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	Origin of Chick pea & Pigeon pea			1	ABJ	OCT	
2	Morphology of Chick pea			1	ABJ	OCT	
3	Morphology of Pigeon pea			1	ABJ	NOV	
4	Uses of Chick pea & Pigeon pea and Importance to man and ecosystem			1	ABJ	NOV	
5	Question Answer Discussion			1	ABJ	NOV	
6	Class Test			1	ABJ	NOV	
TOTAL HOURS				6hrs			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			4				
NAME OF THE UNIT/MODULE			Sources of sugars and starches				
TOTAL HOURS	4 hrs	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	Morphology of sugarcane			1	ABJ	NOV	
2	Processing of sugarcane; products and by-products of sugarcane industry			1	ABJ	NOV	
3	Potato – morphology & uses			1	ABJ	NOV	
4	Potato – propagation			1	ABJ	NOV	
TOTAL HOURS				4 hrs			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			5				
NAME OF THE UNIT/MODULE			Spices				
TOTAL HOURS	6 hrs	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	Introduction; Listing of important spices, their family and part used			1	ABJ	DEC	
2	Economic importance with special reference to fennel			1	ABJ	DEC	
3	Economic importance with special reference to saffron			1	ABJ	DEC	
4	Economic importance with special reference to clove			1	ABJ	DEC	
5	Economic importance with special reference to black pepper			1	ABJ	DEC	
6	QA discussion/ Class Test			1	ABJ	DEC	
TOTAL HOURS				6hrs			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			6				
NAME OF THE UNIT/MODULE			Beverages				
TOTAL HOURS	4hrs	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	Introduction; Tea– morphology			1	SS	AUG	
2	Tea– processing & uses			1	SS	AUG	
3	Coffee – morphology , processing& uses			1	SS	AUG	
4	QA discussion			1	SS	AUG	
TOTAL HOURS				4hrs			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			7				
NAME OF THE UNIT/MODULE			Sources of oils and fats				
TOTAL HOURS	10 hrs	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	General description, classification, extraction, their uses and health implications of groundnut (botanical name, family & uses)			1	SS	AUG	
2	General description, classification, extraction, their uses and health implications of linseed (botanical name, family & uses)			1	SS	AUG	
3	General description, classification, extraction, their uses and health implications of soybean (botanical name, family & uses)			1	SS	SEPT	
4	General description, classification, extraction, their uses and health implications of mustard (botanical name, family & uses)			1	SS	SEPT	
5	General description, classification, extraction, their uses and health implications of coconut (botanical name, family & uses)			1	SS	SEPT	
6	Essential oils – <i>Santalum</i> ; general account, extraction methods& uses			1	SS	SEPT	
7	Essential oils - <i>Eucalyptus</i> : general account, extraction methods& uses			1	SS	SEPT	
8	Comparison of Essential oils with fatty oils			1	SS	SEPT	
9	Doubt clearing class			1	SS	SEPT	
10	Class Test			1	SS	SEPT	
TOTAL HOURS				10 hrs			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			8				
NAME OF THE UNIT/MODULE			Natural Rubber				
TOTAL HOURS	3hrs	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	Para-rubber- tapping and processing			1	SS	OCT	
2	Para-rubber- uses			1	SS	OCT	
3	QA discussion			1	SS	NOV	
TOTAL HOURS				3 hrs			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			9				
NAME OF THE UNIT/MODULE			Drug yielding plants				
TOTAL HOURS	8hrs	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	Introduction			1	SS	NOV	
2	Therapeutic and habit-forming drugs with special reference to <i>Cinchona</i>			1	SS	NOV	
3	Therapeutic and habit-forming drugs with special reference to <i>Digitalis</i>			1	SS	NOV	
4	Therapeutic and habit-forming drugs with special reference to <i>Papaver</i>			1	SS	NOV	
5	Therapeutic and habit-forming drugs with special reference to <i>Cannabis</i>			1	SS	NOV	
6	Tobacco – Morphology, processing, uses and health hazards			1	SS	NOV	
7	QA discussion			1	SS	NOV	
8**	Class test			1	SS	DEC	
TOTAL HOURS				8hrs			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			10				
NAME OF THE UNIT/MODULE			Timber plants				
TOTAL HOURS	3 hrs	THEORY	√	TUTORIAL		PRAC	
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)							
SL	TOPIC			HR	TEACHER	MONTH	
1	General account with special reference to teak			1	SS	DEC	
2	General account with special reference to sal			1	SS	DEC	
3	General account with special reference to and pine			1	SS	DEC	
TOTAL HOURS				3 hrs			

