

AGRO METEOROLOGY & CLIMATE CHANGE		Semester	VII
Course Code	BSA701	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 Hours Theory + 8-10 Lab slots	Total Marks	100
Credits	4	Exam Hours	3
Examination type (SEE)	Theory + Practical		
<p>Course objectives:</p> <ul style="list-style-type: none"> • Understand about agricultural meteorology, Earth atmosphere, solar radiation, weather variables, precipitation, types of precipitation, Artificial rainmaking, mechanism and importance in Indian agriculture • Understand about weather forecast and their uses. • Understand about climatic change and its impact on regional and national Agriculture 			
<p>Teaching-Learning Process (General Instructions) These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> 1. . Lecturer method (L) need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. 2. Use of Video/Animation to explain the functioning of various concepts. 3. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking. 4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it. 5. Introduce new software's in the field of farm management. 6. Discuss how every concept can be applied to the real world – and when that's possible, it helps improve the students' understanding. 			
Module-1			
<p>Meaning and scope of agricultural meteorology-Earth atmosphere- its composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height; Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze.</p>			
Module-2			
<p>Nature and properties of solar radiation: Solar constant, depletion of solar radiation, short wave, long wave and thermal radiation, net radiation, albedo; Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature.</p>			
Module-3			

Energy balance of earth: Atmospheric humidity, concept of saturation, vapour pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; Artificial rainmaking.	
Module-4	
Monsoon -mechanism and importance in Indian agriculture, Weather hazards – drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold wave. Agriculture and weather relations; Modifications of crop microclimate, climatic normal for crop and livestock production.	
Module-5	
Weather forecasting -types of weather forecast and their uses. Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture.	
PRACTICAL COMPONENT OF IPCC (May cover all/ major module)	
Sl. No	Experiments
1	Visit and study of Agrometeorological Observatory and site selection of observatory
2	Exposure of instruments and weather data recording
3	Measurement, Tabulation and analysis of Rainfall
4	Measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis.
5	Measurement of soil temperature and computation of soil heat flux
6	Determination of vapour pressure and calculation of relative humidity
7	Measurement of wind speed and wind direction, establishment of windrows.
8	Measurement and determination of Evaporation
9	Measurement of albedo and sunshine duration, computation of Radiation Intensity using BSS
10	Measurement of total, shortwave and longwave radiation, and its estimation using Planck's intensity law
11	Measurement of atmospheric pressure and analysis of atmospheric conditions
12	Measurement of Dew point temperature
13	Study of Automatic Weather Observatory Station (AWOS)
14	Weather forecasting and Agrometer advisory service and Visit to DAMU or GKMS unit
15	Synoptic charts and Weather reports
Course outcome (Course Skill Set) At the end of the course, the student will be able to:	
<ol style="list-style-type: none"> 1. Agricultural meteorology, 2. Earth atmosphere, solar radiation, weather variables, precipitation, types of precipitation 	

3. Artificial rainmaking, mechanism and importance in Indian agriculture,
4. Weather hazards and their influence on crop protection
5. Weather forecast and climatic change and its impact on regional and national Agriculture

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

The IPCC means the practical portion integrated with the theory of the course. CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.

CIE for the theory component of the IPCC

- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks**).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test (**duration 02/03 hours**) after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks**.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.

2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

- The minimum marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum marks-25) in the theory component and 10 (40% of maximum marks -25) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 sub-questions are to be set from the practical component of IPCC, the total marks of all questions should not be more than 20 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify for the SEE. Marks secured will be scaled down to 50.
- The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Suggested Learning Resources:

Books

1. Sacheti A. K. 1985. Agricultural Meteorological Instructional Cum Practical Manual (Ed.) NCERT Publication, New Delhi.
2. Lal, D.S. 2005 Climatology, Sharda Pustak Bhawan, Allahabad.
3. Varshneya, M.C. and Balakrishna, Pillai, 2003. Text book of Agricultural Meteorology. ICAR New- Delhi.
4. Sahu, D.D., 2007. Agrometeorology and Remote sensing: Principles and Practices, Agrobios (India), Jodhpur.
5. Murithy, K, and Radha, V. 1995. Practical Manual on Agricultural Meteorology , Kalyani Publishers, New-Delhi

Web links and Video Lectures (e-Resources):

1. <https://www.youtube.com/watch?v=yafA8sHJPCk>
2. https://www.youtube.com/watch?v=0TZ5X25_caA
3. <https://www.youtube.com/watch?v=yafA8sHJPCk&list=PLg6dY4ATfXEsfKGRkZs2veUPpDpHRfLL>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminars
- Mini Projects

