INDUSTRIAL MANAGEMENT & ENTREPRENEURSHIP		Semester	5
Course Code	**BSA501**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3•0•0	SEE Marks	50
Total Hours of Pedagogy	40 hours	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

1. Understand the basic concepts of management, planning, organizing, staffing, directing and controlling.
2. Identify various types of supporting agencies and financing available for an entrepreneur
3. Prepare project report and decide selection of industrial ownership.

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. Arrange visits to nearby plants, start •up ecosystem, incubation centers or MSME industries to give information about the industry culture and demand.
3. Show Video/animation films to explain functioning of various machines
4. Encourage collaborative (Group Learning) Learning in the class
5. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking
6. 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.
7. Topics will be introduced in a multiple representation.
8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world • and when that's possible, it helps improve the students' understanding.
10. Individual teacher can device the innovative pedagogy to improve the teaching learning.

MODULE-1 **8 HOURS**

Management: Introduction-Meaning-nature and characteristics of Management, Scope and Functional areas of management-Management as a science, art of profession-Management & Administration-Roles of Management, Levels of Management, Development of Management Thought-early management approaches-Modern management approaches.

Planning: Nature, importance and purpose of planning process Objectives- Types of plans

(Meaning Only)-Decision making Importance of planning-steps in planning & planning premises-Hierarchy of plans.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulation. 4.Laboratory demonstrations and practical experiments
MODULE-2	**8 HOURS**
Organizing and Staffing: Nature and purpose of organization Principles of organization. Types of organization- Departmentation Committees Centralization Vs Decentralization of authority and responsibility-Span of control-MBO and MBE (Meaning Only) Nature and importance of staffing Process of Selection & Recruitment (in brief). **Directing & Controlling:** Meaning and nature of directing Leadership styles, Motivation Theories, Communication Meaning and importance • coordination, meaning and importance and Techniques of Co Ordination. Meaning and steps in controlling-Essentials of a sound control system-Methods of establishing control (in brief).	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulation. 4.Laboratory demonstrations and practical experiments
MODULE-3	**8 HOURS**
Entrepreneur: Meaning of Entrepreneur; Evolution of the Concept; Functions of an Entrepreneur, Types of Entrepreneurs, Entrepreneur-an emerging. Class. Concept of Entrepreneurship-Evolution of Entrepreneurship, Development of Entrepreneurship; Stages in entrepreneurial process; Role of entrepreneurs in Economic Development; Entrepreneurship in India; Entrepreneurship-its Barriers.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulation. 4.Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**
Small Scale Industries: Definition-Characteristics-Need and rationale-Objectives; Scope-role of SSI in Economic Development. Advantages of SSI Steps to start and SSI-Government policy towards SSI. Different Policies of SSI; Government Support for SSI during 5year plans. Impact of Liberalization, Privatization, Globalization on SSI Effect of WTO/GA TT Supporting Agencies of Government for SSI, Meaning, Nature of support; Objectives-Functions, Types of Help, Ancillary Industry and Tiny Industry.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulation. 4.Laboratory demonstrations and practical experiments

MODULE-5	**8 HOURS**
Institutional Support: Different Schemes; TECKSOK; KIADB; KSSIDC; KSIMC; DIC Single Window Agency; SISI; NSIC; SIDBI; KSFC. **Preparation of Project**: Meaning of Project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; Formulation; Guidelines by Planning Commission for Project report; Network Analysis; Errors of Project Report; Project Appraisal. Identification of business opportunities: Market Feasibility Study; Technical Feasibility Study; Financial Feasibility Study & Social Feasibility Study	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulation. 4. Laboratory demonstrations and practical experiments

Course outcome (Course Skill Set)

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

1. Explain about the management and planning.
2. Apply the knowledge on planning, organizing, staffing, directing and controlling.
3. Describe the requirements towards the small-scale industries and project preparation.
4. Explain about preparation of project report and decide selection of industrial ownership.

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:

1. For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
2. 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
3. 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.
4. For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

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

Semester-End Examination:

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

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

Suggested Learning Resources:

Books

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

Web links and Video Lectures (e• Resources)

1. www.nptel.ac.in https://onlinecourses.nptel.ac.in/noc23_mg74/preview
2. https://onlinecourses.nptel.ac.in/noc23_mg70/preview
3. https://cleartax.in/s/small•
4. scaleindustriesssi#:~:text=Small%20Scale%20Industries%20(SSI)%20are,50%20crore
5. https://www.startupindia.gov.in/content/sih/en/startup•scheme.html

Farm Machinery & Equipment-II (IPCC)			
Course Code	**BSA502**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 12 Lab slots	Total Marks	100
Credits	04	Exam Hours	03
**** Additional one hour may be considered for Instructions if required***			

Course objectives:

- To enable the students to understand the basic principles of plant protection equipment, cutting mechanism on various harvesting machines, working principles of threshers, harvesting of field and horticultural crops.
- To recognize the importance of plant protection equipment's agricultural production.
- To explain the role of crop harvesting machinery.
- To identify the various types of plant protection equipment used in agricultural production.
- To know about the working principle and functions of various machine parts of mowers, reapers, windrowers, forage harvesters, threshers, combine harvesters, cotton strippers, cotton pickers, groundnut and potato and sugarcane harvesters.