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			11			
NAME OF THE UNIT/MODULE			Fibers			
TOTAL HOURS	4hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	TOPIC			HR	TEACHER	MONTH
1	Classification based on the origin of fibers			1	SS	DEC
2	Cotton and Jute – morphology, extraction and uses			1	SS	DEC
3	Jute - morphology, extraction and uses			1	ABJ	DEC
4	QA discussion			1	ABJ	DEC
TOTAL HOURS				4hrs		

LESSON PLAN FOR SEMESTER: III

PRACTICAL

Core Course VI

ECONOMIC BOTANY (BOTACOR06P)

(CREDIT: 2)

*** The allotted total 60 hours for the **Practical course** has been adjusted to 58 hours keeping the course content unchanged.

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR HONS)												
NAME OF THE DEPARTMENT						BOTANY						
HOD			DR. ARUNEEMA BARDHAN									
INITIALS OF FACULTIES			AC	AB	SDG	SS	ABJ					
PERIOD OF SEMESTER			FROM JULY 2022 TO DECEMBER 2022					HONS √		GENERAL		
SEM	3	Core Course			6	CREDIT POINT		2	Course Code	BOTACOR06P		
Name of the Course			ECONOMIC BOTANY									
Course Co-ordinator			DR. ARUNEEMA BARDHAN									
TOTAL MARKS		25	TH		TUT			PRAC	√			
TOTAL HOURS		60 Hrs										
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC						PRACTICAL						
NAME OF THE UNIT/MODULE						ECONOMIC BOTANY Practical						
TOTAL HOURS		60 HRS 58 HRS	THEORY		TUTORIAL		PRAC		√			
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)												
SL	TOPIC						HR	TEACHER	MONTH			
	Unit 1: CEREALS											
1.	Wheat: habit sketch, L. S/T.S. grain, starch grains – type						2	AB	SEPT			
2.	Wheat: Micro-chemical tests – iodine spot test						2					
3.	Rice: habit sketch, study of paddy and grain, starch grains– type						2	AB	SEPT			
4.	Rice: Micro-chemical tests – iodine spot test						2					
	Unit 2: LEGUMES											
5.	Soybean: habit sketch, fruit, seed structure						2	AB	SEPT			
6.	Soybean: micro-chemical tests (Millon test- Soyabean						2					
7.	Ground nut: habit sketch, fruit, seed structure						2	ABJ	SEPT			
8.	Ground nut: Micro-chemical tests (Sudan IV test- Groundnut)						2					
	Unit 3: Sources of sugars and starches											
9.	Sugarcane - habit sketch Cane juice- micro-chemical tests (Molisch test)						2	AB	OCT			
10.	Potato - habit sketch, tuber morphology, T.S. of tuber to show localization of starch grains, w.m. starch grains						2	AB	OCT			
11.	Potato - Micro-chemical tests (Iodine test)						2					
	Unit 4: Spices											
12.	Study of Black pepper - Demonstration, habit sketch and comments						2	AB	NOV			

13.	Study of Fennel - Demonstration, habit sketch and comments	2	AB	NOV
14..	Study of Clove - Demonstration, habit sketch and comments	2	AB	NOV
.	Unit 5: Beverages.			
15.	Tea leaf - extraction (Biochemical Tests for Tannin and Alkaloid) and comments	2	AB	NOV
16.	Coffee bean - extraction (Biochemical Tests for Tannin and Alkaloid) and comments	2	AB	NOV
	Unit:6: Sources of oils and fats			
17.	Coconut - kernel: tests for fats (Sudan IV test)	2	AB	DEC
18.	Mustard - seeds: tests for fats (Sudan IVtest)	2	AB	DEC
	Unit:7: Essential oil-yielding plants			
19.	Study of <i>Santalum</i> : habit sketch (specimens /photographs).	2	ABJ	SEPT
20.	Study of Eucalyptus: habit sketch (specimens /photographs).	2	ABJ	SEPT
21.	Unit: 8: Rubber: specimen, photograph/model of tapping, samples of rubber products.	2	ABJ	SEPT
	Unit 9: Drug-yielding plants			
22.	Study from Specimens of <i>Digitalis</i>	2	ABJ	SEPT
23.	Study from Specimens of <i>Papaver</i>	2	ABJ	OCT
24.	Study from Specimens of <i>Cannabis</i>	2	ABJ	OCT
25.	Unit 10: Tobacco: Study from specimen and products of Tobacco.	2	ABJ	OCT
	Unit 11: Woods			
26.	Study from <i>Tectona</i> Specimen; Section of young stem specimen.	2	ABJ	NOV
27.	Study from <i>Pinus</i> Specimen; Section of young stem specimen. Study from <i>Shorea</i> Specimen; Section of young stem specimen.	2	ABJ	NOV
	Unit 12: Fiber-yielding plants			
28.	Cotton – specimen whole mount of fiber and Test for cellulose – general test with benzene and/or aniline acetate test.	2	AB	DEC
29.	Jute - transverse section of stem and Test for lignin – phloroglucinol test on transverse section of stem and fiber.	2	AB	DEC
30.	Practice class		-	-
	TOTAL	58 HRS		