PRINCIPLES OF SEED TECHNOLOGY		Semester	VII
Course Code	BSA702	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 Hours + 8-10 Lab slots	Total Marks	100
Credits	4	Exam Hours	3
SEE Examination	Theory + Practical		
<p>Course objectives: This course will enable students to</p> <ol style="list-style-type: none"> 1. Understand about Seed technology, genetic purity, seed quality 2. Understand about production of important cereals, pulses, oilseeds 3. Understand genetically modified crops, Seed drying, Seed treatment and storage 4. Understand Measures for pest and disease control during storage, Seed marketing 			
<p>Teaching-Learning Process (General Instructions) These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> 1. Lecturer method (L) need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. 2. Use of Video/Animation to explain the functioning of various concepts. 3. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking. 4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it. 5. Introduce new software's in the field of farm management. 6. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. 			
Module-1			
<p>Seed and seed technology: introduction, definition and importance. Deterioration causes of crop varieties and their control; Maintenance of genetic purity during seed production, seed quality; Definition, Characters of good quality seed, different classes of seed.</p>			
Module-2			
<p>Foundation and certified seed production of important cereals, pulses, oilseeds, fodder and vegetables. Seed certification, phases of certification, procedure for seed certification, field inspection. Seed Act and Seed Act enforcement. Duty and powers of seed inspector, offences and penalties. Seeds Control Order 1983, Varietal Identification through Grow Out Test and Electrophoresis, Molecular and Biochemical test.</p>			
Module-3			
<p>Detection of genetically modified crops, Transgene contamination in non-GM crops, GM crops and organic seed production. Seed drying, processing and their steps, seed testing for quality assessment,</p>			

seed treatment, its importance, method of application and seed packing. Seed storage; Visit to seed production farms, seed testing laboratories and seed processing plant.	
Module-4	
General principles , stages and factors affecting seed longevity during storage. Measures for pest and disease control during storage. Seed marketing: structure and organization, sales generation activities, promotional media.	
Module-5	
Factors affecting seed marketing , Role of WTO and OECD in seed marketing. Private and public sectors and their production and marketing strategies. Seed certification: Procedure, Field inspection, Preparation of field inspection report.	
PRACTICAL COMPONENT OF IPCC (May cover all/ major module)	
Sl. No	Experiments
1	Study on external and internal seed structure and identification of major cereals, pulses, oilseed, cotton, forage crops and vegetable crops
2	Practicing supplementary pollination techniques in hybrid rice and detasselling techniques in hybrid maize
3	Practicing emasculation and dusting technique in cotton and vegetables and supplementary pollination in sunflower
4	Practicing pre-germinative technique and female flowers production enhancement in cucurbits
5	Physiological maturity indices in various crops and seed extraction in vegetables
6	Visit to seed production plot
7	Seed enhancement techniques-coating priming and pelleting
8	Seed certification- field inspection and counting procedure
9	Seed testing-seed sampling, mixing and dividing
10	Estimation of seed moisture content and physical purity analysis
11	Seed germination and quick viability test evaluation
12	Genetic purity test-grow out test and electrophoresis
13	Seed health testing-methods
14	Seed and seedling vigour tests
15	Seed production planning and economics
16	Visit seed processing unit and seed testing laboratory
Course outcome (Course Skill Set)	
At the end of the course the student will get familiarize with:	
1. Seed technology, genetic purity, seed quality	

2. Production of important cereals, pulses, oilseeds, genetically modified crops
3. Seed drying, Seed treatment and storage
4. Measures for pest and disease control during storage, Seed marketing

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

The IPCC means the practical portion integrated with the theory of the course. CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.

CIE for the theory component of the IPCC

- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks**).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test (**duration 02/03 hours**) after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks**.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

5. The question paper will have ten questions. Each question is set for 20 marks.

6. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
7. The students have to answer 5 full questions, selecting one full question from each module.
8. Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

- The minimum marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum marks-25) in the theory component and 10 (40% of maximum marks -25) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 sub-questions are to be set from the practical component of IPCC, the total marks of all questions should not be more than 20 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify for the SEE. Marks secured will be scaled down to 50.
- The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Suggested Learning Resources:

Books

1. Agarwal, R.L.1991.Seed Technology. Oxford & IBH Publishing Co. Delhi
2. Agarwal, P.K. 1999. Seed Technology. ICAR, New Delhi.
3. Subir Sen and Nabinanda Ghosh.1999. Seed Science and Technology. Kalyani Publishers. New Delhi.
4. Dhirenra Khare and Mohan S. Bhale.2000. Seed Technology. Scientific Publishers (India), Jodhpur.
5. Maloo,S.R., Intodia, S.K. and Pratap Singh.2008. Beej Pradyogiki. Agrotech Publishing Academy.
6. A.K. Joshi and B.D. Singh.2005. Seed Technology. Kalyani Publishers, New Delhi.