Teaching-Learning Process (General Instructions)

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

1. Adopt different types of teaching methods to develop the outcomes through power point presentations and video demonstrations 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, which fosters students' analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.
6. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills

MODULE-1	**8 HOURS**
Introduction to plant protection equipment: Sprayers and Dusters. Classification of sprayers and sprays. Types of nozzles. Calculations for calibration of sprayers. **Introduction to interculture equipment**: Use of weeders, manual and powered weeders. Study of functional requirements of weeders and main components. Familiarization of fertilizer application equipment.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving (In-general) 3. Video demonstration or simulation. 4. Laboratory demonstrations and practical experiments
MODULE-2	**8 HOURS**
Principles and types of cutting mechanism-Harvesting terminology, principles and type of cutting mechanism, Construction of shear and impact type cutting mechanisms-shear type cutting mechanism, adjustments, registration and alignment, impact type cutting mechanisms. of cutting mechanisms.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving (In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments
MODULE-3	**8 HOURS**
Crop harvesting machinery-Mowers, construction, components and windrowers, reaper and reaper binders, forage harvesting, chopping and handling equipment-forage harvester, hay conditioners, forage chopping and handling equipment, rakes and balers.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving 3. Video demonstration or simulation 4. Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**

Threshers-Threshing mechanism, types of threshers, construction details, components, features and adjustments. Performance of threshers. Grain combines, terminology, adjustments, grain combine losses and straw combine.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE- 5	**8 HOURS**
Root Crop Harvesting Equipment's: Root crop harvester for potato, groundnut, graders and combines. **Cotton picking and sugarcane harvesting equipment**: Cotton pickers, construction and working principle, cotton strippers, construction and working principles. Sugarcane harvester, construction and working principles. **Fruit harvesting:** Principles of fruit harvesting machines, types of fruit harvesting machines, harvesting of fruits from tall trees.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

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

Sl. No	Experiments
1	To study different types of pesticides application equipment's
2	To study different types of spray nozzles
3	To study different types of dusters
4	Study of various types of movers, constructional details, materials and working
5	Study of various types of repairs, constructional details, materials and working
6	Study of grain crop combine harvester's constructional details, materials and working
7	To study different types of threshers constructional details, materials and working and performance
8	Study of chaff cutter
9	Study of Potato harvester
10	Study of various types of fruits harvesting equipment's, constructional details, materials and working
11	Study of various types of forage harvesters, constructional details, materials and working
12	Visit to farm machinery manufacturing industries/ assembler/ spare parts agency (**Optional**)

Course outcome (Course Skill Set):

Upon completion of this course, student should be able to:

1. To equip the students with technical knowledge of plant protection and intercultural equipment

2. To train the students with skills required for the operation, maintenance and evaluation of harvesting, threshing machineries needed for agricultural farms
3. To abreast the students with mathematical, experimental and computational skills for solving different field problems
4. To train the students for development of prototype models

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.

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. Suraj Prakashan Allahabad.
5. Element of Agricultural Engineering. 1990. Sahay, Jagdishwar. Agro. Book Agency, New Chitragupta Nagar, Patna.

Web links and Video Lectures (e-Resources):

1. https://youtu.be/E2a2yadn_i4
2. https://youtu.be/_VJYb-iT3lM
3. https://youtu.be/uspCrwiysGA
4. https://youtu.be/-U3yd0kxRR0
5. https://youtu.be/T4DjLdG-Zv8

PRECISION AGRICULTURE			
PCC Course Code	**BSA503**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	4:0:0	SEE Marks	50
Total Hours of Pedagogy	52 Hours	Total Marks	100
Credits	4	Exam Hours	3

Course objectives:

1. Through lectures, demonstrations and laboratory activities the course examines the concepts, technologies and implementations strategies of precision agriculture.
2. The course should enable students to become familiar enough with the concepts and the technologies for precision agriculture that practical, quantitative and problem-solving skills can develop.
3. Continue to develop competency in agriculture technologies.
3. Graduates should be able to collect and critically analyze appropriate data, to define the plant development/grows problem, to formulate a hypothesis as to the cause and nature of the problem, to test that hypothesis, and, thus, to solve the problem.

Teaching-Learning Process (General Instructions):

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

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:
   - 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 **8 HOURS**

Introduction to Precision Agriculture-Importance of precision agriculture and mapping in farming for decision making. Benefits of precision agriculture-Economic benefits, Environmental benefits and Farm management improvement. Geographical concepts of precision agriculture

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE- 2	8 HOURS
Tools of Precision Agriculture: Geographical Position System (GPS)- GPS Basics (Space Segment, Receiver Segment, Control Segment), Error and correction, Function and usage of GPS. **IDI devices usage in Precision Agriculture-** Yield monitor, VR Application (fertilizers, seed, chemicals). **Remote sensing**-Aerial and satellite imagery, Above ground (non-contact) sensors	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments
MODULE- 3	**8 HOURS**
Processes of Precision Agriculture: Data collection-Methods of data collection (traditional and new)-Data collection by grid sampling-collecting data by Yield Monitor Remote Sensing-using of sensors for data collection. Data analysis-Concepts of data analysis-resolution-surface analysis. **Analysis application:** Interpretive products (map, charts, application map etc).	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments
MODULE- 4	**8 HOURS**
Precision Agriculture technology integration into a farm & business management of technology: Goals based on end results of precision agriculture- Recordkeeping- Spatial Analysis- Variable Rate Application- Reducing of negative environmental impact- Crop/technology cost optimization. **Economic of precision agriculture & determining equipment and software**- Review of Cost/Benefit of Precision Agriculture- System vs. parcels- Making a selection.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments
MODULE- 5	**8 HOURS**
Modern Israel Technologies in precision agriculture & farm management techniques.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

Course outcome (Course Skill Set)

Upon completion of this course, student should be able to:

1. Understand how global positioning system work and how this technology is used in precision agriculture.
2. Explore the role of GIS in precision farming and site-specific crop production.
3. Understand the role of database management system in precision agriculture, including the role of centralized farm management data warehouse.
4. Identify the soil and management factors that influence crop yield.
5. Understand the concept of spatial variability and soil sampling.