*** Total 60 Hours adjusted to 58 hours keeping the course content unchanged.

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SEM III: CORE COURSE VII

Genetics

CODE: BOTACOR07T(4 Credits)

COURSE OUTCOME

On completion of the course, students will be able to:

1. Know about fundamentals of genetics like, concept of gene, Mendelian and non-Mendelian principle of inheritance, extra-chromosomal inheritance, linkage, crossing over, gene mutation, population genetics etc.
2. Know the phenomenon of dominance, laws of segregation, independent assortment of genes.
3. Understand the different types of genetic interaction, incomplete dominance, codominance, inter allelic genetic interactions, multiple alleles and quantitative inheritance etc
4. Acquire a clear-cut knowledge about different genetical analysis like, deciphering different genetical disease, variation of gene pool among different organism's population, applying genetical understanding to analyze and manipulate traits of living organisms etc.
5. A parallel practical course will also help to gather a brief knowledge on techniques of chromosome morphological study, statistical analysis of different types of inheritance and different normal and abnormal stages of cytological behaviour and human genetic disorders.

THEORY

(BOTACOR07T)

***** The allotted total 60 hours for this course has been adjusted to 56 hours, keeping the course content unchanged.**

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR HONS)										
NAME OF THE DEPARTMENT					BOTANY					
HOD		DR. ARUNEEMA BARDHAN								
INITIALS OF FACULTIES		AC	AB	ABJ	SDG	SS				
PERIOD OF SEMESTER		FROM JULY 2022 TO DECEMBER 2022				HONS		√	GENERAL	
SEM	3	Core Course		7	CREDIT POINT	4	Course Code	BOTACOR07T		
Name of the Course			Genetics							
Course Co-ordinator			DR. ARUNEEMA BARDHAN							
TOTAL MARKS	50	TH	√	TUT			PRAC			
TOTAL HOURS	60 Hrs (adjusted to 56 Hrs)									
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC				1						
NAME OF THE UNIT/MODULE				Mendelian genetics and its extension						
TOTAL HOURS	16 Hrs (adjusted to 15 Hrs)	THEORY	√	TUTORIAL			PRAC			
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)										
SL	LECTURE HEAD/ TOPIC				HR	TEACHER	MONTH			
1	Mendelism: Principles of inheritance				1	SDG	AUG			
2	Chromosome theory of inheritance				1	SDG	AUG			
3	Autosomes and sex chromosomes				1	SDG	AUG			
4	Probability analysis				1	SDG	AUG			
5	Problems of probability analysis				1	SDG	AUG			
6	Pedigree analysis				1	SDG	AUG			
7	Problems of pedigree analysis				1	SDG	AUG			
8	Incomplete dominance and co-dominance				1	SDG	AUG			
9	Multiple alleles and lethal alleles				1	SDG	SEPT			
10	Epistasis,				1	SDG	SEPT			
11	Pleiotropy				1	SDG	SEPT			
12	Recessive and dominant traits				1	SDG	SEPT			
13	Penetrance and expressivity, numericals				1	SDG	SEPT			
14	Polygenic inheritance				1	SDG	SEPT			
15	Doubt clearing class				1	SDG	SEPT			
16**										
TOTAL HOURS					15 hrs					