Web links and Video Lectures (e Resources)

1. <https://www.youtube.com/watch?v=j6MwsmmYql8&list=PLMwQyDnbQLRWkULTTg3wMpi8YK04PnzzP>
2. <https://www.youtube.com/watch?v=7748hwRbJvM&list=PLvSukZ-10KuMRf9HRpd9I2ADa9tnJ-pR3>
3. <https://www.youtube.com/watch?v=dRLhSzP5YWg>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminars
- Mini Projects

Design of Agricultural Machinery		Semester	VII
Course Code	BSA703	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	4:0:0:0	SEE Marks	50
Total Hours of Pedagogy	52 Hours	Total Marks	100
Credits	4	Exam Hours	3 Hours
Examination nature (SEE)	Theory		
Course objectives: <ul style="list-style-type: none"> • To enable the students to understand the general procedure for designing any machine parts. • To know the design of cotter and knuckle joints, leavers, springs, various types of shafts, couplings bearings and various IC engine parts. 			
Teaching-Learning Process (General Instructions) These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none"> 1. Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations. 2. Chalk and Talk method for teaching basic concepts. 3. Arranging visits to farmers' fields to expose pupils to real time farming situations. 4. Adopt collaborative (Group Learning) Learning in the class. 5. By giving assignments and presentation tasks to students. 6. Exploring information from research publications and regulatory documents 			
Module-1			
Machine Design – Definition, Classification of machine design, General considerations in machine design, General procedure in machine design. Fundamental units, Mass and Weight, inertia, laws of motion, force, moment of force, couple mass density, torque, work, power and energy. Simple stress in machine parts-Introduction, load, stress, strain, tensile stress and strain, compressive stress and strain, Young's modulus, shear stress and strain, shear modulus, bearing stress.			
Module-2			
Stress strain diagram, working stress , Factor of safety and selection, stresses in composite bars, thermal stress, linear and lateral strain, Poisson's ratio, volumetric strain, bulk modulus and relations, impact stress, resilience. Principal stresses and principal planes-Theories of failure under static load, Rankine's theory, Guest's theory, maximum distortion theory, stress concentration, notch sensitivity - Important terms used in Limit System, fits, types of cotter joints, design of socket and spigot cotter joint.			
MODULE-3			
Levers – Introduction, application of levers in engineering practice, design of lever hand levers, foot lever, cranked lever. Springs-Introduction, types of springs, material for helical springs, spring wire, terminology, springs in series and parallel, flat spiral springs, leaf springs, construction of leaf springs.			

Module-4
Shafts -Material used for shafts, types and sizes of shafts, stresses in shafts, maximum working stresses. Design of shafts, for twisting moment, bending moments, fluctuating loads, axial load in addition to combined twisting and bending loads, design of shafts on the basis of rigidity. Keys and coupling-Introduction, types of keys, sunk keys, saddle keys, tangent keys, round keys, splines, forces acting on sunk keys, strength of sunk key.
Module-5
Design of Machinery: Design of Tillage equipment –a. Cultivator (Manually Drawn and Power Operated); b. Rotavator (Power Operated); c. M.B Plough (Manually Drawn and Power Operated). Design of Sowing Machinery-Tractor Operated seed cum Fertilize drill. Design of harvesting equipment: a. Reaper, b. Mower. Design of Thresher: Power operated thresher (Spike tooth and Rasp bar), Design of spraying equipment – Tractor mounted Boom sprayer
Course outcome (Course Skill Set) At the end of the course the student will be able to: 1: Analyze the general considerations in machine design. 2: Calculate the design Parameters of socket, spigot cotter joint and Knuckle joint. 3: Choose appropriate levers and springs for a given application. 4: Design shafts and keys for the specified conditions.CO5: Design Tillage equipment.
Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.
Continuous Internal Evaluation: <ul style="list-style-type: none"> • For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks. • The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered • Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. • For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.
Internal Assessment Test question paper is designed to attain the different levels of Bloom’s taxonomy as per the outcome defined for the course.
Semester-End Examination: Theory SEE will be conducted by University as per the scheduled timetable, with common

question papers for the course (**duration 03 hours**).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. Machine Design – Khurmi R.S. and Gupta J.K. 1996, Eurasia Publishing House Pvt. Ltd., New Delhi.
2. Machine Design – Jain R.K. 1991. Khanna Publishers, New Delhi

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=PEojc_K7u9U&list=PLbRMhDVUMngfpJp_tkeFAy_qF20vlwn3k&ab_channel=IITKharagpurJuly2018
2. https://www.youtube.com/watch?v=DsipD8fLjuU&ab_channel=IITKharagpurJuly2018

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminars
- Mini Projects

MANURES, FERTILIZERS AND SOIL FERTILITY MANAGEMENT		Semester	VII
Course Code	BSA714A	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 Hours	Total Marks	100
Credits	3	Exam Hours	3
Examination type (SEE)	Theory		
<p>Course objectives: This course will enable students to</p> <ul style="list-style-type: none"> • Understand about organic manures, preparation of bulky and concentrated manures, Green/leaf manures • Understand about Chemical fertilizers, micronutrients, Fertilizer Storage • Understand about soil fertility and plant nutrition, Mechanisms of nutrient transport to plants • Understand about fertilizer recommendations to crops 			
<p>Teaching-Learning Process (General Instructions) These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> 1. Lecturer method (L) need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. 2. Use of Video/Animation to explain the functioning of various concepts. 3. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking. 4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it. 5. Introduce new software's in the field of farm management. 6. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. 			
Module-1			
<p>Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches.</p>			
Module-2			
<p>Integrated nutrient management. Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, Soil amendments, Fertilizer Storage, Fertilizer Control Order.</p>			
Module-3			

