

Engineering Statistics (PCC)			
Course Code	BSA301	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40 Hrs	Total Marks	100
Credits	3	Exam Hours	3
Course objectives: Learning Objectives:			
<ul style="list-style-type: none"> The main objective of this course is to provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in agricultural science like disease modeling, climate prediction, smart agriculture and computer networks etc. 			
Module-1			
<p>Introduction to Statistics – Meaning and definition of functions, scope & limitations, collection & presentation of data (Bar & Pie diagrams), frequency distribution, measures of central tendency- mean, median, mode geometric mean, harmonic mean.</p> <p>Measures of Dispersion: Concepts & Definition, Types of Measures of Dispersion: Range, Quartile deviation, Mean Deviation, Standard Deviation, Variance, Co-efficient of Variance comparison of various measures of dispersion, graphical representation of data. (frequency polygon, cumulative frequency, histogram)</p>			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-2			
Theory of Probability: Review of basic probability theory, random variables (discrete & continuous), probability mass/density functions. Binomial, Poisson, negative binomial, Normal Distribution, and their Applications.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-3			
Sampling theory: Sampling, Sampling distribution, standard errors, test of hypothesis for means, proportions, test of significance for large samples, confidence limits for mean			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-4			
Sampling theory-II: Students t-distribution, chi-square distribution and F-Distribution, Test of significance based on normal distribution, t-distribution, F-distribution, contingency table theory of estimation and confidence intervals			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-5			
Correlation & Regression: Review of measures of central tendency and Dispersion, correlation Karl-pearson's coefficient of correlation problems. Regression analysis lines of regressions and problems. Rank correlation.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Course outcome (Course Skill Set)			
At the end of the course the student will be able to :			
<ol style="list-style-type: none"> Study and design various statistical problems Demonstrate strong basics in statistics and numerical analysis. Solve live problems in various spheres of bioscience and Agri. engineering. 			

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, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books:

1. Fundamentals of Statistics by S C Guptha Himalaya Publishing House.
2. Agricultural Statistics By Rangaswamy. New age International (P) Limited.
3. Statistics Dr. Manoj K Bhowal , Dr. Pronob Barua, Asian Books Pvt. Ltd.

Weblinks and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=COI0BUmNHT8&list=PLyqSpQzTE6M_JcleDbrVyPnE0PixKs2JE
2. <https://www.youtube.com/watch?v=xxpc-HPKN28>
3. https://onlinecourses.nptel.ac.in/noc21_ma74/preview

Semester – III

Plant Water Relation (IPCC)			
Course Code	BSA302	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
<p>Course objectives: This course will enable students to understand</p> <ol style="list-style-type: none"> 1. How plants control hydration of cells. 2. How plants collect water from the soil. 3. How water is transported within the plant & its loss by evaporation from the leaves. 			
<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. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied practical skills. 2. Support and guide the students for self-study. 3. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress. 4. Encourage the students for group learning to improve their creative and analytical skills. 5. Show short related video lectures in the following ways: <ul style="list-style-type: none"> • As an introduction to new topics (pre-lecture activity). • As a revision of topics (post-lecture activity). • As additional examples (post-lecture activity). • As an additional material of challenging topics (pre-and post-lecture activity). • As a model solution for some exercises (post-lecture activity). 			
MODULE-1			
Water and its role in plants, Forces that Bind Water Molecules, properties and functions of water, Water Content, Water Potential, Heads in a Column of Soil, Description and types of a Tensiometer, Movement of Water between Tensiometers.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
MODULE-2			
Water movement in in Saturated Soil, Darcy's Law, Hydraulic Conductivity, Time Domain Reflectometry, Penetrometers, Infiltration, factor affecting infiltration, infiltration models, Root Anatomy and Poiseuille's Law for Water Flow in Roots, Agronomic Applications of Poiseuille's Law			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
MODULE-3			
Ascent of Water in Plants, Cohesion Theory, Sap Flow, Heat-Pulse Method, Leaf Anatomy, Elasticity Applied to Plant Leaves, Definition and Structure of Stomata and Their Distribution, Stomatal Anatomy of Dicots and Monocots, Mechanism of Stomatal Opening,			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
MODULE-4			
Solar Radiation, Definition of a Black Bodies, Heat Budget, and Radiation Balance, Water loss from plants, transportation, evapotranspiration, Definition of evapotranspiration , factors that affect evapotranspiration,			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
MODULE 5			
de Wit's Analysis, Relationship between yield and transpiration, relationship between yield and evapotranspiration, Water and marketable Yield, crop water-use efficiency			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		

PRACTICAL COMPONENT OF IPCC

Sl.NO	Experiments
1	Determination of water content of soil
2	Measurement of soil properties using cone penetrometer.
3	Determination of matric potential using tensiometer.
4	Determination of soil water constants
5	Estimation ET using cropwat
6	Measurement of infiltration using infiltrometer
7	Determination of the rate of transpiration from a leaf
8	Determination of stomatal number and stomatal index

Course outcome (Course Skill Set)

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

1. Understand the plant water relations as a dynamic system affected by the environment and the regulated by plants.
2. They get the basic knowledge how plant water relations can be measured & know management strategies to improve plant growth or reduce water loss under drought.

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.

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:

Textbooks:

1. Kirkham, M.B., 2023. "*Principles of soil and plant water relations*". 2nd Edition, Elsevier publisher, 2014. <https://doi.org/10.1016/C2013-0-12871-1>
2. Livingston, B.E., Hawkins, L.A. and Pulling, H.E.. *The water-relation between plant and soil* . 1st edition, Andesite Press . **2017**
3. Dhyani, S., Chhonkar, P.K. and Pandey, R.N., 1999. *Soil, Plant and water analysis-A method manual*. 1st edition, Westville Publishing House, 2005

Web links and Video Lectures (e-Resources):

1. <https://www.youtube.com/watch?v=KQ4Gd55XEZQ>
2. <https://www.youtube.com/watch?v=a4OuR0n-D4>
3. <https://onlinelibrary.wiley.com/doi/full/10.1002/9780470015902.a0001288.pub2>

Semester–III

Farm Machinery & Equipment- I (IPCC)			
Course Code	BSA303	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
<p>Course objectives: This course will enable students to</p> <ol style="list-style-type: none"> 1. Understand the basic working principles of farm equipment's. 2. Understand the operations of farm equipment's. 			
<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. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied practical skills. 2. Support and guide the students for self–study. 3. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress. 4. Encouragethestudentsforgrouplearningtoimprovetheircreativeandanalyticalskills. 5. Shows related video lectures in the following ways: <ul style="list-style-type: none"> • As an introduction to new topics (pre-lecture activity). • As are vision of topics (post-lecture activity). • As additional examples (post-lecture activity). • As an additional material of challenging topics (pre-and post-lecture activity). <p>As a model solution for some exercises (post-lecture activity).</p>			
MODULE-1			
Introduction to farm mechanization. Classification of farm machines. Unit operations in crop production. Identification and selection of machines for various operations on the farm. Calculation of field capacities and field efficiency. Calculations for economics of machinery usage, comparison of ownership with hiring of machines.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
MODULE-2			
Introduction to machines used for primary tillage, secondary tillage, rotary tillage, deep tillage and minimum tillage. Measurement of draft of tillage tools and calculations for power requirement for the tillage machines. Introduction to tillage machines like mould-board plough, disc plough, chisel plough, sub-soiler, harrows, cultivators, Identification of major functional components. Attachments with tillage machinery.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
MODULE-3			
Earth moving equipment: Construction and working principles viz., levellers- laser guided levellers, dozer & trencher. Principles & Types of Earthmoving Equipment, Methods for moving the earth after cutting or loading, Angle-Blade Scrapers and Graders, Push-Type Scrapers, Trailed Scrapers of Push Type, Brag-Type “Carry-all” Scrapers, Wheel-type Carrying Scrapers, Land smoothing, Blades-type long-span smoothers.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
MODULE-4			
Sowing equipment: Seeding And Planting Mechanisms, methods of sowing- Broad casting, Dibbling, Drilling, seed drill, Functions of Seed Drill, Seed-cum-Fertilizer Drill, Components of Seed Drill, Seed Metering Mechanisms, planters-calibration, working principles and adjustments. Trans-planter, fertilizer and FYM spreading equipment.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
MODULE 5			
Intercultural Equipment: hoes, cultivators, weeders, slashers, thinners and earthing-up equipment. Cost of operation of different implements and machinery. Test codes and procedures for evaluation of tillage, planting and sowing machinery/equipment.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		

PRACTICAL COMPONENT OF IPCC

Sl.NO	Experiments
1	Introduction to various farm machines and equipment used on the farm Objectives: (i) To make familiar about various farm machines used on farm
2	To Measure Field capacity and field efficiency of Farm implements Objectives: i. To measure field capacity of farm implements used on farm ii. To measure field efficiency of farm implements used on farm
3	Draft & fuel consumption measurement for different implements under different soil conditions. Objective: 1. To measure the draft of different tillage implements under different soil conditions. 2. To measure fuel consumption of different tillage implements under different soil condition.
4	Study of construction details, adjustments and working of M.B. plough Objectives: i) To study the various components of M.B. plough and their function ii) To study the various adjustments of M. B. Plough
5	Study of construction details, adjustments and working of Disc plough Objectives: i) To study the various components of disc plough and their function ii) To study the various adjustments of disc Plough
6	Study of construction details, adjustments and working of Disc Harrow Objectives: i) To study the various components of disc harrow and their function ii) To study the various adjustments of disc harrow
7	Study of construction details, adjustments and working of Cultivator Objectives: i) To study the various components of a cultivator and their function ii) To study the different types of shovel and sweep used in a cultivator
8	To study the Construction details and working of earth moving machinery Objectives: i) To study the various components of a earth moving machinery and their function ii) To study the working of earth moving machinery
9	To study the Construction details and working of rotavator Objectives: i) To study the various components of a rotavator and their function ii) To study the working of a rotavator
10	Study of seed cum fertilizer drill and its calibration Objectives: i) To study the various components of seed cum fertilizer drill ii) To study the calibration method of seed cum fertilizer drill
11	Study of different type of mechanical paddy transplants Objectives: 1) To study the various types of mechanical paddy transplanters 2) To study the various components of mechanical paddy transplanters
12	Study of different weeding equipment's and their use Objective: i. To study the various types of weeding/ intercultural equipments
13	Study of sprayers & dusters and measurement of nozzle discharge Objectives: 1. To study the major components and their functions 2. To study the various types of sprayer and their application 3. To study the various types of nozzles and their applications

Course outcome (Course Skill Set)

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

1. Understand the basic working principles of farm equipment's.
2. Understand the operations of farm equipment's& their uses in various agricultural operations.
3. Familiarize with different farm implements and tools.

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.