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 the only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

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

Semester-End Examination:

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

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

Suggested Learning Resources:

Books

1. The Precision Farming Guide for Agriculturists By Dan Ess, John Deere
2. GIS USER MANUAL By Mr. Prashant Agarwal

Web links and Video Lectures (e-Resources):
1. www.cargill.com/aghorizons/agronomics/soiltest.htm 2. www.agrigrowth.com/archivegridsoil.htm 3. www.agriculture.com 4. www.pioneer.com/usa/technology/remotesam.htm 5. www.nrsc.co.UK/index.htm 6. www.dtnearthscan.com 7. www.pioneer.com/usa/technology/

MANUFACTURING PROCESS LAB			
Course Code	**BSAL504**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	(0:0:2:0)	SEE Marks	50
Credits	01	Exam Hours	03

Course objectives:

1. To provide an insight to different machine tools, accessories and attachments.
2. Hands on training on machine tools to build the knowledge and confidence which aids the students to enhance their manufacturing skills during the period of their project works.
3. To expose the students to CNC Machine Tools, CNC part programming, and industrial robots.
4. To provide an insight into different sand preparation and foundry equipment.
5. To provide training to students to enhance their practical skills in milling, shaping and hand moulding operations.

Sl. No	**Experiments**
1	**Machine shop:**
	I. Introduction, Lathe machine, types of lathe machine, working principle of lathe, parts, Cutting tools, accessories & attachment II. Jobs involving in thread cutting, groove cutting & plane turning III. Jobs involving in taper turn, knurling, chamfering & center drilling
2	**Shaper**
	I. Introduction, classification of shaper, working principle & parts of shaper II. Jobs involving in cutting of V Groove/ dovetail / Rectangular groove using a shaper
3	**Milling machine**
	I. Introduction, types, working principle, tools & equipment's used II. Jobs involving in Cutting of Gear Teeth using Milling Machine III. Jobs involved to use indexing for preparation of hexagon
4	**Computer Numerical Control (CNC):**
	I. Introduction, components of CNC, CNC programming, manual part programming, G Codes, M Codes, programming of simple components in turning, drilling and milling systems, programming with canned cycles. Cutter radius compensations.

5	**Foundry shop** I. Introduction to foundry materials, moulds, uses of cores, melting furnaces, tools & equipment used in Foundry shop II. Mould making using single piece pattern (step block-round) III. Mouldmaking using split piece pattern

Course outcomes (Course Skill Set):

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

1. Understand integral parts of lathe, shaping and milling machines and various accessories and attachments used.
2. Select cutting parameters like cutting speed, feed, depth of cut, and tooling for various machining operations.
3. Perform cylindrical turning operations such as plain turning, taper turning, step turning, thread Cutting, facing, knurling, internal thread cutting, eccentric turning and estimate cutting time.
4. Perform machining operations such as plain shaping, inclined shaping, keyway cutting and indexing etc.
5. Explain the use of different computer applications in manufacturing, and able to prepare part Programs for simple jobs on CNC machine tools and robot programming.

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.

Suggested Learning Resources:

Text Books

1. Elements of Mechanical Engineering - Hajra Choudhury & others, Media Promoters 2010.
2. The Elements of Workshop Technology - Vol I & II, S.K. Hajra Choudhury, A.K. Hajra Choudhury, Nirjhar Roy, 11th edition 2001 others, Media Promoters and Publishers, Mumbai.
3. Mikell P, Groover. 2015. Automation, Production Systems and Computer-Integrated Manufacturing. 4th Edition, Pearson Learning.
4. P N Rao, 2015, CAD / CAM Principles and Applications, 3rd Edition, Tata McGraw-Hill.

Dr. P. Radhakrishnan, CAD/CAM/CIM, 3rd edition New Age International Publishers, New Delhi.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=oiODxvYCyyo
2. https://www.youtube.com/watch?v=5H0UPAalB_M

WATER HARVESTING AND SOIL CONSERVATION STRUCTURE			
Course Code	**BSA515A**	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	03

Course Objectives:

1. To Appreciate basic concepts of water, understanding the principles of water harvesting and its importance.
2. To learn elementary knowledge of design and construction of rainfall conservation structures.
3. To understand and design sustainable measures for runoff Conservation Structures.
4. To estimate soil loss under different land use condition
5. To Learn elementary knowledge of design and construction of soil conservation Structures

Teaching-Learning Process (General Instructions)

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

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. 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 and develops thinking skills such as evaluating, generalizing, and analyzing information.
6. Conduct laboratory demonstrations and practical experiments to enhance experiential skills.

MODULE-1 **8HOURS**

Monsoon: Types and behavior in India, rainfall-characteristics and distribution. Water (hydrological) cycle, influence of human activity on the water cycle, Surface water resources. Water harvesting-principles, importance and issues. Water harvesting techniques classification based on source, storage and use.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-2 **8HOURS**

Rain water harvesting: Methods, classes, benefits, approach, rooftop rainwater harvesting, traditional techniques for water harvesting. available rain water for harvesting, design of rain water harvesting structure. Runoff harvesting-short-term and long-term techniques. Short-term harvesting techniques-terracing and bunding, rock and ground catchments. Long-term harvesting techniques- purpose and design criteria.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

MODULE-3 **8HOURS**

Different types of farm ponds: Dugout and embankment reservoir types, tanks and subsurface dykes. Farm pond-components, site selection, computation of storage capacity of embankment type of farm ponds, design of dugout farm ponds, cost estimation and construction. Percolation pond-site selection, design and construction details. Design considerations of nala bunds.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

MODULE-4 **8HOURS**

Earthen dam: Components of an earthen dam, advantages, disadvantages, types of earthen dam, design criteria, design of earthen dam, estimation of soil loss, the universal soil loss equation (USLE), Use of USLE, Limitations of Universal Soil Loss Equation, Revised Universal Soil Loss Equation (RUSLE), Modified Universal Soil Loss Equation (MUSLE).