<p>History of soil fertility and plant nutrition. criteria of essentiality. role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants.</p>
<p>Module-4</p>
<p>Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants.</p>
<p>Module-5</p>
<p>Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.</p>
<p>Course outcome (Course Skill Set) At the end of the course the student will familiarize with:</p> <ol style="list-style-type: none"> 1. Organic manures, preparation of bulky and concentrated manures, Green/leaf manures, 2. Chemical fertilizers, micronutrients, Fertilizer Storage, soil fertility and plant nutrition, 3. Mechanisms of nutrient transport to plants, fertilizer recommendations to crops
<p>Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p>
<p>Continuous Internal Evaluation:</p> <ul style="list-style-type: none"> • There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component. • Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks • Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks) • The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks.
<p>Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</p>

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions (for 100 marks), selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:**Books**

1. Manures, fertilizers and soil fertility management by Das Mohan
2. Biswas, T.D. and Mukherjee, S.K. (2006) Text book of soil science. Tata McGraw Hill publishing Co. Ltd, New Delhi
3. Das, D.K. (2002) Introductory Soil Science, Kalyani publisher, New Delhi
4. Rai, M.M. (2002) Principal of Soil Science, Mac Millan India Ltd, New Delhi
5. Mehra R.K. (2004) Text book of Soil Science, ICAR New Delhi
6. ISSS (2002) Fundamental of Soil Science Div. of Soil Science, IARI, New Delhi

Web links and Video Lectures (e-Resources):

1. <https://www.youtube.com/watch?v=5E9e02qAS14&list=PL8h5E6mWCuw37T3iOm4KR2UM7PAvoUZfR>
2. https://www.youtube.com/watch?v=XzeBUuZl_Bw
3. <https://www.youtube.com/watch?v=TjbxOEEOCh0>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminars
- Mini Projects

FUNDAMENTALS OF RENEWABLE ENERGY SOURCES		Semester	VII
Course Code	BSA714B	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40 Hours	Total Marks	100
Credits	3	Exam Hours	3
Examination type (SEE)	Theory		
<p>Course objectives: This course will enable students to</p> <ol style="list-style-type: none"> 1. Understand energy scenario, energy sources and their utilization 2. Learn about solar energy conservation methods 3. Study the principles of renewable energy conservation systems 			
<p>Teaching-Learning Process (General Instructions) These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> 1. Lecturer method (L) need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. 2. Use of Video/Animation to explain the functioning of various concepts. 3. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking. 4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it. 5. Introduce new software's in the field of farm management. 6. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. 			
Module-1			
<p>Renewable Energy Sources: Concept and limitation of Renewable Energy Sources (RES), Criteria for assessing the potential of RES, Classification of RES, Solar, Wind, Geothermal, Biomass, Ocean energy sources, Comparison of renewable energy sources with non-renewable sources.</p>			
Module-2			
<p>Solar Energy: Energy available from Sun, Solar radiation data, solar energy conversion into heat through, Flat plate and Concentrating collectors, different solar thermal devices-Applications of solar energy sources.</p>			
Module-3			
<p>Principle of natural and forced convection drying system: Solar Photo voltaics: p-n junctions. Solar cells, PV systems, Stand alone, Grid connected solar power station, Calculation of energy through photovoltaic power generation and cost economics.</p>			

Module-4

Wind Energy: Energy available from wind, General formula, Lift and drag. Basis of Wind energy conversion, Effect of density, Frequency variances, Angle of attack, Wind speed, Types of Windmill rotors, Determination of torque coefficient, Induction type generators, Working principle of wind power plant.

Module-5

Biomass Energy: Photosynthesis, photosynthetic oxygen production, energy plantation. Bio Chemical Route: Biogas production from organic wastes by anaerobic fermentation, Bio gas plants-KVIC, Janta, Deenbandu models, factors affecting bio gas generation. **Geothermal Energy-**Forms of geothermal energy, Dry steam, wet steam, hot dry rock and magnetic chamber systems.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

1. Identify renewable energy sources and their utilization.
2. Understand principles of energy conversion from alternate sources including wind, geothermal,
3. Understand the applications of solar energy
4. Understand the concept of wind energy and their utilization
5. Understand the concept of biomass energy and their utilization

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component.
- Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks)
- The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's

taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions (for 100 marks), selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:

Books

7. Fundamentals and Applications of Renewable Energy by Mehmet Kanoglu (Author), Yunus A. Cengel (Author), John M. Cimbala (Author)
8. Fundamentals of renewable energy processes by Aldo da Rosa
9. Wind and Solar Power Systems: Design, Analysis, and Operation Mukund R. Patel and Omid Beik.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=mh51mAUexK4&list=PLwdnzlV3ogoXUifhvYB65lLJCZ74o_fAk
2. <https://www.youtube.com/watch?v=HNjwoe4mSkE&list=PLyqSpQzTE6M-ZgdjYukayF6QevPv7WE-r>
3. https://www.youtube.com/watch?v=wsz-LEFuLdc&list=PLLy_2iUCG87A7TdFpl6_xdgo-aYskxjXb