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 the 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. Principles of Agricultural Engineering. Vol. I. 2012. Michael, A.M. and T.P. Ojha. Jain Brothers, Jodhpur.
2. Farm Tractors, Maintenance and Repair. 1989. Rai and Jain. Tata Mc Graw Hill Publ. New Delhi.
3. Elements of Farm Machinery. 1989. Srivastava, A.C. Oxford IBH Publ. Company, New Delhi.
4. Elements of Agricultural Engineering, Vol. I & III. 1989. Singhal, O.P. SurajPrakashan, Allahabad.
5. Element of Agricultural Engineering. 1990. Sahay, Jagdishwar. Agro. Book Agency, New Chitragupta Nagar, Patna.
6. Farm Machinery and Equipment-I (Practical Manual) By Jagvir Dixit

Web link and Videos lecturers (e-Resources)

1. <http://ecoursesonline.iasri.res.in/course/view.php?id=12>
2. <http://ecoursesonline.iasri.res.in/course/view.php?id=540>
3. https://www.youtube.com/watch?v=Q5PdBZ1DCYw&t=1s&ab_channel=IITKharagpurJuly2018
4. <https://www.slideshare.net/SolomonTekeste/agricultural-machinery-chapter-1-105550247>
5. https://www.researchgate.net/publication/323771721_Farm_Machinery_and_Equipment-I

III Semester

Principles of Agronomy (PCC)			
Course Code	BSA304	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 Hrs	Total Marks	100
Credits	3	Exam Hours	3
Course objectives: <ol style="list-style-type: none"> 1. Understand the basic concepts of Agronomy. 2. Soil types, agricultural operations, crop production . 3. Agro-climatic zones of India & Agro meteorology. 			
Teaching-Learning Process (General Instructions) These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.			
Teaching-Learning Process (General Instructions): These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"> 1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied practical skills. 2. Support and guide the students for self-study. 3. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress. 4. Encourage the students for group learning to improve their creative and analytical skills. 5. Show short related video lectures in the following ways: <ul style="list-style-type: none"> • As an introduction to new topics (pre-lecture activity). • As a revision of topics (post-lecture activity). • As additional examples (post-lecture activity). • As an additional material of challenging topics (pre-and post-lecture activity). As a model solution for some exercises (post-lecture activity).			
Module-1			
Agriculture – Definition – Importance and scope - Branches of agriculture - Evolution of man and agriculture – Development of scientific agriculture - National and International Agricultural Research Institutes. Agronomy – definition – meaning and scope. Agro-climatic zones of India and Tamil Nadu – Agro ecological zones of India. Crops and major soils – Classification – Economic and agricultural importance in India and Tamil Nadu. Factors affecting crop production – climatic – edaphic – biotic- physiographic and socio economic factors			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-2			
Tillage – Definition – objectives – types of tillage – modern concepts of tillage – main field preparations. Seeds – Seed rate – Sowing methods – Germination – Crop stand establishment – Planting geometry Role of manures and fertilizers in crop production – agronomic interventions for enhancing FUE – Inter cultivation – Thinning – Gap filling and other intercultural operations			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-3			
Irrigation - Time and methods - Modern techniques of irrigation - Drainage and its Importance. Planting Geometry and its Effect on Growth and Yield Cropping pattern and cropping system - Intensive cropping- Sustainable agriculture –IFS Organic / eco-friendly agriculture - Dry farming - Concepts and principles			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-4			
Agro-climatic zones of India. Agro meteorology. Weather and climate, micro-climate. Weather elements and their influence on different crops. Monsoon, Clouds			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		

Module-5	
Weather aberrations. Weather forecasting Weather modification -Artificial rain making and cloud seeding. Remote sensing.	
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.
Course outcome (Course Skill Set)	
At the end of the course the student will be able to : <ol style="list-style-type: none"> 1. Will get familiarized about the basic concepts of Agronomy. 2. Know about Soil types, agricultural operations, crop production . 3. Agro-climatic zones of India & Agro meteorology. 	
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:	
<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. 	
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).	
<ol style="list-style-type: none"> 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. Principles of Agronomy – T.Yellamande reddy & G.H.Sankara Reddy.	

2. Principles of Agronomy – Dr.S.R.Reddy.

Reference Books:

1. ICAR. 2010. Handbook of Agriculture (6th edition), Indian Council of Agricultural Research, New Delhi.
2. Panda, S.C. 2012. Modern Concepts and Advance Principles in Crop Production. Agrobios(India), Jodhpur
3. Balasubramanian, P. and Palaniappan, S.P.2016. Principles and Practices of Agronomy (2nd edition), Agrobios (India), Jodhpur
4. Reddy, T.Yellamanda and Reddy, G.H. Sankara. 2016. Principles of Agronomy (2nd edition) ,Kalyani Publishers, Ludhiana
5. Reddy, S.R.2012. Principles of Crop Production (4th edition), Kalyani Publishers, Ludhiana

Web links and Video Lectures (e-Resources):

1. <https://www.youtube.com/watch?v=NqqsronLmWA>
2. <http://ecoursesonline.iasri.res.in/Courses/Principles%20of%20Agronomy%20&%20agrcltr1%20Meteorology/AGRO101/Start%20to%20read%20the%20Course.html>
3. https://www.youtube.com/watch?v=C4BzBySi0_g

BASIC WORKSHOP PRACTICE LAB (PCCL)		Semester	III
Course Code	BSAL305	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	(0:0:2:0)	SEE Marks	50
Credits	01	Exam Hours	03
Examination nature (SEE)	Practical		
Course objectives:			
<ul style="list-style-type: none"> To identify tools, work material and measuring instruments useful for fitting, carpentry, Sheet metal working and Smithy practice To handle tools and instruments and use them to prepare joints of specific shape and size 			
Sl.NO	Experiments		
1	Fitting: Introduction, Various tools used in fitting shop- Holding tools; Marking and Measuring tools; Striking tools; Cutting tools; finishing tools		
2	Preparation of Square fitting model in fitting shop		
3	Preparation of V fitting model in fitting shop		
4	Carpentry: Introduction, Timber, classification and characteristics; Various tools used in carpentry shop- Holding tools; Marking and Measuring tools; Striking tools; Planing tools; Cutting tools – saws and chisels		
5	Preparation of T-Lap joint model in Carpentry shop		
6	Preparation of Dove-tail Lap joint model in Carpentry shop		
7	Sheet metal working: Introduction, Sheet metals used in metal work; Various tools used- Holding tools; Marking and Measuring tools; Striking tool – hammers and mallets; Snips; Stakes		
8	Preparation of Open scoop model in Sheet metal shop		
Demonstration Experiments (For CIE)			
9	Preparation of Rectangular tray model in Sheet metal shop		
10	Smithy: Introduction, Principle of forging; Various tools used- Holding tools; Marking and Measuring tools; Striking tool – hammers; Flatters; Swage block; V-Block; Tongs, etc		
11	To prepare S-Hook from a given round rod		
12	To make a square rod from a given round rod		
Course outcomes (Course Skill Set):			
At the end of the course the student will be able to:			
<ol style="list-style-type: none"> To select suitable tools and equipment to prepare joints using bench-work tools. To produce joints using materials of specific shape and size by a suitable PO1, PO3, PO5, PSO1, set of operations and check the accuracy of shape and dimensions using suitable measuring tools.. 			

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 (CIE):

CIE marks for the practical course are **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of **60%** and the rest **40%** for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

- SEE marks for the practical course are 50 Marks.
- SEE shall be conducted jointly by the two examiners , **one from the same institute and another from other institute as external examiners**, are appointed by the the University.
- The examination schedule **is to be informed** to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.

- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

Suggested Learning Resources:

1. **Elements of Workshop Technology. Vol. I: Manufacturing Processes**, BY S. K. Hajra Choudhury,1971
2. Khurmi, R.S. and Gupta, J.K., 2008. *A Textbook of Workshop Technology*. S. Chand Publishing.

Web links and Video Lectures (e-Resources):

https://www.youtube.com/watch?v=D_xEl0ZVxII&list=PLzkMouYverALpuDI4g4TiCc6_vLcS1Ny
<http://ecoursesonline.iasri.res.in/course/view.php?id=86>

Information Technology for Land and Water Management (ESC)		Semester	III
Course Code	BSA306A	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		
<p>Course objectives:</p> <ol style="list-style-type: none"> 1. To existing system of information generation and organizations involved in the field of land and water management 2. Application and production of multimedia, Internet application tools and web technology. 3. To develop effective natural resource management by using GIS and GPS 			
<p>Teaching-Learning Process (General Instructions)</p> <p>These are sample strategies, which teachers can use to accelerate the attainment of the various courseoutcomes.</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 Problem Solving. 3. Adopt flipped classroom teaching method. 4. Adopt collaborative (Group Learning) learning in the class. 5. Adopt Problem Based Learning (PBL), which fosters students' analytical skills and develops thinkingskills such as evaluating, generalizing, and analysing information. 			
Module-1			
Concept of Information Technology (IT) and its application potential. Role of IT in natural resources management. Existing system of information generation and organizations involved in the field of land andwater management.			
Module-2			
Application and production of multimedia. Internet application tools and web technology. Networking system of information. Problems and prospects of new information and communication technology.			
Module-3			
Development of database concept for effective natural resources management. Application of remote sensing, geographic information system (GIS) and GPS.			
Module-4			
Rational data base management system. Object oriented approaches. Information system, decision support systems and expert systems. Agricultural information management systems - use of mathematical models and programmes.			
Module-5			
Application of decision support systems, multi sensor data loggers and overview of software packages in natural resource management. Video-conferencing of scientific information.			
<p>Course outcome (Course Skill Set)</p> <ol style="list-style-type: none"> 1. By using an information technology, to generation and organization involved in the field of land and water management. 2. To development of database concept for effective natural resources management. 			

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:

- 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 220B2.4, 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:

Text Books & Reference books

1. Kang-Tsung Chang, 'Introduction to Geographic Information Systems', McGraw-Hill Book Company.
2. M. Anji Reddy, 'Remote Sensing and Geographical Information Systems' 4th Edition, BS Publications.
3. Longley, P. A., Goodchild, M. F., Maguire, D. J., and Rhind, D. W., 'Geographic Information Systems and Science', 2nd Edition, John Wiley and Sons.

Web links and Video Lectures (e-Resources):

1. https://www.itu.int/dms_pub/itu/oth/23/01/T23010000100003PDFE.pdf
2. <https://icar.org.in/>
3. <https://naarm.org.in/home/>
4. https://www.indiastat.com/Alsosee/OurSubscribers?gclid=Cj0KCQjw-pyqBhDmARIsAKd9XIMWGl0v8J5NYyYAN2ungUbBoqnOprAxLiRrxhrAJ6Yi8lILUg3rvEaAnKiEALw_wcB

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

- Quizzes
- Assignments
- Seminars

Artificial Intelligence and Machine learning (ESC)		Semester	III
Course Code	BSA306B	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		
<p>Course objectives:</p> <ol style="list-style-type: none"> 1. Understands the basics of AI, history of AI and its foundations, basic principles of AI for problem solving 2. Explore the basics of Machine Learning & Machine Learning process, understanding data 3. Understand the Working of Artificial Neural Networks 			
<p>Teaching-Learning Process (General Instructions)</p> <p>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 to 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 functioning of various concepts. 3. Encourage collaborative (Group Learning) Learning in the class. 4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking. 5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it. 6. Introduce Topics in manifold representations. 7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them. 8. 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: What is AI, The foundation of Artificial Intelligence, The history of Artificial Intelligence, Intelligent Agents: Agents and Environments, Good Behaviour: The concept of rationality, the nature of Environments, the structure of Agents</p>			
Module-2			
<p>Problem solving by searching: Problem solving agents, Example problems, Searching for solutions, Uniformed search strategies, Informed search strategies, Heuristic functions</p>			
Module-3			
<p>Introduction to machine learning: Need for Machine Learning, Machine Learning Explained, and Machine Learning in relation to other fields, Types of Machine Learning. Challenges of Machine Learning, Machine Learning process, Machine Learning applications.</p> <p>Understanding Data: What is data, types of data, Big data analytics and types of analytics, Big data analytics framework, Descriptive statistics, univariate data analysis and visualization</p>			
Module-4			

Understanding Data: Bivariate and Multivariate data, Multivariate statistics, Essential mathematics for Multivariate data, Overview hypothesis, Feature engineering and dimensionality reduction techniques.

Basics of Learning Theory: Introduction to learning and its types, Introduction computation learning theory, Design of learning system, Introduction concept learning.

Similarity-based learning: Introduction to Similarity or instance based learning, Nearest-neighbor learning, weighted k- Nearest - Neighbor algorithm.

Module-5

Artificial Neural Network: Introduction, Biological neurons, Artificial neurons, Perceptron and learning theory, types of Artificial neural Network, learning in multilayer Perceptron, Radial basis function neural network, self-organizing feature map.

Course outcome (Course Skill Set)

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

1. Design intelligent agents for solving simple gaming problems.
2. Have a good understanding of machine learning in relation to other fields and fundamental issues and Challenges of machine learning
3. Understand data and applying machine learning algorithms to predict the outputs.
4. Model the neuron and Neural Network, and to analyze ANN learning and its applications.

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:

- 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**).

- The question paper will have ten questions. Each question is set for 20 marks.
- 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.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:**Textbooks:**

1. Stuart Russel, Peter Norvig: "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2015.
2. S. Sridhar, M Vijayalakshmi "Machine Learning". Oxford, 2021

Reference books:

1. Elaine Rich, Kevin Knight: "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2009, ISBN-10: 0070087709
2. Nils J. Nilsson: "Principles of Artificial Intelligence", Elsevier, 1980, ISBN: 978-3-540-11340-9.