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

MODULE-5 **8HOURS**

Soil erosion control structures: Introduction and classification. Permanent structures for soil conservation and gully control-check dams, drop, chute and drop inlet spillways-design requirements, planning for design, design procedures-hydrologic, hydraulic and structural design and stability analysis. Hydraulic jump and its application. Drop spillway- applicability, types-straight drop, box-type inlet. Chute spillway-description, components, energy dissipaters.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

Course outcome (Course Skill Set)

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

1. Technical Proficiency in Water Harvesting Techniques
2. Competence in Soil and Water Conservation Structure Design
3. Practical Application of Conservation Strategies.
4. Apply modern tools in watershed 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 thesecond 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 20marks.
- 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 haveto 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. Suresh, R., 2012. *Soil and water conservation engineering*. Standard Publishers Distributors.1st edition
2. Singh Vir, Raj., "Watershed Planning and Management", Yash Publishing House, Bikaner.3rd Revised Edition, 2016.
3. Murthy, J. V. S., "Watershed Management in India", New Age Publishers, New Delhi. 2nd Edition, 2017.
4. "Decision Support System for Integrated Watershed Management", Colorad State University. 2012.

Web links and Video Lectures (e-Resources):

- NPTEL course
- https://www.youtube.com/watch?v=wkPu4LwRKro
- https://youtu.be/wkPu4LwRKro
- https://youtu.be/wkPu4LwRKro
- https://youtu.be/wkPu4LwRKro

PESTS OF CROPS AND STORED GRAINS AND THEIR MANAGEMENT			
PEC Course Code	**BSA515B**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 hours	Total Marks	100
Credits	3	Exam Hours	03

Course objectives:

This course will enable students to

1. Understand about pests &arthropods
2. Understand about Management of major pests, damage and control practices
3. Understand about arthropod pests of various field crop
4. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management, methods of grain storage.

Teaching-Learning Process (General Instructions)

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

- Lecturer method (L) need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
- Use of Video/Animation to explain the functioning of various concepts.
- Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
- Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it.
- Introduce new software's in the field of farm management.
- Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

MODULE-1 **8HOURS**

Introduction: General account on nature and type of damage by different arthropods pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments
MODULE-2	**8HOURS**
Management of pests: Management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various field crop, vegetable crop, fruit crop, plantation crops, ornamental crops, spices and condiments.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments
MODULE-3	**8HOURS**
Grain losses: Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments
MODULE-4	**8HOURS**
Insect pests: mites, rodents, birds and microorganisms associated with stored grain and their management.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments
MODULE-5	**8HOURS**
Storage of grain: Storage structure and methods of grain storage and fundamental principles of grain store management.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments
Course outcome (Course Skill Set) At the end of the course the student will get familiarize with 1. Students can able to understand different Pests & Arthropods, 2. Management of major pests, damage and control practices, arthropod pests of various field crop, 3. Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management, 4. Methods of grain storage.	

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 thesecond 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 20marks.
- 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.
- Thestudents 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. Atwal, A.S. and Dhaliwal, G.S. 2002. Agricultural Pests of South Asia and Their Management, Kalyani Publishers, New Delhi.
2. David, B.V. and Ramamurthy, V.V. 2016. Elements of Economic Entomology, 8th Ed. Popular Book, Depot, Chennai.
3. Mathur and Upadhyay, 2005. A Text Book of Entomology, Aman Publishing House, Meerut.
4. Nayar, M.R.G.K. 1986. Insects and Mites of Crops in India, ICAR, New Delhi.
5. Srivastava, K.P. 2004. A Text Book of Entomology, Vol.I & II, Kalyani Publishers, New Delhi.

Web links and Video Lectures (e-Resources):

https://www.youtube.com/watch?v=XuDptTMpsn8

https://www.youtube.com/watch?v=g3DSosMYjkQ

STORAGE & PACKAGING TECHNOLOGY			
Course Code	**BSA515C**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 hours	Total Marks	100
Credits	03	Exam Hours	03

Course Objectives:

- To impart knowledge to the students on spoilage, storage methods food packaging principles, technology and equipment

Teaching-Learning Process (General Instructions)
These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

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. 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 and develops thinking skills such as evaluating, generalizing, and analyzing information.
6. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills.

MODULE-1	**8 HOURS**
Spoilage and storage: Direct damages, Indirect damages of perishable and durable commodities- control measures - factors affecting storage-types of storage-Losses in storage and estimation of losses.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or Simulations 4.Laboratory demonstrations and practical experiments

MODULE-2	**8 HOURS**
Storage methods: Improved storage methods for grain-modern storage structures-infestation-temperature and moisture changes in storage structures-CAP storage-CA storage of grains and perishables- construction operation and maintenance of CA storage facilities	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-3	**8 HOURS**
Functions of packaging materials: Introduction-packaging strategies for various environment-functions of package-packaging materials-bio degradable packaging materials-shrink and stretch packaging materials.	

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**
Food Packaging Materials and Testing: Introduction- paper and paper boards- flexible-plastics-glass containers-cans-aluminum foils-package material testing-tensile, bursting and tear strength.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-5	**8 HOURS**
Special Packaging Techniques: Vacuum and gas packaging- aseptic packaging- retort pouching-edible film packaging-tetra packaging-shrink and stretch packaging.	
Teaching- Learning Process	1. PowerPoint Presentation 2. Chalk and Talk are used for Problem Solving (In-general) 3.Video demonstration or Simulations 4.Laboratory Demonstrations and Practical Experiments

Course outcome (Course Skill Set)

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

1. Understand the various packaging methods
2. Understand the importance of packaging of food
3. Understand the interaction of food, packaging and environment
4. Understand the different methods of package development and packaging Select the best type and form of packaging of specific food for specific end users

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 thesecond 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 20marks.
- 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 haveto 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. Sahay, K.M. and K.K.Singh. 1996. unit operations of agricultural processing. Vikas publishing house Pvt.ltd., New Delhi.
2. Food Packaging Technology, Hand book, 2004. NIIR Board, New Delhi.
3. Pandey, P.H.2002. Post harvest engineering of horticultural crops through objectives. Saroj Prakasam.Allahabad.
4. Himangshu Barman. 2008, Post Harvest Food grain storage. Agrobios (India), Jodhpur.
5. Chakaraverty, A. 2000. third edition. Post harvest technology of cereals, pulses and oil seeds. Oxford & IBH publishing & Co.Pvt.Ltd. New Delhi.