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminars
- Mini Projects

REMOTE SENSING AND GIS APPLICATIONS		Semester	VII
Course Code	BSA714C	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 Hours	Total Marks	100
Credits	3	Exam Hours	3
Examination type (SEE)	Theory		
<p>Course Objectives: This course will enable students to</p> <ul style="list-style-type: none"> • To equip the students with the knowledge on techniques of Remote Sensing and GIS applications for land and water resources management. • To impart the knowledge on advance techniques such as hyper spectral, thermal and LiDAR units scanning for mapping, modelling and monitoring. • To enable the students to use GIS software to perform different spatial and satellite image analysis. 			
<p>Teaching-Learning Process (General Instructions) These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> 1. Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations. 2. Chalk and Talk method for teaching basic concepts. 3. Arranging visits to farmers' fields to expose pupils to real time farming situations. 4. Adopt collaborative (Group Learning) Learning in the class. 5. By giving assignments and presentation tasks to students. 6. Exploring information from research publications and regulatory documents 			
Module-1			
<p>Remote sensing: Introduction to Remote Sensing, stages of remote sensing, Data acquisition and analysis, Sensors- Remote sensing types and applications, important features of Indian Remote Sensing Satellites, Electromagnetic spectrum: Different bands, Resolution, Spectral response Pattern-multi spectral data use, modern remote sensing technology versus conventional aerial photography.</p>			
Module-2			
<p>Visual image interpretation: Image interpretation, Basic principles of image interpretation, Factors governing the quality of an image, Factors governing interpretability, visibility of objects, Elements of image interpretation, Techniques of image interpretation, Digital image processing- Digital image, pixel, resolution, Image processing overview; Image restoration- Radiometric correction-DN (Digital Number value)-Noise removal and correction, Atmospheric error and correction, Geometric Error and correction;</p>			
Module-3			

Image enhancement -Contrast manipulation-gray level, threshold level, slicing-contrast stretching, Digital image processing-spatial Feature Manipulation-spatial filtering convolution edge enhancement. Vegetation Indices: Digital image processing, vegetation components, supervised and unsupervised image classification and output stage data merging.

Module-4

Remote sensing in agriculture: Progress and prospects of yield assessment, remote sensing application in water resources development, remote sensing in soil conservation, aerial photo interpretation for water resources development and soil conservation survey. Remote sensing in geology and soil mapping.

Module-5

Geographical Information System: History of development of GIS: Definition, Basic components and standard GIS packages. Data entry, storage and maintenance, Data types-spatial, non-spatial (attribute-date), Data structure, data format, point line vector-raster polygon, Object structural model, files, files organization, Data base management, systems (DBMS), Entering data in computer-digitizer-scanner data compression.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

1. Understand the importance of protected cultivation in precision farming
2. Know about various components, shape, types of green houses
3. Know about design and construction of green houses in different agro-climatic zones
4. Know about greenhouse cooling and heating systems, environmental parameter and control, ventilation systems
5. To assess different root media, micro-irrigation, fustigation, planting techniques in green housecultivation. Hydroponics, post-harvest management, pest management and economic aspects of a green house.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component.
- Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be

planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks)

- The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions (for 100 marks), selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:

Books

1. Remote sensing and Geographical information system, B.S. publications.
2. Introduction to remote sensing, James B and Compell, Published by Taylor & Francis Limited.
3. Remote Sensing and Image Interpretation, Lillesand, Kiefer and Chipman Published by Wiley.
4. Basics of remote Sensing and GIS, University Science Persons.
5. Remote Sensing and GIS by Basudeb Bhatta, Oxford University Persons, NewDelhi.
6. Fundamentals of Remote Sensing, George Joseph and C. Jeganathan, Universities Press Publisher.
7. Remote Sensing And Geographic Information System Paper, Chandra, Narosa Publisher.

Web links and Video Lectures (e-Resources):

1. <http://nptel.ac.in/downloads/105108077/>
2. http://civil.iisc.ernet.in/~nagesh/rs_gis.htm
3. http://geology.wlu.edu/harbor/geol260/lecture_notes/notes.html

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminars
- Mini Projects

DRONE TECHNOLOGY		Semester	VII
Course Code	BSA714D	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 Hours	Total Marks	100
Credits	3	Exam Hours	3
Examination type (SEE)	Theory		
Course objectives:			
This course will enable students to			
<ul style="list-style-type: none"> • Familiarization with Drone Parts • To learn assembling of Drone • Preparation for Drone for Flight, making flight plan and basic drone flight training • Understand the debugging and repairing of the drone • Understand the operation of Drone for different Applications 			
Teaching-Learning Process (General Instructions)			
These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"> 1. Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations. 2. Chalk and Talk method for teaching basic concepts. 3. Arranging visits to farmers' fields to expose pupils to real time farming situations. 4. Adopt collaborative (Group Learning) Learning in the class. 5. By giving assignments and presentation tasks to students. 6. Exploring information from research publications and regulatory documents 			
Module-1			
Flight Dynamics of Aerial Vehicles -Definitions of Drone, UAV, RPA, Quad Copters-Basic Components and Categories-Principles of Flight-Flight Maneuvers-Airframes Creating a Frame: Materials, Different Frame Shapes-Building Airframes-Flight dynamics. Applications -Future potential-Comparison with other aerial vehicles			
Module-2			
Hardware Anatomy of Quadcopter: Power Train-Propellers, Motors- Total Lift-Electronic Speed Controllers-Flight Battery-Radio transmitter and receiver-Flight Controller-GPS, Compass, Camera Assembling for Quad copter-Connectors, Mounting of Propellers and Powering up.			
Module-3			
Key Flight Safety Rules -Preflight Checklist and Flight Log Information-Flight Instructions- Repair and Maintenance: Crash analysis, Common issues, Voltage testing. Test and troubleshoot Flight Controller Board (FCB), Electronic Speed Controller (ESC), and its associated peripherals. Perform programming and configure the flight control board (FCB).			