Web links and Video Lectures (e-Resources)

1. <http://www.getfreebooks.com/16-sites-with-free-artificial-intelligence-e-books/>https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_overview.htm
2. Problem solving agent:<https://www.youtube.com/watch?v=KTPmo-KsOis>.
3. https://www.youtube.com/watch?v=X_Qt0U66aH0&list=PLwdnzlV3ogoXaceHrrFVZCJkbn_laSHcH
4. <https://www.javatpoint.com/history-of-artificial-intelligence>
5. <https://www.tutorialandexample.com/problem-solving-in-artificial-intelligence>
6. <https://techvidvan.com/tutorials/ai-heuristic-search/>
7. <https://www.analyticsvidhya.com/machine-learning/>
8. <https://www.hackerearth.com/practice/machine-learning/machine-learningalgorithms/mldecision-tree/tutorial/>
9. <https://www.javatpoint.com/unsupervised-artificial-neural-networks>

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

- Real world problem solving: Demonstration of projects related to AI and ML.

Analog and Digital Electronics Circuit (ESC)		Semester	III
Course Code	BSA306C	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		

Course objectives:

1. Explain the use of photo electronics devices, 555 timer IC, Regulator ICs and uA741
2. Make use of simplifying techniques in the design of combinational circuits.
3. Illustrate combinational and sequential digital circuits
4. Demonstrate the use of flipflops and apply for registers
5. Design and test counters, Analog-to-Digital and Digital-to-Analog conversion techniques.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in a multiple representation.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module-1

BJT Biasing: Fixed bias, Collector to base Bias, voltage divider bias Operational Amplifier Application Circuits: Peak Detector, Schmitt trigger, Active Filters, Non-Linear Amplifier, Relaxation Oscillator, Current-to-Voltage and Voltage-to-Current Converter, Regulated Power Supply Parameters, adjustable voltage regulator, D to A and A to D converter.

Module-2

Karnaugh maps: minimum forms of switching functions, two and three variable Karnaugh maps, four variable Karnaugh maps, determination of minimum expressions using essential prime implicants, Quine McClusky Method: determination of prime implicants, the prime implicant chart, Petricks method, simplification of incompletely specified functions, simplification using map-entered variables

Module-3

Combinational circuit design and simulation using gates: Review of Combinational circuit design, design of circuits with limited Gate Fan-in, Gate delays and Timing diagrams, Hazards in combinational Logic, simulation and testing of logic circuits Multiplexers, Decoders and Programmable Logic Devices: Multiplexers, three state buffers, decoders and encoders, Programmable Logic devices.

Module-4

Introduction to VHDL: VHDL description of combinational circuits, VHDL Models for multiplexers, VHDL Modules. Latches and Flip-Flops: Set Reset Latch, Gated Latches, Edge-Triggered D Flip Flop 3, SR Flip Flop, J K Flip Flop, T Flip Flop.

Module-5

Registers and Counters: Registers and Register Transfers, Parallel Adder with accumulator, shift registers, design of Binary counters, counters for other sequences, counter design using SR and J K Flip Flops.

Course outcome (Course Skill Set)

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

1. Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.
2. Explain the basic principles of A/D and D/A conversion circuits and develop the same.
3. Simplify digital circuits using Karnaugh Map, and Quine-McClusky Methods
4. Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types.
5. Develop simple HDL programs

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:

- 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**).

- The question paper will have ten questions. Each question is set for 20 marks.
- 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.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:**Textbooks:**

1. Charles H Roth and Larry L Kinney, Raghunandan G H Analog and Digital Electronics, Cengage Learning, 2019

Reference Books:

1. Anil K Maini, Varsha Agarwal, Electronic Devices and Circuits, Wiley, 2012.
2. Donald P Leach, Albert Paul Malvino & Goutam Saha, Digital Principles and Applications, 8th Edition, Tata McGraw Hill, 2015.
3. M. Morris Mani, Digital Design, 4th Edition, Pearson Prentice Hall, 2008.
4. David A. Bell, Electronic Devices and Circuits, 5th Edition, Oxford University Press, 2008

Web links and Video Lectures (e-Resources):

1. Analog Electronic Circuits: <https://nptel.ac.in/courses/108/102/108102112/>
2. Digital Electronic Circuits: <https://nptel.ac.in/courses/108/105/108105132/>
3. Analog Electronics Lab: <http://vlabs.iitkgp.ac.in/be/>
4. Digital Electronics Lab: <http://vlabs.iitkgp.ac.in/dec>

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

- Quizzes
- Assignments
- Seminars

Solid Waste and By-Product Utilization (ESC)		Semester	III
Course Code	BSA306D	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		
<p>Course objectives:</p> <ol style="list-style-type: none"> 1. Appreciate basic concepts of by-products and waste generation in agricultural production and processing 2. Utilize the energy from direct combustion of solid waste 3. To convert solid waste into thermo-chemical and Bio-chemical 4. To manage the solid waste for bio-utilization 5. Effluent treatment and disposal of waste 			
<p>Teaching-Learning Process (General Instructions)</p> <p>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. Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations. 2. Chalk and Talk method for Problem Solving. 3. Adopt flipped classroom teaching method. 4. Adopt collaborative (Group Learning) learning in the class. 5. Adopt Problem Based Learning (PBL), which fosters students' analytical skills and develops thinking skills such as evaluating, generalizing, and analysing information. 			
Module-1			
<p>Introduction to by-products and waste generation in agricultural production and processing: By-products/waste, types of food by-product and waste, magnitude of by-products and waste in food production, magnitude of by-products and wastes in food processing</p> <p>Waste management concepts: Waste characteristics, waste management and effluent treatment</p>			
Module-2			
<p>Direct combustion of solid waste: Proximate and ultimate analysis of biomass, theory of combustion, direct combustion of biomass as fuel in furnaces, operating conditions affecting design of furnace. Bales, operation of baler, briquettes, advantages and uses of briquettes.</p>			
Module-3			
<p>Thermo-chemical conversion of solid waste: Biomass gasification, gasification process mechanism, types of gasifier reactors, utilization of producer gas.</p> <p>Bio-chemical conversion of solid waste: Biogas, biogas plants, classification of biogas plants, design of biogas plants, comparison among KVIC, Janta and Deenbandhu biogas plants, working of Deenbandhu biogas plant. Selection of proper size of biogas plant, utilization of biogas for cooking purpose. Utilization of biogas for lighting purposes and engine operation.</p>			
Module-4			
<p>Solid waste management: Methods of disposal solid waste, Vermin composting</p> <p>Presence of typical chemicals: Microbiology of waste, bacteriological analysis of water, water borne diseases, insecticide, pesticide and fungicides residues.</p> <p>Management of Pesticide Residues, equipment's for estimation of pesticide residue.</p>			
Module-5			

Effluent treatment and disposal:

Parameters of effluent like temperature, pH, Oxygen demands (BOD, COD), fat oil and grease content, metal content, forms of phosphorous and Sulphur in effluent. Treatment of effluent, steps for waste water treatment, sedimentation, coagulation, flocculation and floatation.

Characteristics of food processing waste water, trickling filters, rotating biological contractors. Oxidation ditches, activated sludge process, lagoons. Filtration, slow sand filter, rapid sand filter, disinfection of water

Course outcome (Course Skill Set)

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

1. Understand the types and formation of by-products and waste, uses of different agricultural by-products.
2. Understand the concept, scope, maintenance of waste management and effluent treatment, Waste water contents and treatments and also familiar with microbiology of waste, ingredients like insecticide, pesticides & fungicides residues.
3. Understand utilization of waste in various industries, biomass as fuel, charcoal briquette, and generation of electricity using surplus biomass and remember producer gas generation.
4. Understand the design consideration of waste treatment and disposal of community & family size biogas plants, vermin-composting and pre-treatment of waste.
5. Familiar with the secondary treatments for food plant wastes, tertiary treatments, effluent treatment plants and environmental performance of food industry.

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:

- 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**).

- The question paper will have ten questions. Each question is set for 20 marks.
- 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.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:**Books**

1. Markel, I.A. 1981. Managing Livestock Waste, AVI Publishing Co.
2. Pantastico, ECB. 1975. Post Harvest Physiology, Handling and utilization of Tropical and Subtropical fruits and vegetables, AVI Pub. Co.
3. Shewfelt, R.L. and Prussi, S.E. 1992. Post-Harvest Handling – A Systems approach, Academic Press Inc. USDA. 1992. Agricultural Waste Management Field Hand book. USDA, Washington DC.
4. Weichmann J. 1987. Post Harvest Physiology of vegetables, Marcel and Dekker Verlag. V.K. Joshi & S.K. Sharma. Food Processing Waste Management: Treatment & Utilization. New India Publishing Agency.
5. Vasso Oreopoulou and Winfried Russ (Edited). 2007. Utilization of By-products and Treatment
6. G.D. Rai Non-Conventional Energy Sources

Web links and Video Lectures (e-Resources):

1. <http://ecoursesonline.iasri.res.in/course/view.php?id=41>
2. <https://www.youtube.com/watch?v=k0ktJRoRcOA>

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

- Quizzes
- Assignments
- Seminars

Advanced Python Programming [AEC/SEC]		Semester	III
Course Code	BSAL358B	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	0:0:2:0	SEE Marks	50
Total Hours of Pedagogy	30	Total Marks	100
Credits	01	Exam Hours	03
Examination nature (SEE)	Practical		
<p>Course objectives:</p> <ul style="list-style-type: none"> To understand why Python is a useful scripting language for developers To read and write simple Python programs To learn how to identify Python object types. To learn how to write functions and pass arguments in Python. To use Python data structures -- lists, tuples, dictionaries. 			
<p>Teaching-Learning Process (General Instructions)</p> <p>These are sample Strategies, which teachers can use to accelerate the attainment of the various courseoutcomes.</p> <ul style="list-style-type: none"> Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations. Chalk and Talk method for Problem Solving. Adopt flipped classroom teaching method. Adopt collaborative (Group Learning) learning in the class. Adopt Problem Based Learning (PBL), which fosters students' analytical skills and develops thinkingskills such as evaluating, generalizing, and analysing information. 			
Sl. No.	Experiments		
1	Demonstrate following functions/methods which operates on strings in Python with suitable examples: i) len() ii) strip() iii) rstrip() iv) lstrip() v) find() vi) rfind() vii) index() viii) rindex(,ix) count() x) replace() xi) split() xii) join() xiii) upper() xiv) lower() xv) swapcase() xvi) title() xvii) capitalize() xviii) startswith() xix) ends with()		
2	Implementing programs using Functions. (Factorial, largest number in a list, area of shape).		
3	NESTED LISTS: Write a program to read a 3 X 3 matrix and find the transpose, addition, subtraction, multiplication of two 3 X 3 matrices, check whether two given 3 X 3 matrices are identical or not.		
4	Implementing programs using Strings. (Reverse, palindrome, character count, replacing characters). Real time applications using sets and Dictionaries		
5	Scientific problems using Conditionals and Iterative loops. (Number series and different Patterns).		
6	Numpy Library: Linear Algebra a) Write a python program to find rank, determinant, and trace of an array. b) Write a python program to find eigen values of matrices d) Write a python program to solve a linear matrix equation, or system of linear scalar equations.		