Web links and Video Lectures (e-Resources):

- http://www.post-gazette.com/
- http://www.patentstrom.us/patents/6586036.htm

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

LANDSCAPE IRRIGATION DESIGN AND MANAGEMENT			
Course Code	**BSA515D**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 hours	Total Marks	100
Credits	03	Exam Hours	03

Course Objectives:

- Impart Knowledge on historical importance of Indian gardens and conventional methods of landscape irrigation
- To train the students on different types of modern landscape irrigation methods and their design unit operations of agricultural process engineering
- Also to enrich the students and familiarize the students in modern landscape irrigation methods and their design

Teaching-Learning Process (General Instructions)
These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

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. 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 and develops thinking skills such as evaluating, generalizing, and analyzing information.
6. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills.

MODULE-1 **8 HOURS**

Introduction: Historical importance of Indian gardens and history of gardening in different areas. Famous gardens of India and study of their methods of irrigation systems. Definition of landscape - conventional methods of landscape irrigation- study of hose irrigation system- components. Study of components of portable sprinkler with hose pipes. Merits and demerits of conventional landscape irrigation systems.

Teaching- Learning Process	1. PowerPoint Presentation 2. Chalk and Talk areused for Problem Solving (In-general) 3. Video demonstration or Simulations 4. Laboratory Demonstrations and Practical Experiments

MODULE-2 **8 HOURS**

Types of modern landscape irrigation methods: Merits and demerits, Pop-up sprinklers-spray pop-up sprinklers-components-selection criteria. Design criteria for pop-up sprinkler systems in landscaping, Shrub adopter system-features-accessories.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

MODULE-3 **8 HOURS**

Types of drip irrigation methods adopted in landscaping and their components. Design and layout of drip irrigation system in landscaping. Design of bubbler irrigation system-selection and design criteria

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

MODULE-4 **8 HOURS**

Types of landscapes: Natural landscapes and human made landscapes, Basic theme of gardens viz. circular, rectangular and diagonal themes. Factors affecting landscape design viz., initial approach, view, human choice, simplicity and topography etc. Suitability of different types of irrigation systems for land scapes, Study of water requirements for different landscapes- numerical problems on water requirements of landscapes, Study of segments of landscape irrigation systems.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

MODULE-5 **8 HOURS**

Main components of modern landscape irrigation systems and their selection criteria: Types of pipes and pressure ratings in landscape irrigation, Study of economics of pipe selection, pipe sizing and selection criteria. Numerical problems on economics of pipe selection. Study of different automation system for landscape irrigation. Study of main components, types of controllers and their application in automation system. Design and layout of modern landscape irrigation systems.

Teaching- Learning Process	1. PowerPoint Presentation 2. Chalk and Talk areused for Problem Solving (In-general) 3. Video demonstration or Simulations 4. Laboratory Demonstrations and Practical Experiments

Course outcome (Course Skill Set)

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

1. Acquire knowledge on historical importance of Indian gardens and conventional methods of landscape irrigation
2. Be proficient in types of modern landscape irrigation methods and their design
3. Understand the types of drip irrigation methods adopted in landscaping and their design
4. Some of the basic concepts related to landscape and its suitability
5. To acquaint the students with modern landscape irrigation system and its economics

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.
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- 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.
-

Suggested Learning Resources:

Books

1. Michael A.M. 2012. Irrigation: Theory and Practice. Vikas Publishing Vikas Publ. House New Delhi. y Singh Neeraj Partap. 2010.
2. Landscape Irrigation and Floriculture Terminology, Bangalore. y Smith Stepehen W. Landscape Irrigation and Management. Amazon. com.

Web links and Video Lectures (e-Resources):

https://www.youtube.com/watch?v=ec-XxulziVU
https://www.youtube.com/watch?v=nKaaDqUSmys

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

RESEARCH METHODOLOGY & INTELLECTUAL PROPERTY RIGHTS			
Course Code:	**BRMK557**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	25	Total Marks	100
Credits	03	Exam Hours	03

Course Objectives:

1. To Understand the knowledge on basics of research and its types.
2. To Learn the concept of Literature Review, Technical Reading, Attributions and Citations.
3. To learn Ethics in Engineering Research.
4. To Discuss the concepts of Intellectual Property Rights in engineering.

Teaching-Learning Process (General Instructions)

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

1. Lecturer methods (L) need not be only the traditional lecture methods, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video to explain various concepts on IPR.
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. Introduce Topics in manifold representations.
6. Show the different ways to analyze the research problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps Improve the students' understanding.

MODULE-1 **8 HOURS**

Introduction: Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research, Finding and Solving a Worthwhile Problem. Ethics in Engineering Research, Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

MODULE-2 **8 HOURS**

Literature Review and Technical Reading, New and Existing Knowledge, Analysis and Synthesis of Prior Art Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading, Taking Notes While Reading, Reading Mathematics and Algorithms, Reading a Datasheet. Attributions and Citations: Giving Credit Wherever Due, Citations:

Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions, What Should Be Acknowledged, Acknowledgments in, Books Dissertations, Dedication or Acknowledgments.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments
MODULE-3	**8 HOURS**
Building Intellectual Property Rights: Law of Patents, Fundamentals of Patent Law- Evolution of the patent system, Patentability Requirements; Patentable Subject Matter; Industrial Applicability/Utility; Novelty; Anticipation by publication; Anticipation by public knowledge and public use; Anticipation by public display; Anticipation by sale; Inventive Step/Non-Obviousness; Novelty Assessment; Inventive Step Assessment; Specification, **Drafting of A Patent Specification** - Introduction Patent Specification; Provisional Specification Complete Specification, Parts of the complete specification; **Patent Procedure in India-**PATENT PROCEDURE; Registration and Renewal fee payment; **Patent Infringement** - Infringement of a patent; Literal Infringement; Equivalence Infringement; Indirect Infringement; Defenses – Experiment-Research or Education-Bolar Exemption-Government use-Patent Exhaustion-Patent Misuse- Inequitable Conduct-Remedies- Injunction- Account of profits-Costs; **International Patent Regimes-**International Instruments; Paris Convention; TRIPS AGREEMENT; PCT; BUDAPEST TREATY, **Patenting Biotechnology Inventions** - Unique nature of Biotechnology; Patentability Requirements and Biotechnology Inventions; Patentable Subject Matter- USA- Europe- India; **Patentability of Software Inventions** - Patentability of Software Inventions in USA; Patentability of software inventions in Europe; Patentability of Software Inventions in India.	
Teaching- Learning Process	1.Power point presentation
	2.Chalk and talk are used for problem solving (In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**
Law of Copyright and Designs, **Understanding Copyright Law:** Historical Overview-Justification for Copyright Law-The Natural Law Justification-The Economic Rationale of Copyright Clause, Basic Concepts Underlying copyright Law-Idea-Expression, Dichotomy Originality/Creativity-Fixation. **Term of Protection**, **Subject-Matter of Copyright:** Literary Works-Dramatic Works-Musical Work-Artistic, Works-Cinematograph Films and Sound recordings, **Acquisition of Copyright in India**, Rights of the Copyright Owner-Economic Rights-Moral Right or Droid Moral Right of Authorship or Paternity Rights-Rights against Distortion or Mutilation of the Original Works or Integrity Rights-Limitations-Limitations set under International Regime-Berne Convention-Rome Convention-Trips Agreement-Three Step Test, Infringement of Copyright-Transfer of copyright-License and Assignment-License and consent-Duration of a License Form and Content-Disputes in Respect of License-Types of Licenses-Exclusive and Non-Exclusive Licenses.	

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

MODULE-5 **8 HOURS**

Basic Principles of Design Rights: Justification for Protecting Designs-Historical Perspective - Features of Shape, configuration, Pattern or Ornament or Composition of lines or colour. New or Original-Applied to an Article, **Excluded Subject-Matter-**Method or Principle of Construction-Features Dictated Solely by Function-Mechanical Device-Trademark, or Property Mark, or Artistic Work-immoral Designs and Designs Contrary to Public-order-Rights of the Owner of Designs and Tests for Infringement. Assignment of Design Rights, Infringement of Designs. **Case Studies on Patents.** Case study of Curcuma (Turmeric) Patent, Case study of Neem Patent, Case study of Basmati patent, Case study of Apple Inc. v. Samsung Electronics Co., Ltd.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

Course Outcomes (Course Skill Set)

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

1. To know the meaning of engineering research.
2. To know the procedure of Literature Review and Technical Reading.
3. To know the fundamentals of patent laws and drafting procedure.
4. Understanding the copyright laws and subject matters of copyrights and designs
5. Understanding the basic principles of design rights.

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:

1. For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
2. The first test will be administered after 40-50% of the syllabus has been covered, and thesecond test will be administered after 85-90% of the syllabus has been covered
3. 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.
4. 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:

Textbook

1. Dipankar Deb • Rajeeb Dey, Valentina E. Balas "Engineering Research Methodology",
2. ISSN 1868- 4394 ISSN 1868-4408 (electronic), Intelligent Systems Reference Library,
3. ISBN 978-981-13- 2946-3 ISBN 978-981-13-2947-0 (eBook), https://doi.org/10.1007/978-981-13-2947-0

Reference Book:

1. David V. Thiel "Research Methods for Engineers" Cambridge University Press, 978-1-107-03488- 4 -

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=zkCdOFaAucc
2. **https://www.youtube.com/watch?v=6BArSbZ2Gcw**

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

- Quizzes
- Assignments
- Seminars

ENVIRONMENTAL STUDIES			
Course Code	**BESK508**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	2:0:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	02	Exam Hours	03

Course objectives:

1. To create environmental awareness among the students.
2. To gain knowledge on different types of pollution in the environment.

Teaching-Learning Process (General Instructions)

These are sample Strategies; which teacher can use to accelerate the attainment of the variouscourse outcomes.

1. Apart from conventional lecture methods various types of innovative teaching techniques through videos, and animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills.
2. Environmental awareness program for the inhouse campus
3. Encourage collaborative (Group Learning) Learning in the class.
4. Seminars, surprise tests and Quizzes may be arranged for students in respective subjects to develop skills.

MODULE-1	**8 HOURS**
Ecosystems (Structure and Function): Forest, Desert, Wetlands, River, Oceanic and Lake. Biodiversity: Types, Value; Hot-spots; Threats and Conservation of biodiversity, Forest Wealth, and Deforestation.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

MODULE-2	**8 HOURS**
Advances in Energy Systems (Merits, Demerits, Global Status and Applications): Hydrogen, Solar, OTEC, Tidal and Wind. Natural Resource Management (Concept and case-studies): Disaster Management, SustainableMining, case studies, and Carbon Trading.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

MODULE-3	**8 HOURS**

Environmental Pollution (Sources, Impacts, Corrective and Preventive measures, Relevant Environmental Acts, Case-studies): Surface and Ground Water Pollution; Noise pollution; Soil Pollution and Air Pollution. **Waste Management & Public Health Aspects**: Bio-medical Wastes; Solid waste; Hazardous wastes; E-wastes; Industrial and Municipal Sludge.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**
Global Environmental Concerns (Concept, policies and case-studies): Ground water depletion/recharging, Climate Change; Acid Rain; Ozone Depletion; Radon and Fluoride problem in drinking water; Resettlement and rehabilitation of people, Environmental Toxicology.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments
MODULE-5	**8 HOURS**
Latest Developments in Environmental Pollution Mitigation Tools (Concept and Applications): G.I.S. & Remote Sensing, Environment Impact Assessment, Environmental Management Systems, ISO14001; Environmental Stewardship- NGOs. Field work: Visit to an Environmental Engineering Laboratory or Green Building or Water Treatment Plant or Waste water treatment Plant; ought to be Followed by understanding of process and its brief documentation.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

Course outcome (Course Skill Set)

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

1. Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
2. Develop critical thinking and/or observation skills and apply them to the analysis of a problem or question related to the environment.
3. Demonstrate ecological knowledge of a complex relationship between biotic and a biotic component.
4. Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.