Module-4
Perform calibration of the compass, Lidar, and gyro sensor- The test communication link between FCB and RF transceiver. Write and upload computer code to FCB to test sensor results. Test and record data of motor connectivity with ESC. Perform motor rotation using FCB and ESC. Test signal flow into the drone to test ESC parameters on FCB to check its operation. Write and upload computer code to FCB to ESC working
Module-5
Real World Applications and Case Studies- Beneficial Drones, Aerial Photography, Mapping and Surveying, Precision Agriculture, Search and Rescue, Infrastructure Inspection, and Conservation. Case Studies: Agriculture Weed Classification, Microdrone surveillances.
<p>Course outcome (Course Skill Set)</p> <p>At the end of the course, the student will be able to:</p> <ol style="list-style-type: none"> 1. Apply the concept of Flight dynamics for building Quadcopter 2. Assemble and Program the Quadcopter. 3. Perform Testing and Control operations on the Quadcopter 4. Implement Quadcopter for real world applications 5. Design and Develop the Drone
<p>Assessment Details (both CIE and SEE)</p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p>Continuous Internal Evaluation:</p> <ul style="list-style-type: none"> • There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component. • Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks • Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks) • The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks. <p>Internal Assessment Test question paper is designed to attain the different levels of Bloom's</p>

taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions (for 100 marks), selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:

Books

1. Reg Austin “Unmanned Aircraft Systems UAV design, development and deployment”, Wiley, 2010.
2. Robert C. Nelson, Flight Stability and Automatic Control, McGraw-Hill, Inc, 1998.
3. Kimon P. Valavanis, “Advances in Unmanned Aerial Vehicles: State of the Art and the Road to Autonomy”, Springer, 2007
4. Paul G Fahlstrom, Thomas J Gleason, “Introduction to UAV Systems”, UAV Systems, Inc, 1998
5. Dr. Armand J. Chaput, “Design of Unmanned Air Vehicle Systems”, Lockheed Martin Aeronautics

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=jnyQJVzRiyg&list=PL_Fsqn9m2GhU3ep-PzQ4jg8aa-oxFP8W6
2. <https://www.youtube.com/watch?v=9c769xiEXn0&list=PLFW6lRTa1g83B1HdU2mece6QLBrtspL7>
3. <https://www.youtube.com/watch?v=TO7qa8oCACI&list=PLgialSjeVyx3t4N9GroE29SbVwhYrOtL>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminars
- Mini Projects

INTRODUCTION TO FORESTRY		Semester	VII
Course Code	BSA755A	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 Hours	Total Marks	100
Credits	3	Exam Hours	3
Examination type (SEE)	Theory		
<p>Course objectives: This course will enable students to</p> <ol style="list-style-type: none"> 1. Understand the basic principles of forest ecology and structure 2. Perform basic forest measurements and sampling 3. Understand concepts of silviculture as it pertains to reproduction, intermediate management and wildlife habitat management 4. Understand Best Management Practices for forestry operations and how they can be applied 			
<p>Teaching-Learning Process (General Instructions) These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> 1. Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations. 2. Chalk and Talk method for teaching basic concepts. 3. Arranging visits to farmers' fields to expose pupils to real time farming situations. 4. Adopt collaborative (Group Learning) Learning in the class. 5. By giving assignments and presentation tasks to students. 6. Exploring information from research publications and regulatory documents 			
Module-1			
<p>Introduction-Definitions of basic terms related to forestry, Definition of Silviculture, objectives of silviculture, forest classification-16 Major types of forest with species Composition-Salient features of Indian Forest Policies. Natural regeneration-natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers with examples.</p>			
Module-2			
<p>Artificial regeneration: Objectives, choice between natural and artificial regeneration, essential preliminary considerations for AR. Crown classification of trees. Tending operations- weeding, cleaning, thinning-mechanical, ordinary, crown and advance thinning.</p>			
Module-3			
<p>Forest mensuration: Objectives-diameter measurement, instruments used in diameter measurement. Non instrumental methods of height measurement-shadow and single pole method. Instrumental methods of height measurement-geometric and trigonometric principles, instruments used in height measurement</p>			