7	<p>Graphics:</p> <ul style="list-style-type: none"> • Consider turtle object. Write functions to draw triangle, rectangle, polygon, circle and sphere. Use object oriented approach. • Design a Python program using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorizing them into distinction, first class, second class, third class and failed.
8	Create a colour images using NumPy in Python
Demonstration Experiments (For CIE)	
9	Write a python program to implement Pandas Series with labels.. 12 Developing a game activity using Pygame like bouncing ball, car race etc
10	Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)
11	Implementing real-time/technical applications using Exception handling. (divide by zero error, voter's age validity, student mark range validation).
12	Developing a game activity using Pygame like bouncing ball, car race etc

Course outcome (Course Skill Set)

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

1. Understand Python syntax and semantics and be fluent in the use of Python flow control and functions.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Represent compound data using Python lists, tuples, Strings, dictionaries.
4. Read and write data from/to files in Python Programs

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 (CIE):

CIE marks for the practical course are **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

- SEE marks for the practical course are 50 Marks.
- **SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.**
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in - 60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

Suggested Learning Resources:**Textbooks:**

1. Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3", 1st Edition, CreateSpace Independent Publishing Platform, 2016.
http://do1.dr.chuck.com/pythonlearn/EN_us/pythonlearn.pdf
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015. (Chapters 15, 16, 17)
<http://greenteapress.com/thinkpython2/thinkpython2.pdf>

Reference books:

1. R. Nageswara Rao, "Core Python Programming", dreamtech
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Python Programming, Reema theraja, OXFORD publication

Web links and Video Lectures (e-Resources):

1. <https://www.w3resource.com/python/python-tutorial.php>
2. <https://data-flair.training/blogs/python-tutorials-home/>
3. <https://www.youtube.com/watch?v=c235EsGFcZs>
4. <https://www.youtube.com/watch?v=v4e6oMRS2QA>
5. <https://www.youtube.com/watch?v=Uh2ebFW8OYM>
6. <https://www.youtube.com/watch?v=oSPMmeaiQ68>
7. https://www.youtube.com/watch?v=_uQrJ0TkZlc
8. <https://www.youtube.com/watch?v=K8L6KVGG-7o>

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

- **Real world problem solving: Demonstration of projects developed using python language**

Personality Development and Soft skills (A E C / S E C)			
AEC Course Code	BSA358B	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	15 sessions	Total Marks	100
Credits	1	Exam Hours	1 Theory type
<p>Course objectives: Enable the students to</p> <ol style="list-style-type: none"> 1. Experience self-fulfillment and overall development of one's own personality by developing personal skills. 2. Develop awareness about the significance of soft skills and impactful personality in professional life. 3. Improve the soft skills like effective communication, business correspondence, impressive presentation, leadership qualities, team-work, Time management leading to successful performance in interviews and group discussions. 4. Identify opportunities in career building and enhancement with proper time management and stress management. 			
<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. Chalk and talk 2. Power point Presentation, video 3. Group discussion 4. Enacting, Demonstration 5. Industry interaction 			
Module-1			
Introduction to Soft-Skills-Personal Skills: Knowing Oneself/Self-Discovery-Confidence Building-Defining Strengths-Developing Positive Attitude- Thinking Creatively-Improving Perceptions -Forming Values.			
Teaching-Learning Process	Chalk and talk, PowerPoint Presentation		
Module-2			
Interpersonal and Social Skills: Understanding others-Developing Inter-personal relationship Team Building-Group dynamics-Networking-Problem-solving.			
Teaching-Learning Process	Chalk and talk, PowerPoint Presentation.		
Module-3			
Communication Skills: Art of Listening-Art of Speaking-Art of Reading-Art of Writing-Art of Writing E-mails: Email etiquette			
Teaching-Learning Process	Chalk and talk, Enacting, Demonstration.		
Module-4			
Presentation skills: Group discussion- mock Group Discussion using video recording - public speaking.			
Teaching-Learning Process	Chalk and talk, Enacting, Demonstration, Activity		
Module-5			
Corporate Skills: Working with others- Developing a proper body language-behavioral etiquettes and mannerism- Time Management –Stress Management			
Teaching-Learning Process	Chalk and talk, PowerPoint Presentation		

Course outcome (Course Skill Set)

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

1. Develop effective communication skills (spoken and written) and effective presentation skills. Actively participate in group discussion / meetings / interviews and prepare & deliver presentations
2. Conduct effective business correspondence and prepare business reports which produce results.
3. Develop an understanding of and practice personal and professional responsibility.
4. Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.

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 Examination (CIE)

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 Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour**. The student has to secure a minimum of 35% of the maximum marks meant for SEE.

Suggested Learning Resources:

Books

1. Meena K and V. Ayothi (2013) A Book on Development of Soft Skills (Soft Skills: A Road Map to Success), P. R. Publishers & Distributors, No. B-20 & 21, V. M. M Complex, Chatiram Bus Stand, Tiruchirappalli-620002. (Phone No: 0431-2702824 Mobile No.: 9443370597, 9843074472)
2. Alex K. (2012) Soft Skills-Know Yourself & Know the World, S. Chand & Company LTD, Ram Nagar, New Delhi-110055. Mobile No.: 9442514814 (Dr.K.Alex)

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

- Demonstrations of Videos
- Group Discussion
- Presentation on any social issues
- Quizzes

Spreadsheet for Engineers [AEC/SEC]		Semester	III
Course Code	BSAL358C	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2	SEE Marks	50
Credits	01	Exam Hours	03
Examination nature (SEE)	Practical		
Course objectives:			
<ul style="list-style-type: none"> • To create different plots and charts • To compute different functions, conditional functions and make regression analysis • To carryout iterative solutions for roots, multiple roots, optimization and non-linear regression analysis • To carryout matrix operations • To Understand VBA and UDF • To understand VBA subroutines and Macros • To carryout numerical integration and solving differential equations using different methods 			
Sl.NO	Experiments		
1	Charting: Create an XY scatter graph, XY chart with two Y-Axes, add error bars to your plot, create a combination chart		
2	Functions: Computing Sum, Average, Count, Max and Min, Computing Weighted Average, Trigonometric Functions, Exponential Functions, Using The CONVERT Function to Convert Units		
3	Conditional Functions: Logical Expressions, Boolean Functions, IF Function, Creating a Quadratic Equation Solver, Table VLOOKUP Function, AND, OR and XOR functions		
4	Regression Analysis: Trendline, Slope and Intercept, Interpolation and Forecast, The LINEST Function, Multilinear Regression, Polynomial Fit Functions, Residuals Plot, Slope and Tangent, Analysis ToolPack.		
5	Iterative Solutions Using Excel: Using Goal Seek in Excel, Using The Solver To Find Roots, Finding Multiple Roots, Optimization Using The Solver, Minimization Analysis, Nonlinear Regression Analysis.		
6	Matrix Operations Using Excel: Adding Two Matrices, Multiplying a Matrix by a Scalar, Multiplying Two Matrices, Transposing a Matrix, Inverting a Matrix and Solving System of Linear Equations.		
7	VBA User-Defined Functions (UDF): The Visual Basic Editor (VBE), The IF Structure, The Select Case Structure, The For Next Structure, The Do Loop Structure, Declaring Variables and Data Types, An Array Function The Excel Object Model, For Each Next Structure.		
8	VBA Subroutines or Macros: Recording a Macro, Coding a Macro Finding Roots by Bisection, Using Arrays, Adding a Control and Creating User Forms.		
Demonstration Experiments (For CIE)			
9	Numerical Integration Using Excel: The Rectangle Rule, The Trapezoid Rule, The Simpson's Rule, Creating a User-Defined Function Using the Simpson's Rule.		
10			
11	Differential Equations: Euler's Method, Modified Euler's Method, The Runge Kutta Method, Solving a Second Order Differential Equation		
12			

Course outcomes (Course Skill Set):

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

- Create different plots and charts
- Compute different functions, conditional functions and make regression analysis
- Carryout iterative solutions for roots, multiple roots, optimization and non-linear regression analysis
- Carryout matrix operations
- Understand VBA and UDF
- Understand VBA subroutines and Macros
- Carryout numerical integration and solving differential equations using different methods

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 (CIE):

CIE marks for the practical course are **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of **60%** and the rest **40%** for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

- SEE marks for the practical course are 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

Suggested Learning Resources:

1. McFedries PaulMicrosoft Excel 2019 Formulas and Functions Microsoft Press, U.S, 2019 Edition
2. Excel Resources -600+Self Study Guides, Articles & Tools (wallstreetmojo.com)
3. <https://www.ictlounge.com/html/year-7/esafety-part.htm>
4. McFedries PaulMicrosoft Excel 2019 Formulas and Functions Microsoft Press, Microsoft Press, U.S, 2019

Semester III

Importance of Solar Energy in Agriculture (AEC/SEC)			
Course Code	BSA358D	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	1	Exam Hours	1
Course objectives:			
<ol style="list-style-type: none"> To give an insight into solar applications in agriculture for sustainable development. To acquire knowledge about energy saving. To enable an understanding about protection of the environment. To ensure backup power source. To reduce the consumption of energy from fossil fuels. 			
Teaching-Learning Process (General Instructions):			
These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"> In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied practical skills. Support and guide the students for self-study. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress. Encourage the students for group learning to improve their creative and analytical skills. Show short related video lectures in the following ways: <ul style="list-style-type: none"> As an introduction to new topics (pre-lecture activity). As a revision of topics (post-lecture activity). As additional examples (post-lecture activity). As an additional material of challenging topics (pre-and post-lecture activity). 			
Module-1			
Solar thermal energy in agricultural operations.			
<ol style="list-style-type: none"> Drying Cooking Greenhouse Heating Cooling 			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-2			
Solar electrical energy in agricultural operations.			
<ol style="list-style-type: none"> Rural Electrification Energy for agricultural operations, farm fencing, Threshing, milling, water pumping for irrigation. 			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos		
Module-3			
Awareness about government subsidy schemes.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos		
Module-4			
Site visits to learn about above solar operations.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos		
Module-5			
Seminar on above topics.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos		

Course outcome (Course Skill Set)

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

1. Understand the solar energy applications in agriculture.
2. Get knowledge about energy saving.
3. Learn about protection of the environment & to ensure backup power source.
4. Learn about reduction in the consumption of energy from fossil fuels.

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 Examination (CIE)

- 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 Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour**. The student has to secure a minimum of 35% of the maximum marks meant for SEE.

Suggested Learning Resources:**Books**

1. Solar Energy In Agriculture by Santra, Priyabrata. New India Publishing Agency- Nipa
2. Solar Energy in Agriculture by Priyabrata Santra, Ranjay Kumar Singh, Surendra Poonia, Dilip Jain, ICAR
3. Energy & Agriculture by Stephen Butz. Published by Cengage Learning

Web links and Video lectures (e-Resources)

1. <http://ecoursesonline.iasri.res.in/course/view.php?id=35>
2. https://mrcet.com/downloads/digital_notes/EEE/31082020/IV-I%20SOLAR%20&%20WIND%20ELECTRICAL%20SYSTEMS%20DIGITAL%20NOTES%201.pdf
3. https://onlinecourses.nptel.ac.in/noc20_ph14/preview
4. https://www.youtube.com/watch?v=BWqjPHGM5D0&ab_channel=NPTELITGuwahati
5. https://www.youtube.com/watch?v=7xAwR1uzx8g&list=PLQvp2ogq1WVIEUZOmhPBoSgoZ_qX1tW_Qs&index=4&ab_channel=iPolytekOnlineEngineeringCourses

Fundamentals of fruit, vegetable and ornamental crops (PCC)		Semester	IV
CourseCode	BSA401	CIEMarks	50
TeachingHours/Week(L:T:P:S)	3:0:0:0	SEEMarks	50
Total HoursofPedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examinationnature(SEE)	Theory		
<p>Courseobjectives:</p> <ol style="list-style-type: none"> 1. Explaintheuseofphotoelectronicsdevices,555 timerIC,RegulatorICsandA741 2. Makeuseofsimplicifying techniquesinthedesignofcombinationalcircuits. 3. Illustratecombinationalandsequentialdigitalcircuits 4. Demonstrate the use of flip flops and apply for registers 5. Designandtestcounters,Analog-to-DigitalandDigital-to-Analogconversiontechniques. 			
<p>Teaching-LearningProcess(GeneralInstructions)</p> <p>ThesearesampleStrategies,whichteacherscanusettoacceleratetheattainmentofthevariouscourseoutcomes.</p> <ol style="list-style-type: none"> 1. Lecturermethod(L)doesnotmeanonlytraditionallecturemethod,butdifferenttypeofteachingmethodsmaybeadoptedto develop theoutcomes. 2. ShowVideo/animationfilmstoexplainfunctioningofvariousconcepts. 3. Encouragecollaborative(GroupLearning)LearningintheClass. 4. AskatleastthreeHOT(HigherorderThinking)questionsintheClass,whichpromotescriticalthinking. 5. Adopt ProblemBasedLearning(PBL),whichfostersstudents'Analyticalskills,develop thinkingskillssuch astheabilityto evaluate,generalize,and analyzeinformationratherthansimplyrecallit. 6. Topicswillbeintroducedinamultiplerepresentation. 7. Showthe differentways tosolve the same problemandencourage thestudents tocomeupwiththeir owncreativewaystosolve them. 8. Discusshoweveryconceptcanbeappliedtotherealworld-andwhenthat'spossible,ithelpsimprovethestudents' understanding. 			
Module-1			
Importance of horticulture in nutritional security and national economy; Horticultural geography (regions and zones); Present status and prospects of important horticultural crops.			
Module-2			
UNIT II Classification of fruit crops; Propagation technique; nursery management; training and pruning; rootstock and scion; causes of unfruitfulness and control; Orchard establishment and orchard floor management.			
Module-3			
UNIT III Classification of vegetable crops; types of vegetable farming; factors affecting vegetable productivity; economics, marketing and export potential of vegetable crops etc.			
Module-4			
Importance of flower crops and ornamental plants. Global Scenario of flower production and trade; classification of ornamental plants; Landscape designs, Bio-aesthetic planning; types and styles of gardens; landscaping;			
Module-5			
Garden plant components; brief ideas about lawn, indoor gardening, pot culture, bonsai, hanging baskets, avenue trees, water garden, rock gardens, herbaceous and shrubbery borders, hedges and edging plants etc.			