**Total 16 hours allotted for this unit-1 has been adjusted to 15 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		2				
NAME OF THE UNIT/MODULE		Extra-chromosomal Inheritance				
TOTAL HOURS	6Hrs (adjusted to 5 Hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/ TOPIC			HR	TEACHER	MONTH
1	Chloroplast mutation: Variegation in Four o'clock plant			1	SDG	SEPT
2	Mitochondrial mutations in yeast			1	SDG	NOV
3	Maternal effects-shell coiling in snail			1	SDG	NOV
4	Infective heredity- kappa particles in <i>Paramecium</i>			1	SDG	NOV
5	Doubt clearing class			1	SDG	NOV
6**						
TOTAL HOURS				5hrs		

**Total 6 hours allotted for this unit-2 has been adjusted to 5 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		3				
NAME OF THE UNIT/MODULE		Linkage, crossing over and chromosome mapping				
TOTAL HOURS	12Hrs (adjusted to 11 Hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/ TOPIC			HR	TEACHER	MONTH
1	Linkage and crossing over			1	AC	AUG
2	cytological basis of crossing over			1	AC	AUG
3	recombination frequency			1	AC	SEPT
4	Two factor and three factor crosses			1	AC	SEPT
5	Interference and coincidence			1	AC	SEPT
6	Numerical based on gene mapping			1	AC	SEPT
7	Problem solving two and three point crosses			1	AC	SEPT
8	Problem solving two and three point crosses			1	AC	NOV
9	Sex Linkage			1	AC	NOV
10	Sex linked pedigree analysis			1	AC	NOV
11	QA discussion			1	AC	NOV
12**						
TOTAL HOURS				11 hrs		

**Total 12 hours allotted for this unit-3 has been adjusted to 11 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			4			
NAME OF THE UNIT/MODULE			Variation in chromosome number and structure			
TOTAL HOURS	8Hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/ TOPIC			HR	TEACHER	MONTH
1	Deletion and duplication			1	SDG	NOV
2	Inversion			1	SDG	NOV
3	Translocation			1	SDG	DEC
4	Position effect			1	SDG	DEC
5	Euploidy			1	SDG	DEC
6	Aneuploidy			1	SDG	DEC
7	Doubt clearing class			1	SDG	DEC
8**	Class Test			1	SDG	DEC
TOTAL HOURS				8 hrs		

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			5			
NAME OF THE UNIT/MODULE			Gene mutations			
TOTAL HOURS	6 Hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/ TOPIC			HR	TEACHER	MONTH
1	Types of mutations and molecular basis of mutations			1	AC	DEC
2	mutagens – physical and chemical			1	AC	DEC
3	detection of mutations			1	AC	DEC
4	CIB method			1	ABJ	DEC
5	Role of transposons in mutation			1	ABJ	DEC
6	DNA repair mechanisms			1	ABJ	DEC
TOTAL HOURS				6 hrs		

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			6			
NAME OF THE UNIT/MODULE			Fine structure of gene			
TOTAL HOURS	6Hrs (adjusted to 5 Hrs)	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/ TOPIC			HR	TEACHER	MONTH
1	Classical vs molecular concepts of gene			1	ABJ	AUG
2	Cis-Trans complementation test for functional allelism			1	ABJ	AUG
3	Structure of phage T4			1	ABJ	SEPT
4	Structure of rII locus			1	ABJ	SEPT
5	Class test			1	ABJ	SEPT
6**						
TOTAL HOURS				5hrs		

**Total 6 hours allotted for this unit-6 has been adjusted to 5 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			7			
NAME OF THE UNIT/MODULE			Population and Evolutionary Genetics			
TOTAL HOURS	6 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	LECTURE HEAD/ TOPIC			HR	TEACHER	MONTH
1	Allele frequencies			1	ABJ	SEPT
2	Genotype frequencies			1	ABJ	SEPT
3	Hardy-Weinberg Law, role of natural selection, mutation			1	ABJ	NOV
4	Role of natural selection, mutation genetic drift			1	ABJ	NOV
5	Genetic variation and speciation			1	ABJ	NOV
6	Doubt clearing class			1	ABJ	DEC
TOTAL HOURS				6 hrs		

**LESSON PLAN FOR
SEMESTER: III**

PRACTICAL

Core Course VII

Genetics (BOTACOR07P)

(CREDIT: 2)

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR HONS)