Module-4
Tree stem form: Form factor, form quotient. measurement of volume of felled and standing trees, age determination of trees. Agroforestry-definitions, importance, Classification of Agroforestry systems, criteria of selection of trees in agroforestry.
Module-5
Different agroforestry: Different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens with regional examples. Cultivation practices of two important fast growing tree species of the region.
<p>Course outcome (Course Skill Set)</p> <p>At the end of the course, the student will be able to:</p> <ol style="list-style-type: none"> 1. Explain about the management and planning. 2. Apply the knowledge on planning, organizing, staffing, directing and controlling. 3. Describe the requirements towards the small-scale industries and project preparation. 4. Explain about preparation of project report and decide selection of industrial ownership.
<p>Assessment Details (both CIE and SEE)</p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p>Continuous Internal Evaluation:</p> <ul style="list-style-type: none"> • There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component. • Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks • Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks) • The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks. <p>Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</p>

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions (for 100 marks), selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:**Books**

1. Dwivedi.A.P. 1993.Textbook of Silviculture. International Book Distributors.
2. Khanna, L. S.1989. Principles and Practice of Silviculture. Khanna Bandhu, 7 Tilak Marg, DehraDun
3. Kumar, B. and Nair, P.K.R. (eds). 2006. Tropical Homegardens: A Time-Tested Example of Sustainable Agroforestry. Volume 3 in the Book Series “Advances in Agroforestry”. Springer Science, the Netherlands
4. Chaturvedi, A.N and L.S. Khanna. 2011. Forest Mensuration and Biometry (5th edition). KhannaBandhu. Dehra Dun. 364 pp.
5. Husch, B., Beers, T.W. and Kershaw, J. J.A. 2002.Forest Mensuration (4th edition). John Wiley & Sons, Nature.456 pp.

Web links and Video Lectures (e Resources)

1. <https://www.youtube.com/watch?v=3x4Ik8c-bqc&list=PLLtcxq1-RGPurU6dMR2syQBicJmX76ldD>
2. <https://www.youtube.com/watch?v=VMz4bI0vyAU>
3. <https://www.youtube.com/watch?v=AXNAR3oqcHQ>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminars
- Mini Projects

AGRICULTURAL FINANCE AND CO-OPERATION		Semester	VII
Course Code	BSA755B	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 Hours	Total Marks	100
Credits	3	Exam Hours	3
Examination type (SEE)	Theory		
Course objectives:			
This course will enable students to			
<ol style="list-style-type: none"> 1. Understand the meaning, scope of Agricultural finance and Co-operation 2. Understand the Credit needs in Agriculture 3. Understand the Recent trends in Agricultural Finance 4. Understand the Higher Financing Agencies- Reserve Bank of India (RBI) 5. Understand the Co-Operation in Indian Agriculture 			
Teaching-Learning Process (General Instructions)			
These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"> 1. Lecturer method (L) need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. 2. Use of Video/Animation to explain the functioning of various concepts. 3. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking. 4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it. 5. Introduce new software's in the field of farm management. 6. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. 			
Module-1			
Definition of agricultural Finance: Nature-scope-meaning-significance-micro & macro finance. Credit needs in Agriculture-meaning and definition of credit-classification of credit based on time, purpose, security, lender and borrower. Credit Analysis-Economic Feasibility Tests>Returns to investment, Repayment capacity and Risk bearing ability.			
Module-2			
Five Cs of credit - Character, Capacity, Capital, Condition and Commonsense and Seven Ps of credit - Principle of Productive purpose, Principle of personality, Principle of productivity, Principle of phased disbursement, Principle of proper utilization, Principle of payment and Principle of protection. Methods and Mechanics of Processing Loan Application. Repayment plans. Lump sum repayment /straight-end repayment, Amortized decreasing repayment, Amortized even repayment, Variable or quasi variable repayment plan, Future repayment plan and Optional repayment plan.			

Module-3
Recent trends in Agricultural Finance -Social control and Nationalization of Banks. Lead Bank Scheme-Origin-Objectives-functions and progress; Regional Rural Banks (RRBs)-origin-objectives-functions-progress-RRBs in Andhra Pradesh. Crop Loan System: Objectives-Importance-Scale of Finance-Estimation-Term Loans-Objectives and Interest Rates, Kisan Credit Card.
Module-4
Schemes for financing weaker sections: Differential Interest Rate (DIR), Integrated Rural development Programme (IRDP), Ganga Kalyan Yozana (GKY), Swarnajayanti Gram Swarozgar Yojana (SGSY), Self Help Groups etc. Crop Insurance-meaning and its- advantages-progress of crop insurance scheme in India-limitations in Application-Agricultural Insurance Company of India-National Agricultural Insurance scheme (NAIS)-salient Features-Weather insurance. Higher Financing Agencies-Reserve Bank of India (RBI)- origin-objectives and functions- role of RBI in agricultural development and finance.
Module-5
Co-Operation: Meaning-Scope, Importance and definition-principles-objectives of co-operation. Origin and history of Indian cooperative movement cooperative movement during pre-independence period-progress of cooperative movement during post- independence period. Short comings of Indian co-operative movement and remedies-recommendations of various committees-development of cooperative credit and non-credit organizations- co-operative credit structure.
Course outcome (Course Skill Set) At the end of the course the student will get familiarize with: <ol style="list-style-type: none"> 1. Explain the broad feature of Indian financial institutions with instruments to control credit in the country 2. Effectively narrate the kinds and components of money with its regulatory system. Be aware of the functions, objectives and limitations of commercial bank. 3. Identify the existence and development of non- banking financial institutions, know the important role of mutual fund. LIC investment companies etc. Utilize and effectively participate in the development process 4. Understand the conditions of financial markets and its impact in the economy. 5. Understand the macroeconomics aspects of the economy as they affect the agricultural sector
Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component.
- Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks)
- The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions (for 100 marks), selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:**Books**