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:

1. For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
2. 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
3. Any two assignment methods mentioned in the 22OB4.2, 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.
4. For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

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

Semester-End Examination:

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

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

Suggested Learning Resources:

Books

1. Environmental studies, Benny Joseph, Tata Mcgraw-Hill 2nd edition 2012
2. Environmental studies, S M Prakash, pristine publishing house, Mangalore 3rd edition-2018

Reference Books: -

1. Benny Joseph, Environmental studies, Tata Mcgraw-Hill 2nd edition 2009
2. M.Ayi Reddy Textbook of environmental science and Technology, BS publications 2007
3. Dr. B.S Chauhan, Environmental studies, university of science press 1st edition

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=wFtsKLubCnc
2. **https://www.youtube.com/watch?v=cd5UEoGb-5k**

PHYSICAL EDUCATION (SPORTS &ATHLETICS/YOGA & NSS)			
Course Code	**BPEK559/ BYOK559/ BNSK559**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	0:0:2:0	SEE Marks (VIVA)	50
Total Hours of Pedagogy	25	Total Marks	100
Credits	--	Exam Hours	--

Course objectives:

1. Understand the Meaning and Importance of the Fit India Movement, the Definition of fitness, Benefits of fitness, Types of fitness, and Fitness tips.
2. Importance of Sports & Yoga in day-to-day life
3. National Service Scheme (NSS) will enable the students to: Understand the community in which they work identify the needs and problems of the community and involve them in problem-solving.
4. Develop among themselves a sense of social & and civic responsibility & and utilize their knowledge in finding practical solutions to individual and community problems.

SPORTS and ATHLETICS:

Athletics

Track- 100 &400 Mtrs,100 Mtrs and 400Mtrs:

Hurdling Technique: Lead leg Technique, Trail leg Technique, Side Hurdling, Overthe Hurdles

Crouch start (its variations) use of Starting Block.

Approach to First Hurdles, In Between Hurdles, Last Hurdles to Finishing Hurdles

Jumps- High Jump

Approach Run, Take-off, Bar Clearance (Straddle), and Landing

Throws- Discuss Throw: Holding the Discus, Initial Stance Primary Swing, Turn, Release and Recovery (Rotation in the circle).

YOGA:

Introduction of Yoga, Aim, and Objectives of Yoga, Prayer, Yoga, its origin, history, and development.1)Yoga, its meaning, definitions.

a. Brief introduction of yogic practices for the common man- Yogic practices for the common man to promotepositive health
b. Rules and regulations
c. Misconceptions of Yoga
d. Suryanamaskara
e. Different types of Asanas
f. Sitting- 1. Padmasana, 2. Vajrasana
g. Standing- 1. Vrikshana, 2. 2. Trikonasana
h. Prone line-1. Bhujangasana 2. Shalabh asana
i. Supine line- Utthita dvipadasana, 2. Ardha halasana

Course Outcome:

The student should be able to understand:

- The importance of fitness/sports in day-to-day life
- Benefits of Yoga on fitness and health
- Understand the importance of his/her responsibility towards the society.
- Analyze the environmental and societal problems/issues and will be able to design solutions for the same

❖ **CIE & SEE will be evaluated based on their presentation, assignments/Charts/Video/reports.**

ASSESSMENT AND EVALUATION PATTERN

WEIGHTAGE	**CIE-50**	**SEE-50**
Practical sessions on sports/Conducting sports competitions-10marks Assignments for the theory part5marks	15 (30%)	15 (30%)
Yoga and Its Benefits Practical Sessions-10 Marks Yoga & its benefits: presentation-5marks	15 (30%)	15 (30%)
NSS/ Social Connect-Report Presentations.	20 (40%)	20 (40%)
Total	50	100%

References:

- Dharma, P.N. Fundamentals of Track and Field, Khel Sahitya Kendra, New Delhi
- Swami Kuvulyananda: Asma (Kavalyadhama, Lonavala)
- Tiwari, O P: Asana Why and How
- Ajitkumar: Yoga Pravesha (Kannada)
- Swami Satyananda Saraswati: Asana Pranayama, Mudra, Bandha(Bihar School of yoga, Munger)
- Swami Satyananda Saraswati: Surya Namaskar, (Bihar School of Yoga, Munger)
- Nagendra H R: The art and science of Pranayama
- NSS Course Manual, Published by NSS Cell, VTU Belagavi.

6th Sem

BASICS CONCEPTS AND APPLICATIONS OF AGROCHEMICALS		Sem	6th
IPCC Course Code	**BSA601**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	4:0:0:0	SEE Marks	50
Total Hours of Pedagogy	50 hours	Total Marks	100
Credits	4	Exam Hours	03

Course objectives: This course will enable students to

1. Understand agrochemicals, their type and role in agriculture.
2. Understand about Pesticides, Herbicides, and fungicides.
3. Understand about Fertilizers and their importance.