NAME OF THE DEPARTMENT										BOTANY					
HOD		DR. ARUNEEMA BARDHAN													
INITIALS OF FACULTIES				AC	AB	SDG	SS	ABJ							
PERIOD OF SEMESTER			FROM JULY 2022 TO DECEMBER 2022							HONS √		GENERAL			
SEM	3	Core Course		7				CREDIT POINT	2	Course Code	BOTACOR07P				
Name of the Course				Genetics											
Course Co-ordinator				DR. ARUNEEMA BARDHAN											
TOTAL MARKS		25	TH				TUT			PRAC	√				
TOTAL HOURS		60 Hrs													
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC										PRACTICAL					
NAME OF THE UNIT/MODULE										Genetics Practical					
TOTAL HOURS		60 HRS (adjusted to 58 Hrs)		THEORY		TUTORIAL		PRAC	√						
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)															
SL	TOPIC								HR	TEACHER	MONTH				
	Unit 1														
1.	Introduction to chromosome staining, aceto-orcein and acto-carmine stain preparation.								2	SDG	AUG				
2.	Squash and smear techniques.									SDG	AUG				
3.	Study of Mitosis through temporary squash preparation (<i>Allium cepa</i>).								2	SDG	AUG				
4.	Study of Mitosis through temporary squash preparation (<i>Lens esculentus</i>).									SDG	AUG				
5.	Study of Mitosis through temporary squash preparation (<i>Aloe vera</i>).								2	SDG	AUG				
6.	Study of Meiosis through temporary smear preparation (<i>Allium cepa</i>).								2	SDG	AUG				
7.	Study of Meiosis through temporary smear preparation (<i>Rhoeo discolor</i>).								2	SDG	AUG				
8.	Practice class/ Doubt clearing class								2	SDG	SEPT				
	Unit 2														
9.	Mendel's laws through seed ratios(3:1, 1:1). Laboratory exercises in probability and chi-square.								2	SDG	SEPT				
10.	Mendel's laws through seed ratios (9:3:3:1, 1:1:1:1). Laboratory exercises in probability and chi-square.								2	SDG	SEPT				
11.	Practice class/ Doubt clearing class								2	SDG	SEPT				
	Unit 3														
12.	Chromosome mapping using point test cross data								2	SDG	SEPT				
13.	Chromosome mapping using point test cross data (Repeat class)								2	SDG	SEPT				
	Unit 4														
14.	Study of Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1)								2	SDG	SEPT				
15.	Study of Incomplete dominance and gene interaction through seed ratios (13:3, 15:1)								2	SDG	SEPT				

16.	Study of Incomplete dominance and gene interaction through seed ratios (12:3:1, 9:3:4)	2	SDG	OCT
17.	Practice class/ Doubt clearing class	2	SDG	NOV
.	Unit 5			
18.	Study of aneuploidy: Down's, Klinefelter's (demonstration through pictures).	2	SDG	NOV
19.	Study of aneuploidy: Turner's syndromes (demonstration through pictures).	2	SDG	NOV
	Unit:6			
20.	Photographs and permanent slides showing translocation ring, Laggards and Inversion Bridge.	2	SDG	NOV
21.	Photographs and permanent slides showing Multipolarity, Sticky Bridge.	2	SDG	NOV
22.	Photographs and permanent slides showing Fragmentation and Pollen mitosis.	2	SDG	NOV
23.	Practice class/ Doubt clearing class	2	SDG	NOV
	Unit:7			
24.	Study of human genetic traits: Sickle cell anemia, xeroderma pigmentosum (demonstration through pictures).	2	SDG	DEC
25.	Study of human genetic traits: albinism, red-green colour blindness (demonstration through pictures).	2	SDG	DEC
26.	Study of human genetic traits: widow's peak, rolling of tongue (demonstration through pictures).	2	SDG	DEC
27.	Study of human genetic traits: Hitchhiker's thumb and attached ear lobe (demonstration through pictures).	2	SDG	DEC
28.	Practice class/ Doubt clearing class	2	SDG	DEC
29.	Practice class/ Doubt clearing class	2	SDG	DEC
30.	Practice class/ Doubt clearing class		-	-
	TOTAL	58 HRS		

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SEM III: SKILL ENHANCEMENT COURSE

Plant Diversity and Human Welfare

Course code: BOTSSEC01M (Credits 2)

COURSEOUTCOME: The course deals with plant diversity and human welfare. Now a day's loss of biodiversity is a major problem which is threatening the earth. Through this course student will come to know the causes of diversity loss and also about the organization who have been continuously working for biodiversity management and sustainable development. We are hopeful enough that the course will be helpful in growing student's awareness about conservation of nature and natural recourses.