1. Sacheti, A.K. 1985. Agricultural Meteorological Instructional Cum Practical Manual (Ed.) NCERT Publication, New Delhi.
2. Lal, D.S. 2005 Climatology, Sharda Pustak Bhawan, Allahabad.
3. Varshneya, M.C. and Balakrishna, Pillai, 2003. Text book of Agricultural Meteorology. ICAR, New- Delhi.
4. Sahu, D.D., 2007. Agrometeorology and Remote sensing: Principles and Practices, Agrobios (India), Jodhpur.
5. Murithy, K, and Radha, V. 1995. Practical Manual on Agricultural Meteorology, Kalyani Publishers, New-Delhi

Web links and Video Lectures (e-Resources)

1. <https://www.youtube.com/watch?v=5yQHbbxRJyA>
2. <https://www.youtube.com/watch?v=a6hXBcw7mw4>
3. <https://www.youtube.com/watch?v=WELVCSp7rNk>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminars
- Mini Projects

AGRICULTURAL WASTE MANAGEMENT		Semester	VII
Course Code	BSA755C	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 Hours	Total Marks	100
Credits	3	Exam Hours	3
Examination type (SEE)	Theory		
Course objectives:			
<p>This course will enable students to</p> <ul style="list-style-type: none"> • Understand the basics of Agricultural waste & its impact • Understand the concept of Agricultural waste management • Adopt sustainable practices for Agricultural waste management • Provide a platform for Agricultural waste management with respect to agriculture and allied sectors 			
Teaching-Learning Process (General Instructions)			
<p>These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> 1. Lecturer method (L) need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes. 2. Use of Video/Animation to explain the functioning of various concepts. 3. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking. 4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it. 5. Introduce new software's in the field of farm management. 6. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding. 			
Module-1			
Introduction to agricultural waste management: Nature and characteristics of agricultural waste and their impact on the environment, Kinds of wastes, Classification, role of soil and plants in waste management, sources of waste, impact of waste on soil and plant quality			
Module-2			
Biological processes of waste management- Utilization and Recycling of Agricultural waste, Potential of Recyclable Crop Residues and its management, In-situ management of agriculture waste,			

Module-3
Composting: Composting and Vermicomposting for bio conservation of biodegradable waste, Biogas Technology, Agricultural waste and water, air and animal resources, Impacts of waste on human, animal health and environment
Module-4
Management of bedding & litter: wasted feed, run-off from feed lots and holding areas and waste water from dairy parlors, agro-waste recycling through farming system, waste management machineries, environmental benefit of waste management.
Module-5
Nutrient status (N, P, K, secondary and micronutrients): Analysis of agricultural waste. Waste management equipment operation, Maintenance and safety hazards. Survey of different agri waste from livestock, dairy, poultry, food processing, fruit & vegetable and agri-chemicals.
<p>Course outcome (Course Skill Set)</p> <p>At the end of the course, the student will be able to:</p> <ol style="list-style-type: none"> 1. Explain about the management and planning. 2. Apply the knowledge on planning, organizing, staffing, directing and controlling. 3. Describe the requirements towards the small-scale industries and project preparation. <p>Explain about preparation of project report and decide selection of industrial ownership.</p>
<p>Assessment Details (both CIE and SEE)</p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p>Continuous Internal Evaluation:</p> <ul style="list-style-type: none"> • There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component. • Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks • Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks) • The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks.

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Semester-End Examination:

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1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions (for 100 marks), selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks.

Suggested Learning Resources:

Books

1. Principles of Management, P. C. Tripathi, P.N. Reddy, Tata McGraw Hill,
2. Dynamics of Entrepreneurial Development & Management, Vasant Desai, Publishing House.
3. Entrepreneurship Development, Poornima. M. Charantimath, Small Business Enterprises –Pearson, 2006 (2 & 4).
4. Management Fundamentals Concepts, Application, Skill, Robers Lusier Thomson
5. Entrepreneurship Development, S. S. Khanka, S. Chand & Co
6. Management, Stephen Robbins, Pearson Education/PHI, 17th Edition, 2003

Web links and Video Lectures (e Resources)

1. <https://www.youtube.com/watch?v=5jYWPRcCiNs&list=PLIwmhEE4g3TTh6-USgHIDjj1HSCu2PS0i>
2. <https://www.youtube.com/watch?v=EhoimBBXNIY>
3. <https://www.youtube.com/watch?v=fsNXIvzDx9w>

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