Courseoutcome(CourseSkillSet)

Attheendofthecoursethestudent will beableto:

Students will acquire theoretical and practical knowledge on horticultural crops and their classification, establishment of orchard, vegetables cultivation and landscaping

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 Examinations (SEE)

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

- The question paper will have ten questions. Each question is set for 20 marks.
- 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.
- The students have to answer 5 full questions, selecting one full question from each module.
- 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.

Suggested Learning Resources:**Textbooks:**

1. Prasad and Kumar, 2014. Principles of Horticulture 2nd Edn. Agrobios (India).
2. Neeraj Pratap Singh, 2005. Basic concepts of Fruit Science 1st Edn. IBDC Publishers.
3. Gardner/Bardford/Hooker. J.R., 1957. Fundamentals of Fruit Production. Mac Graw HillBook Co., New York.
4. Edmond,J.B, Sen,T.L, Andrews,F.S and Halfacre R.G., 1963. Fundamentals of Horticulture.Tata Mc Graw Hill Publishing Co., New Delhi.
5. K.V.Peter, 2009. Basics Horticulture. New India Publishing Agency
6. Kausal Kumar Misra and Rajesh Kumar, 2014. Fundamentals of Horticulture. Biotech Books.
7. Kumar, N., 1990. Introduction to Horticulture. Rajyalakshmi publications, Nagarcoil, Tamilnadu
8. Jitendra Singh, 2002. Basic Horticulture. Kalyani Publishers, Hyderabad.
9. D.K. Salunkhe and S.S. Kadam, 2013. A handbook of Fruit Science and Technology. CRC Press
10. S. Prasad and U. Kumar, 2010. A handbook of Fruit Production. Agrobios (India).
11. Jitendra Singh, 2011. Basic Horticulture. Kalyani Publications, New Delhi
12. Denisen E.L.,1957. Principles of Horticulture. Macmillan Publishing Co., New York

ReferenceBooks:

1. Bose, Chowdhury and Sharma.1991.Tropical Garden Plants in colour .Horticulture and allied publishers, 3D Madhab Chatterjee street Kolkata.
2. K.V.Peter.2009.Ornamental plants. New India publishing agency, Pitampura, New Delhi.
3. Richard Bird. 2002. Flowering trees and shrubs. Printed in Singapore by Star Standard Industries pvt. Ltd.
4. Bimaldas Chowdhury and Balai Lal Jana.2014.Flowering Garden trees. Pointer publishers, Jaipur. India.
5. Arora, J.S. 2006. Introductory Ornamental Horticulture. Kalyani Publishers, Ludhiana
6. Randhawa, G.S. Amitabha Mukhopadhyay, 2004. Floriculture in India. Allied Publishers Pvt.Ltd., New Delhi.
7. Bose, T.K. Mukherjee, D. 2004. Gardening in India. Oxford & IBH Publishers.
8. Chadha, K.L. and Chaudhary, B. 1986. Ornamental Horticulture in India. Publication andInformationdivision. ICAR,NewDelhi.

WeblinksandVideoLectures(e-Resources):

1. AnalogElectronicCircuits:<https://nptel.ac.in/courses/108/102/108102112/>
2. DigitalElectronicCircuits:<https://nptel.ac.in/courses/108/105/108105132/>
3. AnalogElectronicsLab:<http://vlabs.iitkgp.ac.in/be/>
4. DigitalElectronicsLab:<http://vlabs.iitkgp.ac.in/dec>

ActivityBasedLearning(SuggestedActivitiesinClass)/PracticalBasedlearning

- Quizzes
- Assignments
- Seminars

Irrigation and Drainage Engineering (IPCC)			
Course Code	BSA402	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 Hrs of Theory+8-10 lab hrs	Total Marks	100
Credits	4	Exam Hours	3
Course objectives: This course will enable students to Understand about the Irrigation Schemes, Hydraulic Measurements, Water control & distribution & irrigation methods, Sprinkler irrigation, Micro Irrigation Systems.			
Teaching-Learning Process (General Instructions): These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none"> 1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied practical skills. 2. Support and guide the students for self-study. 3. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress. 4. Encourage the students for group learning to improve their creative and analytical skills. 5. Show short related video lectures in the following ways: <ul style="list-style-type: none"> • As an introduction to new topics (pre-lecture activity). • As a revision of topics (post-lecture activity). • As additional examples (post-lecture activity). • As an additional material of challenging topics (pre-and post-lecture activity). • As a model solution for some exercises (post-lecture activity). 			
MODULE-1			
Irrigation Schemes: Major and medium irrigation schemes of India, purpose of irrigation, Environmental impact of irrigation projects, source of irrigation water, present status of development and utilization of different water resources of the country. Hydraulic Measurements: measurement of irrigation water: weir, flumes and orifices and other methods; open channel water conveyance system : design and lining of irrigation field channels, on farm structures for water conveyance			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
MODULE-2			
Water control & distribution : control & distribution of water; underground pipe conveyance system: components and design; land grading: criteria for land levelling, land levelling design methods, estimation of earth work; soil water plant relationship: soil properties influencing irrigation management, soil water movement, infiltration, soil water potential, soil moisture characteristics, soil moisture constants,			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
MODULE-3			
measurement of soil moisture, moisture stress and plant response; water requirement of crops: concept of evapotranspiration (ET), measurement and estimation of ET, water and irrigation requirement of crops, depth of irrigation, frequency of irrigation, irrigation efficiencies; surface methods of water application: border, check basin and furrow irrigation- adaptability, specification and design considerations.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
MODULE-4			
Sprinkler irrigation: adaptability, problems and prospects, types of sprinkler irrigation systems; design of sprinkler irrigation system: layout selection, hydraulic design of lateral, sub-main and main pipe line, design steps; selection of pump and power unit for sprinkler irrigation system; performance evaluation of sprinkler irrigation system: uniformity coefficient and pattern efficiency;			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
MODULE 5			
Micro Irrigation Systems: types-drip, spray, & bubbler systems, merits and demerits, different components; necessary steps for proper operation of a drip irrigation system; maintenance of micro irrigation system: clogging problems, filter cleaning, flushing and chemical treatment; fertigation: advantages and limitations of fertigation, fertilizers solubility and			

their compatibility, precautions for successful fertigation system, fertigation frequency, duration and injection rate, methods of fertigation.

Teaching-Learning Process Chalk and talk method, PowerPoint Presentation, YouTube videos.

PRACTICAL COMPONENT OF IPCC

Sl.NO	Experiments
1	To determine the co-efficient of discharge in triangular and rectangular notches.
2	To determine the co-efficient of discharge in broad crested weir.
3	To determine the soil bulk density by field method.
4	Soil suction measurement with tension meter.
5	Determination of soil intake characteristics using cylinder infiltrometer.
6	To determine the co-efficient of permeability of soil using drain permeator.
7	Study of Sprinkler Irrigation system & major components.
8	Sprinkler Layout, Types of Sprinklers based on Precipitation.
9	Response on different crops to sprinkler irrigation, Wetting patterns.
10	Drip system layout, major components of drip irrigation system.
11	List of crops suitable for drip irrigation system.

Course outcome (Course Skill Set)

At the end of the course the student will:

Get familiarized about the Irrigation Schemes, Hydraulic Measurements, Water control & distribution & irrigation methods, Sprinkler irrigation, Micro Irrigation Systems.

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). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and 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

CIE for the theory component of IPCC

Average of Two Tests, each of 15 Marks (duration 1 hour)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester

Average of Two assessments, each of 10 Marks

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Scaled-down marks of two tests and two assignments added will be CIE marks for the theory component of IPCC for **25 marks**.

CIE for the practical component of IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory

record, the other **10 marks shall be for the test** conducted at the end of the semester.

- 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**) at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 05 marks.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.

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.

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 shall include questions from the practical component).

- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) 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 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

Suggested Learning Resources:

Textbooks

1. Irrigation engineering by DR. P N Darde.
2. Irrigation and Water Power Engineering by Dr. B C Punmia.
3. Garg, S.K., Irrigation Engineering and Hydraulic Structures, Khanna Publishers, Delhi 21st Edition (April, 2007).
4. Daugherty, R.L., Franzini, J.B. and Finnemore, E.J., Fluid Mechanics with Engineering Applications, McGraw-Hill Book Co, Singapore-1989.

Web links and Video Lectures (e-Resources):

1. <http://ecoursesonline.iasri.res.in/course/view.php?id=52>
2. <https://www.youtube.com/watch?v=d1FbhF8demA&list=PLbRMhDVUMngdyecGEkCH8BmO8N78lCVqh>
3. <https://www.slideshare.net/parandhamanspsp/ce8603-irrigation-engineering-notespdf>
4. <https://archive.nptel.ac.in/courses/126/105/126105010/>

AGRICULTURAL PROCESS ENGINEERING (IPCC)			
Course Code	BSA403	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	04	Exam Hours	03
Examination nature (SEE)	Theory		
Course Objectives:			
<ul style="list-style-type: none"> To train the students on unit operations of agricultural process engineering To acquaint with the engineering properties of agricultural materials Enable the students to understand the concepts of cleaning of cereals, size reduction and rice milling 			
Teaching-Learning Process (General Instructions)			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"> Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations. Chalk and Talk method for Problem Solving. Arrange visits to show the live working models other than laboratory topics. Adopt collaborative (Group Learning) Learning in the class. Adopt Problem Based Learning (PBL), which fosters students Analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills. 			
Module-1		8 HOURS	
Physical characteristics of different food grains: fruits and vegetables – importance, Shape and size – criteria for describing shape and size, Roundness and sphericity – Volume and density – Specific gravity – Bulk density Porosity – surface area.			
Rheology – basic concepts, ASTM standard definition of terms, Rheological Properties – Force deformation behavior, stress and strain behavior, Visco elasticity – time effects, Rheological models - Kelvin and Maxwell models, electrical equivalence of mechanical models.			
Module-2		8 HOURS	
Frictional Properties: Friction in agricultural materials – measurement – rolling resistance – angle of internal friction and angle of repose, Aerodynamics of agricultural products – drag coefficient and terminal velocity.			
Electrical properties – Di electrical properties, Thermal Properties – specific heat – thermal conductivity-thermal diffusivity, Application of engineering properties in handling and processing equipment.			
Module-3		8 HOURS	
Theory of separation: Types of separators, Cyclone separators, Size of screens applications, Separator based on length, width and shape of the grains, specific gravity, density, Air-screen grain cleaner principle and types, Design considerations of air screen grain cleaners, Sieve analysis-particle size determination, Ideal screen and actual screen– effectiveness of separation and related problems, Pneumatic separator, Cleaning and separation equipment's.			
Module-4		8 HOURS	
Scope and importance of crop processing: Principles and methods of food processing- cleaning and grading of cereals, Size reduction –principle of comminution/ size reduction, mechanisms of comminution of food, particle shape, average particle size, Characteristics of comminuted products, crushing efficiency, Determination and designation of the fineness of ground material, screen analysis, Empirical relationships (Rittinger_s, Kick_s and Bond's equations), Work index, energy utilization, Size reduction equipment – Principal types, crushers (jaw crushers, gyratory, smooth roll), Hammer mills, Attrition mills, Burr mill, Tumbling mills, Action in tumbling mills, Size reduction equipment –Ultra fine grinders (classification hammer mills, colloid mill), Cutting machines.			
Module-5		8 HOURS	
Milling - Rice milling: Principles and equipment's, Paddy parboiling methods and equipment, Wheat milling, Milling of Pulses, wet milling, dry milling and milling efficiency. Theory of filtration, Rate of filtration, Applications, Constant rate filtration and Constant–pressure filtration derivation of equation, Filtration equipment, Plate and frame filter press, Rotary filters and tubular filters.			