On completion of the course, students will be able to:

1. Know about Genetic diversity, Species diversity and Plant diversity at the ecosystem level.
2. Understand the values and uses of Biodiversity and methodologies for valuation.
3. Know about the Organizations associated with biodiversity management and Biodiversity legislation and conservations.
4. Know various utilization and commercial aspects of forestry.

LESSON PLAN FOR

THEORY

(BOTSSEC01M)

BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR HONS)									
NAME OF THE DEPARTMENT					BOTANY				
HOD		DR. ARUNEEMA BARDAHN							
INITIALS OF FACULTIES		AC	AB	SDG	SS	ABJ			
PERIOD OF SEMESTER		FROM JULY 2022 TO DECEMBER 2022				HONS √		GENERAL √	
SEM	3	SEC		1	CREDIT POINT	2	Course Code	BOTSSEC01M	
Name of the Course		Plant Diversity and Human Welfare							
Course Co-ordinator		DR. ARUNEEMA BARDAHN							
TOTAL MARKS	25	TH	√	TUT		PRAC			
TOTAL HOURS	30 hrs (Adjusted to 29 hrs)								
UNIT/ SECTION/ GROUP/ MODULE/ TOPIC			1						
NAME OF THE UNIT/MODULE			Plant diversity and its scope						
TOTAL HOURS	8 hrs 7 hrs	THEORY	√	TUTORIAL		PRAC			
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)									
SL	TOPIC					HR	TEACHER	MONTH	
1	Genetic diversity, Species diversity and Plant diversity at the eco-system level					1	AB	AUG	
2	Agrobiodiversity					1	AB	AUG	
3	Cultivated plant taxa, wild taxa					1	AB	AUG	
4	Values and uses of Biodiversity: Ethical and aesthetic values					1	AB	SEPT	
5	Precautionary principle					1	AB	SEPT	
6	Methodologies for valuation					1	AB	SEPT	
7	Uses of plants and Uses of microbes					1	AB	OCT	
8**									
TOTAL HOURS						7 hrs			

*** Alloted total 8 hours adjusted to 7 hours.

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		2				
NAME OF THE UNIT/MODULE			Loss of Biodiversity			
TOTAL HOURS	8 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	TOPIC			HR	TEACHER	MONTH
1	Loss of genetic diversity, Loss of species diversity			1	AB	NOV
2	Loss of ecosystem diversity Loss of agrobiodiversity			1	AB	NOV
3	Projected scenario of Bio-diversity loss			1	AB	NOV
4	Management of Plant Biodiversity: Organizations associated with biodiversity management-Methodology for execution- IUCN, UNEP, UNESCO			1	AB	NOV
5	Management of Plant Biodiversity: Organizations associated with biodiversity management-Methodology for execution- WWF, NBPGR			1	AB	DEC
6	Biodiversity legislation and conservations,			1	AB	DEC
7	Biodiversity information management and communication			1	AB	DEC
8**	Class Test			1	AB	DEC
TOTAL HOURS				7 hrs		

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		3				
NAME OF THE UNIT/MODULE		Conservation of Biodiversity:				
TOTAL HOURS	8 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	TOPIC			HR	TEACHER	MONTH
1	Conservation of genetic diversity			1	SDG	AUG
2	Conservation of species diversity			1	SDG	AUG
3	Conservation of ecosystem diversity			1	SDG	SEPT
4	<i>In situ</i> conservation			1	SDG	SEPT
5	<i>En situ</i> conservation			1	SDG	SEPT
6	Social approaches to conservation.			1	SDG	SEPT
7	Social approaches to conservation			1	SDG	SEPT
8	Biodiversity awareness programmes and Sustainable development.					NOV
	TOTAL HOURS			7 hrs		

UNIT/ SECTION/ GROUP/ MODULE/ TOPIC		4				
NAME OF THE UNIT/MODULE		Role of plants in relation to Human Welfare				
TOTAL HOURS	6 hrs	THEORY	√	TUTORIAL		PRAC
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL	TOPIC			HR	TEACHER	MONTH
1	Importance of forestry			1	SDG	NOV
2	Utilization and commercial aspects: Avenue trees and Ornamental plants of India			1	SDG	NOV
3	Alcoholic beverages through ages,			1	SDG	DEC
4	Fruits and nuts: Important fruit crops their commercial importance			1	SDG	DEC
5	Wood and its uses			1	SDG	DEC
6	Class Test			1	SDG	DEC
	TOTAL HOURS			6 hrs		

**** Total allotted 30 hours for this course has been adjusted to 29 hours keeping the total content unchanged.

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