PRACTICAL COMPONENT OF IPCC (May cover all / major modules)

Sl.NO	Experiments
1	Preparation of flow charts and layout of a food processing plant
2	Mixing index and study of mixers
3	Determination of fineness modulus and uniformity index
4	Determination of mixing index of a feed mixer
5	Determination of the efficiency of cyclone separator
6	Tutorial on use of psychometric chart
7	Tutorial on power requirement in size reduction of grain using Ratzinger's law, Kicks law and Bond's law
8	Performance evaluation of hammer mill and attribution mill.
9	Separation behaviour in pneumatic separation
Course outcomes (Course Skill Set): At the end of the course the student will be able to: <ul style="list-style-type: none">• Be proficient in the scope of the process engineering and the use of processing machinery• Understand the physical properties, rheological properties and frictional properties of agricultural materials• Summarizing the thermal properties, electrical properties and the terms related to the machine design aspects• Some of the basic concepts related to cleaning and size reduction equipment's• To acquaint the students with the milling of rice, parboiling technologies and milling of pulses and oil seeds• Understand the filtration equipment's	

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.

CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means 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**.
- 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 the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) 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 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.

- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

Suggested Learning Resources:

Books

1. Unit Operations of Agricultural Processing, Sahay KM and Singh KK 1994, Vikas Publishing House Pvt. Ltd., New Delhi.
2. Post Harvest Technology of Cereals, Pulses and oil seeds, Chakraverty A 1988. Oxford and IBH Publishing Co. Ltd., Calcutta.
3. Unit Operations of Chemical Engineering, McCabe WL, Smith JC and Harriott P 2017 McGraw-Hill Book Co., Boston.
4. Transport Processes and separation Process Principle, Geankoplis C J 2015 Prentice-Hall Inc., New Jersey.
5. Unit operations in Food processing, Earle R L 1983. Pergamon Press, New York
6. file:///C:/Users/DELL/Downloads/AlabmanualonAgriculturalProcessingandStructures.pdf
7. Post Harvest Technology of Cereals, Pulses and oil seeds, Chakraverty A 1988. Oxford and IBH Publishing Co. Ltd., Calcutta.

Web links and Video Lectures (e-Resources):

1. <https://archive.nptel.ac.in/courses/126/105/126105011/>
2. <https://www.youtube.com/watch?v=ZD3auEylazQ&list=PLbRMhDVUMngd9ZQul3t-OUxD4713C7QCh>
3. <http://ecoursesonline.iasri.res.in/course/view.php?id=22>

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

- Quizzes
- Assignments
- Seminars

MACHINE DRAWING AND GD & T (PCCL)		Semester	IV
Course Code	BSAL404	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Credits	01	Exam Hours	03
Examination nature (SEE)	Practical		
* One additional hour may be considered wherever required			
Course objectives:			
<ul style="list-style-type: none"> ● To acquire the knowledge of limits, tolerance and fits and indicate them on machine drawings. ● To make drawings using orthographic projections and sectional views ● To impart knowledge of thread forms, fasteners, keys, joints, couplings and clutches. ● To understand and interpret drawings of machine components leading to preparation of assembly drawings manually and using CAD packages. 			
Module 1 (only for CIE)			01 Sessions
Review of basic concepts of Engineering Visualization			
Geometrical Dimensioning and Tolerances (GD&T): Introduction, Fundamental tolerances, Deviations, Methods of placing limit dimensions, machining symbols, types of fits with symbols and applications, geometrical tolerances on drawings. Standards followed in industry.			
Module 2 (only for CIE)			02 Sessions
Sections of Simple and hollow solids: True shape of sections.			
Module 3 (only for CIE)			03 Sessions
Thread Forms: Thread terminology, sectional views of threads. ISO Metric (Internal & External), BSW (Internal & External) square and Acme. Sellers thread, American Standard thread, Helicoil thread inserts			
Fasteners: Hexagonal headed bolt and nut with washer (assembly), square headed bolt and nut with washer (assembly), simple assembly using stud bolts with nut and lock nut. Flanged nut, slotted nut, taper and split pin for locking, countersunk head screw, grub screw, Allen screw			
Rivets Keys: Parallel key, Taper key, Feather key, Gib-head key and Woodruff key.			
Module 4			03 Sessions
Assembly of Joints, couplings and clutches (with GD&T) using 2D environment			
Joints: Like Cotter joint (socket and spigot), knuckle joint (pin joint).			
Couplings: Like flanged coupling, universal coupling			
Module 5			05 Sessions
Assembly of Machine Components (with GD&T) using 3D environment			
<i>(Part drawings shall be given)</i>			
<ol style="list-style-type: none"> 1. Bearings 2. Valves 3. Safety Valves 4. I.C. Engine components 5. Lifting devices 6. Machine tool components 7. Pumps 			

Course outcomes (Course Skill Set):

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

CO1: Interpret the Machining and surface finish symbols on the component drawings.

CO2: Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.

CO3: Illustrate various machine components through drawings

CO4: Create assembly drawings as per the conventions.

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) and that for SEE minimum passing mark is 35% of the maximum marks (18 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 not less than 35% (18Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sumtotal of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together **Continuous Internal Evaluation (CIE):**

CIE marks for the practical course is **50 Marks**.

- CIE shall be evaluated for max marks 100. Marks obtained shall be accounted for CIE final marks, reducing it by 50%.
- CIE component should comprise of
 - Continuous evaluation of Drawing work of students as and when the Modules are covered.
 - At least one closed book **Test** covering all the modules on the basis of below detailed weightage.

Weightage for Test and Continuous evaluation shall be suitably decided by respective course coordinators.

Module	Max. Marks weightage	Evaluation Weightage in marks	
		Computer display & printout	Preparatory sketching
Module 1	10	05	05
Module 2	15	10	05
Module 3	25	20	05
Module 4	25	20	05
Module 5	25	25	00
Total	100	80	20

Semester End Evaluation (SEE):

SEE marks for the practical course is 50 Marks.

- The duration of SEE is 03 hours. **Questions shall be set worth of 3 hours**

- SEE shall be conducted jointly by the two examiners, **one internal examiner from the same institute and another from other institute as external examiners**, are appointed by the University.
- SEE shall be conducted and evaluated for maximum marks 100. Marks obtained shall be accounted for SEE final marks, reducing it to 50 marks.
- Question paper shall be set jointly by both examiners and made available for each batch as per schedule.
Questions are to be set preferably from Text Books.
- Evaluation shall be carried jointly by both the examiners.
- Scheme of Evaluation: *To be defined by the examiners jointly and the same shall be submitted to the university along with question paper.*
- One full question shall be set from Modules 3 and 4 as per the below table weightage details.
However, the student may be awarded full marks, if he/she completes solution on computer display without sketch.

Suggested Learning Resources:

Books:

- K L Narayana, P Kannaiah, K Venkata Reddy, "Machine Drawing", New Age International, 3rd Edition. ISBN-13: 978-81-224-2518-5, 2006
- N D Bhatt, "Machine Drawing", Charotar Publishing House Pvt. Ltd., 50th

Web links and Video Lectures (e-Resources):

1. <https://www.youtube.com/watch?v=ptjfomL117o&list=PLLvBXFAV-DeIsmVkmcNv2RzwCuT1XvhTV>
2. <https://nptel.ac.in/courses/112103019>

TRACTOR SYSTEMS AND CONTROLS (ESC)		Semester	IV
Course Code	BSA405A	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		
<p>Course objectives: The course will enable the students to</p> <ul style="list-style-type: none"> • Acquire a basic understanding the concepts of transmission system in a tractor, major functional systems, Gearing theory, principle of operation, gear box types, functional requirements. • Understand the study of brake system, familiarization with the hydraulic system adjustments and Study of tractor mechanics. 			
<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. Adopt different type of teaching methods to develop the outcomes through Power-Point Presentation and Video demonstration or Simulations. 2. Chalk and Talk method for Problem Solving. 3. Arrange visits to show the live working models other than laboratory topics. 4. Adopt collaborative (Group Learning) Learning in the class. 5. Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information. 6. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills. 			
Module-1			
<p>Study of need for transmission system in a tractor. Transmission system – types, major functional systems. Study of clutch – need, types, functional requirements, construction and principle of operation. Familiarization with single plate, multi-plate, centrifugal and dual clutch systems.</p>			
Module-2			
<p>Study of Gear Box – Gearing theory, principle of operation, gear box types, functional requirements, and calculation for speed ratio. Study of differential system – need, functional components, construction, calculation for speed reduction. Study of need for a final drive.</p>			
Module-3			
<p>Study of Brake system – types, principle of operation, construction, calculation for braking torque. Study of steering system – requirements, steering geometry characteristics, functional components, calculation for turning radius. Familiarization with Ackerman steering. Steering systems in track type tractors. Study of Hydraulic system in a tractor – Principle of operation, types, main functional components, functional requirements.</p>			
Module-4			
<p>Familiarization with system the Hydraulic adjustments and ADDC. Study of tractor power outlets – PTO. PTO standards, types and functional requirements. Introduction to traction. Traction terminology. Theoretical calculation of shear force and rolling resistance on traction device. Study of wheels and tyres – Solid tyres and pneumatic tyres, tyre construction and tyre specifications. Study of traction aids.</p>			
Module-5			

Study of tractor mechanics – forces acting on the tractor. Determination of CG of a tractor. Determination and importance of moment of inertia of a tractor. Study of tractor static equilibrium, tractor stability especially at turns. Determination of maximum drawbar pull. Familiarization with tractor as a spring-mass system. Ergonomic considerations and operational safety. Introduction to tractor testing. Deciphering the engine test codes

Course outcome (Course Skill Set)

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

1. Analyze functions of power transmission system and clutch system.
2. Discuss Gear Box – Gearing theory, principle of operation, gear box types.
3. Apply principle of operation, construction, calculation for braking torque.
4. Familiarization with system the Hydraulic adjustments and ADDC
5. Analyze the importance of moment of inertia of a tractor. Study of tractor static equilibrium, tractor stability especially at turns.

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:

- 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.

Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:**Text Books**

1. Liljedahl J B and Others. Tractors and Their Power Units.
2. Rodichev V and G Rodicheva. Tractors and Automobiles.

Reference Books:

1. C.B.Richey. Agricultural Engineering Handbook.
2. John Deere. Fundamentals of Service Hydraul
3. Singh Kirpal. Automobile Engineering – Vol I.
4. Heitner Joseph. Automotive Mechanics: Principles and Practices

Web links and Video Lectures (e-Resources):

1. <http://ecoursesonline.iasri.res.in/course/view.php?id=520>
2. <https://bbsbec.edu.in/wp-content/uploads/2020/01/final.pdf>
3. <http://www.eagri.org/eagri50/FMP211/lec04.html>
4. https://ecourses.icar.gov.in/e-Learningdownload3_new.aspx?Degree_Id=04

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

- Quizzes
- Assignments
- Seminars

Robotics and Automation (ESC)		Semester	IV
Course Code	BSA405B	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		
<p>Course objectives: The course will enable the students to</p> <ul style="list-style-type: none"> • Awareness about renewable Energy Sources and technologies. • Adequate inputs on a variety of issues in harnessing renewable Energy. • Recognize current and possible future role of renewable energy sources. 			
<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. Adopt different type of teaching methods to develop the outcomes through Power-Point Presentation and Video demonstration or Simulations. 2. Chalk and Talk method for Problem Solving. 3. Arrange visits to show the live working models other than laboratory topics. 4. Adopt collaborative (Group Learning) Learning in the class. 5. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills. 			
Module-1			
Definitions- Robots, Robotics; Types of Robots- Manipulators, Mobile Robots-wheeled & Legged Robots, Aerial Robots; Anatomy of a robotic manipulator-links, joints, actuators, sensors, controller; open kinematic vs closed kinematic chain; degrees of freedom; Robot configurations-PPP, RPP, RRP, RRR; features of SCARA, PUMA Robots; Classification of robots based on motion control methods and drive technologies; 3R concurrent wrist; Classification of End effectors - mechanical grippers, special tools, Magnetic grippers, Vacuum grippers, adhesive grippers, Active and passive grippers, selection and design considerations of grippers in robot.			
Module-2			
Robot Kinematics Direct Kinematics- Rotations-Fundamental and composite Rotations, Homogeneous coordinates, Translations and rotations, Composite homogeneous transformations, Screw transformations, Kinematic parameters, The Denavit-Hartenberg (D-H) representation, The arm equation, direct kinematics problems (upto 3DOF) Inverse kinematics- general properties of solutions, Problems (upto 3DOF) Inverse kinematics of 3DOF manipulator with concurrent wrist (demo/assignment only) Tool configuration Jacobian, relation between joint and end effector velocities.			
Module-3			
Trajectory planning Tasks Path planning Trajectory Planning. Joint space trajectory planning- cubic polynomial, linear trajectory with parabolic blends, trajectory planning with via points; Cartesian space planning, Point to point vs continuous path planning. Obstacle avoidance methods- Artificial Potential field, A* algorithms.			
Module-4			
Manipulator Dynamics Lagrange's formulation – Kinetic Energy expression, velocity Jacobian and Potential Energy expression, Generalised force, Euler-Lagrange equation, Dynamic model of planar and spatial serial robots upto 2 DOF, modelling including motor and gearbox. Robot Control - The control problem, Single axis PID control-its disadvantages, PD gravity control, computed torque control. Simulation of simple robot-control system-Matlab programming for control of robots(demonstration/assignment only)			
Module-5			

Industrial Applications - Material handling, welding, Spray painting, Machining. Case study for robotic applications including robot selection considerations for a typical industrial ROBOTICS & AUTOMATION application- number of axes, work volume, capacity & speed, stroke & reach, Repeatability, Precision and Accuracy, Operating environment. forge – the robotic configuration for pick and place robot, spot welding robot in a car manufacturing industry, peg in hole assembly. Applications in the medical, mining, space, defence, security, domestic, entertainment.

Course outcome (Course Skill Set)

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

1. Familiarize with anatomy, specifications and types of Robots
2. Obtain forward and inverse kinematic models of robotic manipulators
3. Plan trajectories in joint space & Cartesian space and avoid obstacles while robots are in motion
4. Develop dynamic model and design the controller for robotic manipulators
5. Choose appropriate Robotic configuration and list the technical specifications for robots used in different applications
6. Familiarize with different types of mobile robots, kinematic models, motion control and sensors for mobile robots

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:

- 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**).

- The question paper will have ten questions. Each question is set for 20 marks. .
- 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.
- The students have to answer 5 full questions, selecting one full question from each module.

Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:**Books**

1. Robert. J. Schilling , “Fundamentals of robotics – Analysis and control”, Prentice Hall of India 1996.
2. Introduction to Robotics (Mechanics and control), John. J. Craig, Pearson Education Asia 2002.
3. Introduction to Robotics by S K Saha, Mc Graw Hill Education
4. R K Mittal and I J Nagrath, “Robotics and Control”, Tata McGraw Hill, New Delhi,2003.
5. Ashitava Ghosal, “Robotics-Fundamental concepts and analysis”, Oxford University press.
6. Robotics Technology and Flexible Automation, Second Edition, S. R. Deb
7. Introduction to Autonomous Mobile Robots, Siegwart, Roland, Cambridge, Mass. : MIT Press, 2nd ed.

Additional References:

1. Siciliano, Khatib , “Handbook of Robotics”, Springer
2. John J. Craig, Introduction to Robotics – Mechanics and Control
3. Kevin M. Lynch, Frank C. Park, Modern Robotics Mechanics, Planning and Control

Web links and Video Lectures (e-Resources):

1. <https://www.youtube.com/watch?v=rYWJdZ5qg6M&list=PLbRMhDVUMngcdUbBySzyzcPiFTYWr4rV>
2. https://www.youtube.com/watch?v=a6_fgnuuYfE&list=PLyqSpQzTE6M_XM9cvjLLO_Azt1FkgPhpH
3. https://onlinecourses.nptel.ac.in/noc21_me76/preview

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

- Quizzes
- Assignments
- Seminars

Non-Conventional Energy Resources (ESC)		Semester	IV
Course Code	BSA405C	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		
<p>Course objectives: The course will enable the students to</p> <ul style="list-style-type: none"> • Awareness about renewable Energy Sources and technologies. • Adequate inputs on a variety of issues in harnessing renewable Energy. • Recognize current and possible future role of renewable energy sources. 			
<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. Adopt different type of teaching methods to develop the outcomes through Power-Point Presentation and Video demonstration or Simulations. 2. Chalk and Talk method for Problem Solving. 3. Arrange visits to show the live working models other than laboratory topics. 4. Adopt collaborative (Group Learning) Learning in the class. 5. Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information. 6. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills. 			
Module-1			
<p>RENEWABLE ENERGY (RE) SOURCES - Importance of renewable sources of energy. 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, Principle of natural and forced convection drying system, Solar Photo-voltaic: 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-3			
<p>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.</p>			
Module-4			
<p>Biomass Energy - Introduction-Biomass resources –Energy from Bio mas: conversion process - Biomass Cogeneration-Environmental Benefits. Geothermal Energy: Basics, Direct Use, Geothermal Electricity. Mini/micro hydro power: Classification of hydropower schemes, Classification of water turbine, Turbine theory, Essential components of hydroelectric system.</p>			
Module-5			
<p>Other Energy Sources - Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems. Wave Energy: Energy from waves, wave power devices. Ocean Thermal Energy Conversion (OTEC)- Hydrogen Production and Storage- Fuel cell :Principle of working- various types – construction and applications. Energy</p>			

Storage System- Hybrid Energy Systems.

Course outcome (Course Skill Set)

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

1. Ability to create awareness about renewable Energy Sources and technologies.
2. Ability to get adequate inputs on a variety of issues in harnessing renewable Energy.
3. Ability to recognize current and possible future role of renewable energy sources.
4. Ability to explain the various renewable energy resources and technologies and their applications.
5. Ability to understand basics about biomass energy.
6. Ability to acquire knowledge about solar energy

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:

- 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**).

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.

Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:**Books**

1. G. D Rai, Non-Conventional Energy Sources, Kanna Publishers.
2. Joshua Earnest, Tore Wizeliu, 'Wind Power Plants and Project Development', PHI Learning Pvt. Ltd, New Delhi, 2011.
3. D.P.Kothari, K.C Singal, Rakesh Ranjan "Renewable Energy Sources and Emerging Technologies", PHI Learning Pvt.Ltd, New Delhi, 2013.
4. Scott Grinnell, "Renewable Energy & Sustainable Design", CENGAGE Learning, USA, 2016.

Additional References:

1. A.K.Mukerjee and Nivedita Thakur," Photovoltaic Systems: Analysis and Design", PHI Learning Private Limited, New Delhi, 2011
2. Richard A. Dunlap," Sustainable Energy" Cengage Learning India Private Limited, Delhi, 2015.
3. Chetan Singh Solanki, " Solar Photovoltaics : Fundamentals, Technologies and Applications", PHI Learning Private Limited, New Delhi, 2011

Web links and Video Lectures (e-Resources):

1. <http://ecoursesonline.iasri.res.in/course/view.php?id=35>
2. <https://archive.nptel.ac.in/courses/121/106/121106014/>
3. https://www.youtube.com/watch?v=7Ry643d3deE&list=PL3QMEfkoIRFbGhXveCE7RFDBgY0_gRxkh
4. <https://www.toppr.com/guides/physics/sources-of-energy/non-conventional-sources-of-energy/>

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

- Quizzes
- Assignments
- Seminars

Industrial Instrumentation (ESC)		Semester	IV
Course Code	BSA405D	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		
<p>Course objectives: The course will enable the students to</p> <ul style="list-style-type: none"> To introduce the measurement techniques of force, torque and speed. To introduce the measurement techniques of acceleration, Vibration and density To introduce the measurement Viscosity, Humidity and moisture. To introduce the temperature measurement techniques To introduce the pressure measurement techniques 			
<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"> Adopt different type of teaching methods to develop the outcomes through Power-Point Presentation and Video demonstration or Simulations. Chalk and Talk method for Problem Solving. Arrange visits to show the live working models other than laboratory topics. Adopt collaborative (Group Learning) Learning in the class. Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills. 			
Module-1			
<p>MEASUREMENT OF FORCE, TORQUE AND SPEED - Different types of load cells: Hydraulic, Pneumatic, Strain gauge, Magneto-elastic and Piezoelectric load cells – Different methods of torque measurement: Strain gauge, Relative angular twist. Sped measurement: Capacitive tacho, Drag cup type tacho, D.C and A.C tacho generators – Stroboscope.</p>			
Module-2			
<p>MEASUREMENT OF ACCELERATION, VIBRATION AND DENSITY -Accelerometers: LVDT, Piezoelectric, Strain gauge and Variable reluctance type accelerometers – Mechanical type vibration instruments – Seismic instruments as accelerometer – Vibration sensor – Calibration of vibration pickups – Units of density and specific gravity – Baume scale and API scale – Densitometers: Pressure type densitometers, Float type densitometers, Ultrasonic densitometer and gas densitometer. Power station, Calculation of energy through photovoltaic power generation and cost economics.</p>			
Module-3			
<p>MEASUREMENT OF VISCOSITY, HUMIDITY AND MOISTURE -Viscosity: Saybolt viscometer – Rotameter type and Torque type viscometers – Consistency Meters – Humidity: Dry and wet bulb psychrometers – Resistive and capacitive type hygrometers – Dew cell – Commercial type dew meter. Moisture: Different methods of moisture measurements –Thermal Conductivity and Capacitive sensors, Microwave, IR and NMR sensors, Application of moisture measurement – Moisture measurement in solids.</p>			
Module-4			
<p>TEMPERATURE MEASUREMENT - Definitions and standards – Primary and secondary fixed points – Different types of filed in system thermometers – Sources of errors in filed in systems and their compensation – Bimetallic thermometers – IC sensors – Thermocouples: Laws of thermocouple, Fabrication of industrial thermocouples, Reference junctions compensation, Signal conditioning for thermocouple, Commercial circuits for cold junction compensation, Response of thermocouple, Special techniques for measuring high temperature using thermocouple – Radiation fundamentals – Radiation methods of temperature measurement – Total radiation pyrometers – Optical pyrometers – Two colour radiation pyrometers – Fiber optic sensor for temperature measurement – Thermograph, Temperature switches and thermostats – Temperature sensor selection, Installation and Calibration.</p>			
Module-5			

PRESSURE MEASUREMENT -Units of pressure – Manometers: Different types, Elastic type pressure gauges: Bourdon tube, Bellows, Diaphragms and Capsules – Electrical methods: Elastic elements with LVDT and strain gauges – Capacitive type pressure gauge – Piezo resistive pressure sensor-Resonator pressure sensor – Measurement of vacuum: McLeod gauge, Thermal conductivity gauge, ionization gauges, Cold cathode type and hot cathode type – Pressure gauge selection, installation and calibration using dead weight ester.

Course outcome (Course Skill Set)

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

1. Understand Principles and working of Viscosity, Humidity, Moisture, temperature, pressure, flow and level measuring Instruments.
2. Calibrate temperature, flow , level and Pressure measuring devices
3. Apply measurement of Viscosity, Humidity, Moisture, temperature , pressure, flow and level in Industrial Applications
4. Select and install Industrial instruments for various applications
5. Understand various Electrical type Industrial Instruments

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:

- 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.

Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books.

1. Doebelin, E.O. and Manik, D.N., "Measurement systems Application and Design", 6thMcGraw-Hill Education Pvt. Ltd,2011.
2. A.K. Sawhney and PuneetSawhney, "Mechanical Measurements and Instrumentation and Control", DhanpatRai & Co. (P) Limited, 2015

Web links and Video Lectures (e-Resources):

1. <https://instrumentationtools.com/introduction-industrial-instrumentation/>

2. [https://kanchiuniv.ac.in/coursematerials/Industrial Instrumentation K Saraswathi.pdf](https://kanchiuniv.ac.in/coursematerials/Industrial%20Instrumentation%20K%20Saraswathi.pdf)
3. <https://www.youtube.com/watch?v=NuQqDFkhIU&list=PLC7B26029C4E955FA>
4. <https://archive.nptel.ac.in/courses/108/105/108105064/>

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

- Quizzes
- Assignments
- Seminars

Semester IV

MASTERING MS - OFFICE (MS Word, Excel, PPT, Outlook) (AEC/SEC)			
Course Code	BSAL456A	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2	SEE Marks	50
Total Hours of Pedagogy	25	Total Marks	100
Credits	01	Exam Hours	03 Hrs -Practical type
Course objectives:			
<ol style="list-style-type: none"> 1. Understand the basics of computers and prepare documents and small presentations. 2. Attain the knowledge about spreadsheet/worksheet with various options. 3. Create simple presentations using templates various options available. 4. Demonstrate the ability to apply application software in an office environment. 5. Use MS Office to create projects, 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. Chalk and talk 2. Power point Presentation, video 3. Practice sessions 			
Module-1			
MS-Word -Working with Files, Text – Formatting, Moving, copying and pasting text, Styles – Lists – Bulleted and numbered lists, Nested lists, Formatting lists. Table Manipulations. Graphics – Adding clip Art, add an image from a file, editing graphics, Page formatting – Header and footers, page numbers, Protect the Document, Mail Merge, Macros – Creating & Saving web pages, Hyperlinks.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-2			
MS-Excel - Modifying a Worksheet – Moving through cells, adding worksheets, rows and columns, Resizing rows and columns, selecting cells, Moving and copying cells. Linking worksheets - Sorting and Filling, Alternating text and numbers with Auto fill, Auto filling functions. Graphics – Adding clip art, add an image from a file.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-3			
MS-Power Point -Create a Presentation from a template- Working with Slides – Insert a new slide, applying a design template, changing slide layouts – Resizing a text box, Text box properties, delete a text box - Video and Audio effects, Color Schemes & Backgrounds Adding clip art, adding an image from a file, Save as a web page.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-4			
MS-Access - Using Access database wizard, pages and projects. Creating Tables – Create a Table in design view. Datasheet Records – Adding, Editing, deleting records, Adding and deleting columns Resizing rows and columns. Print a datasheet. Queries - MS-Access.			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-5			
Microsoft Outlook - Introduction, Starting Microsoft Outlook, Outlook Today, Different Views In Outlook, Outlook Data Files			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Course outcome (Course Skill Set)			
At the end of the course the student will be able to:			
<ol style="list-style-type: none"> 1. Know the basics of computers and prepare documents, spreadsheets, make small presentations with audio, video and graphs and would be acquainted with internet. 2. Create, edit, save and print documents with list tables, header, footer, graphic, spellchecker, mail merge and grammar checker 3. Attain the knowledge about spreadsheet with formula, macros spell checker etc. 4. Demonstrate the ability to apply application software in an office environment. 5. Use Google Suite for office data management tasks 			

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 (CIE):

CIE marks for the practical course are **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

- SEE marks for the practical course are 50 Marks.
- **SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.**
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in - 60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

Suggested Learning Resources:**Books**

1. Mastering MS Office by Kumar Bittu, ISBN: 9789350578780

Web links and Video Lectures (e-Resources):

1. <https://youtu.be/9VRmgC2GRFE>
2. <https://youtu.be/rJPWi5x0g3l>
3. <https://youtu.be/tcj2BhhCMN4>
4. <https://youtu.be/ubmwp8kbFPc>
5. <https://youtu.be/i6eNvfQ8fTw>
6. <http://office.microsoft.com/en-us/training/CR010047968.aspx>
7. <https://gsuite.google.com/learning-center>
8. <http://spoken-tutorial.org>

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

- Real world problem solving using group discussion.
Real world examples of Windows Framework

Animation in Agriculture (AEC/SEC)			
Course Code	BSAL456B	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2	SEE Marks	50
Total Hours of Pedagogy	25	Total Marks	100
Credits	01	Exam Hours	03 hrs -Practical type
Course objectives: <ol style="list-style-type: none"> 1. Understand the basics of animation & developing some animation characters. 2. Attain the knowledge about image, formats & image creation & editing. 3. Create simple animation presentations of any agricultural scenario. 4. Demonstrate the ability to develop 2D & 3D animation characters, related to 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. Chalk and talk 2. Power point Presentation, video 3. Practice sessions 			
Module-1			
Basics of Animation Introduction to Animation, Terms used in Animation, Types of Animation, Basic Principles of Animation, Developing any simple Animation Characters			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-2			
Basics of photo editing Introduction to Image , different Image formats, getting into Photoshop interface ,practice on layers, selection tools, painting tools, blur and highlight tools .			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-3			
Basics of HTML & CSS What is a HTML and HTML 5; Getting started with tags; How to save web pages; Viewing your web pages; Basic HTML Tags ; Basic HTML template; Images and CSS; Text wrapping with CSS; CSS and image borders			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-4			
Computer Based 2 D Animation Introduction to the flash interface, o drawing and drawing tools in Flash, Object Selection, working with objects & transforming Objects, Animation -Principles , Frame by frame animation, tweening, masks, Developing some basic animation such as seed germination, flower blossoming ,wind blowing in farm land etc..			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Module-5			
Introduction to 3 D Animation Introduction & Context for 3 D Studio Max, Interface, Creating & editing simple farm primitive objects, Selecting Objects & setting object properties, Transforming objects, pivoting, aligning & snapping Developing some basic animation such as seed germination, flower blossoming, Simple farm equipment operation etc..			
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos.		
Course outcome (Course Skill Set) At the end of the course the student will be able to: <ol style="list-style-type: none"> 1. Know the basics of animation & developing some animation characters. 2. Get Proficient knowledge on image & image creation & editing. 3. Attain the knowledge about basics on HTML & CSS for web animations. 4. Demonstrate the ability to create 2D & 3D animation characters in relation to 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). 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 (CIE):

CIE marks for the practical course are **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

- SEE marks for the practical course are 50 Marks.
- **SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.**
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in - 60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

Suggested Learning Resources:**Books**

1. The Complete Animation course by Chris Patmore, By – Barons Educational Series (New York)
2. The complete Reference: Thomas Powell; Osborne/McGraw Hil
3. Flash CS4 Professional Bible Published by Wiley Publishing (Robert R & Snow D.)
4. 3ds Max- Bible 2011 By – Kelly L. Murdock WILEY PUBLICATIONS

Web links and Video Lectures (e-Resources):

1. <https://www.youtube.com/watch?v=UjmpXVritPk>
2. <https://www.skillshare.com/en/browse/animation>
3. <https://www.youtube.com/watch?v=4ZSWwHk4AOQ&list=PLQbv9ydn0-sSKDUifYdnxF44MgHTt875J>
4. <https://archive.nptel.ac.in/courses/107/101/107101001/>

Principles of Soil Science (AEC/SEC)			
Course Code	BSAL456C	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2	SEE Marks	50
Credits	1	Exam Hours	3hrs-Practical type
Course objectives:			
<ol style="list-style-type: none"> 1. Understand about the rocks & minerals, 2. soil types, particle size, Soil pH., 3. organic carbon of soi , 4. Determination of nitrogen, phosphorus, Potassium & micro nutrients. 5. water quality parameters. 			
Sl.NO	Experiments		
1	Identification of rocks & minerals.		
2	Examination of soil profile in the field. Collection of Soil Sample.		
3	Determination of particle size analysis.		
4	Determination of Soil pH.		
5	Determination of water soluble and exchangeable cat ions in soil.		
6	Determination of organic carbon of soil.		
7	Determination of nitrogen, phosphorus, Potassium & micro nutrients.		
8	Identification of nutrient deficiency symptoms of crops in the field.		
9	Determination of gypsum & lime requirement of sodic soil & acid soils.		
10	Determination of water quality parameters.		
Course outcomes (Course Skill Set):			
At the end of the course the student will be able to:			
<ol style="list-style-type: none"> 1. Know about the rocks & minerals, soil types, particle size, Soil pH., organic carbon of soi , Determination of nitrogen, phosphorus, Potassium & micro nutrients. water quality parameters. 			

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). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination(SEE).

Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

The duration of SEE is 03 hours

Rubrics suggested in Annexure-II of Regulation book

Suggested Learning Resources:

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

Web links and Video Lectures (e-Resources):

<http://ecoursesonline.iasri.res.in/course/view.php?id=125>

<https://www.youtube.com/watch?v=IQk07T4LCNE>

Technical writing skills (A E C / S E C)			
Course Code	BSA456D	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	1	Exam Hours	1hr - Theory type
<p>Course objectives: Enable the students to</p> <ol style="list-style-type: none"> 1. Achieve better Technical writing and Presentation skills for employment. 2. Develop adequate knowledge of paragraph writing and precise writing techniques 3. Write business proposals and reports. 4. Write conference papers and prepare gist of published papers. 5. Develop efficiency in drafting social media posts and blogs. 			
<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. Chalk and talk 2. Power point Presentation, video 3. Practice sessions 			
Module-1			
<p>Technical Report Writing: Introduction to Technical writing process, Understanding of writing process, Introduction to various Technical Report writing..</p>			
Teaching-Learning Process	Chalk and talk, PowerPoint Presentation		
Module-2			
<p>Art of condensation and Paragraph Writing: Introduction and importance, Types and principles of condensation. Importance of paragraph writing, Features and its construction styles.</p>			
Teaching-Learning Process	Chalk and talk, Practice sessions.		
Module-3			
<p>Business Report Writing: Introduction, Definition and Salient features of Business reports. Significance and types of report writing. (Formal and Informal). Resume building and Types of resumes. (samples of resumes)</p>			
Teaching-Learning Process	Chalk and talk, Practice sessions.		
Module-4			
<p>Technical Articles and Proposals: Nature and significance, Types of technical Articles Journal articles and conference papers. Elements of technical articles .Introduction to technical proposal writing, Purpose, importance, structure and types of technical proposals.</p>			
Teaching-Learning Process	Chalk and talk, Activity		
Module-5			
<p>Social media posts and Blog Writing: Ethics and practices of social media posts, Principles and fundamentals, Guiding principles for composition of articles, some common pitfalls. Maintaining common etiquette. Blogs and Blog writings strategies.</p>			
Teaching-Learning Process	Chalk and talk, PowerPoint Presentation		

Course outcome (Course Skill Set)

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

1. Effectively communicate in technical matters.
2. Practice preparation of gist, abstract and notes from a technical article.
3. Prepare a business proposals and reports.
4. Write and respond in social media and write blogs.

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 Examination (CIE)

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 Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour**. The student has to secure a minimum of 35% of the maximum marks meant for SEE.

Suggested Learning Resources:**Books**

1. Sanjay Kumar and Pushpalata, 'Communication Skills', Oxford University Press. 2018.
2. M. Ashraf Rizvi, 'Effective Technical Communication', McGraw Hill, 2018.
3. Gajendra Singh Chauhan and et.al. 'Technical Communication', Cengage Publication, 2018.
4. Meenakshi Raman and Sangeeta Sharma, Technical Communication Principles and Practice, Oxford University Press, 2018.

Web links and Video Lectures (e-Resources):

1. <https://developers.google.com/tech-writing/announcements>
2. <https://www.classcentral.com/course/technical-writing-7117>

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

- Demonstrations of Videos
- Group Discussion
- Practice sessions
- Presentation on any social issues
- Quizzes