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 the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the architecture and pin functions of various Microcontroller.
3. Encourage collaborative (Group) Learning in the class
4. Ask at least three HOTS (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 multiple representations.
7. Show the different ways to think and write the same program with different algorithms, 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	**8 HOURS**
An introduction to agrochemicals: Their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses in agriculture, management of a agrochemicals for sustainable agriculture.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments
MODULE-2	**8 HOURS**
Herbicides-Major classes, properties and important herbicides. Fate of herbicides: Fungicides – Classification-Inorganic fungicides-characteristics, preparation and use of Sulphur and copper, Mode of action-Bordeaux mixture and copper oxychloride. Organic fungicides-Mode of action-Di	

thiocarbamates-characteristics, preparation and use of Zineb and maneb.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-3	**8 HOURS**
Systemic fungicides: Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use. Introduction and classification of insecticides: inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids, Biorationals, Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Bio pesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses. Fertilizers and their importance.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**
Nitrogenous fertilizers: Feedstocks and Manufacturing of ammonium sulphate, ammonium nitrate, ammonium chloride, urea. Slow-release N-fertilizers. Phosphatic fertilizers: feedstock and manufacturing of single superphosphate. Preparation of bone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassium chloride, potassium sulphate and potassium nitrate. Organic fertilizers & Nano urea.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-5	**8 HOURS**
Mixed and complex fertilizers: Sources and compatibility–preparation of major, secondary and micronutrient mixtures. Complex fertilizers: Manufacturing of ammonium phosphates, nitro phosphates and NPK complexes. Fertilizer control order. Fertilizer logistics and marketing. Plant bio-pesticides for ecological agriculture, Bio-insect repellent.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
Course outcome (Course Skill Set) At the end of the course the student will get familiarized with: Understand the different agrochemicals, their type and role in agriculture, Understand the different types Herbicides, Understand the various fungicides. Nitrogenous fertilizers Mixed and complex fertilizers	

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 the 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. Organic Farming by Dr. T. D. Pandey

2. Weed Management by T.K. Das.

Web links and Video Lectures (e-Resources):

https://www.youtube.com/watch?v=kc_Z_itn7Bs
https://www.youtube.com/watch?v=xoM93_kN76o

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

Quizzes
Assignments
Seminars
Mini Projects

SOIL AND WATER CONSERVATION ENGINEERING			
Course Code	**BSA602**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory +12 Lab slots	Total Marks	100
Credits	4	Exam Hours	03

Course objectives:

This course will enable students to,

1. Understand about Soil erosion and Water erosion, control measures
2. Understand about Terraces and Gully and ravine reclamation
3. Understand about Wind erosion and control measures, sedimentation, silt monitoring and storage loss in tanks

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 the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the architecture and pin functions of various Microcontroller.
3. Encourage collaborative (Group) Learning in the class
4. Ask at least three HOTS (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 analyse information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to think and write the same program with different algorithms, 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	**8 HOURS**
Soil erosion: Introduction, causes and types - geological and accelerated erosion, agents, factors affecting and effects of erosion. Water erosion-Mechanics and forms-splash, sheet, rill, gully, ravine and stream bank erosion.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-2	**8 HOURS**

Gullies: Classification, stages of development. Soil loss estimation-Universal soil loss equation (USLE) and modified USLE. Rainfall erosivity-estimation by KE>25 and EI30 methods. Soil erodibility-topography, crop management and conservation practice factors. Measurement of soil erosion-Runoff plots, soil samplers.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-3	**8 HOURS**
Water erosion control measures: Agronomical measures-contour farming, strip cropping, conservation tillage and mulching. Engineering measures– Bunds and terraces. Bunds, contour and graded bunds-design and surplus-sing arrangements.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**
Terraces level and graded broad base terraces, bench terraces: planning, design and layout procedure, contour stonewall and trenching. Gully and ravine reclamation - principles of gully control - vegetative measures, temporary structures and diversion drains. Grassed waterways and design.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-5	**8 HOURS**
Wind erosion: Factors affecting, mechanics, soil loss estimation and control measures - vegetative, mechanical measures, wind breaks and shelter belts and stabilization of sand dunes. Land capability classification.Rate of sedimentation, silt monitoring and storage loss in tanks.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

PRACTICAL COMPONET OF IPPC (May cover all / major module)

Sl. No	Experiments
1	Study different types and forms of water erosion.
2	Calculation of erosion index by EI30 method
3	Computation of soil Erodibility index in soil loss estimation
4	Exercises on soil loss estimation / measuring techniques

5	Estimation of soil loss (USLE)
6	Preparation of counter maps
7	Identification of different types of erosion as per field visit
8	Design of contour bunds
9	Design of graded bunds
10	Design of terraces

Course outcome (Course Skill Set)

At the end of the course the student will get familiarize with:

1. Soil erosion and Water erosion, control measures,
2. Terraces and Gully and ravine reclamation,
3. Wind erosion and control measures,
4. Sedimentation, silt monitoring and storage loss in tanks

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 **25marks**.
- 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 **10marks** 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.

Suggested Learning Resources:

Books

1. Soil and Water Conservation Engineering by Dr. R Suresh.
2. Introductory Soil and Water Conservation Engineering by Bimal Chandra Mal, Ashish Pandey, Kalyani
3. Fundamental of Soil and Water Conservation by B P Sawant, H W Awari, A M Kamble, D D Tekale.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=CxgwgMtzrsQ
2. https://www.youtube.com/watch?v=8aJk59gs0Cc&t=950s

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

IOT ARCHITECTURE AND PROTOCOLS			
Course Code	**BSA613A**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 hours	Total Marks	100
Credits	03	Exam Hours	03

Course Objectives:

1. To understanding the basic fundamentals of IOT Architecture and Protocols
2. To understand the various layers in the IOT protocols

Teaching-Learning Process (General Instructions)

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

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. 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 student's Analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.
6. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills.

MODULE-1 **8 HOURS**

Introduction: IoT architecture outline, standards-IoT Technology, Fundamentals-Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics.

Teaching- Learning Process	1. PowerPoint Presentation 2. Chalk and Talk are used for Problem Solving (In-general) 3.Video demonstration or Simulations 4.Laboratory Demonstrations and Practical Experiments

MODULE-2 **8 HOURS**

IOT Reference Architecture: Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints-Introduction, Technical Design constraints.

Teaching- Learning Process	1. PowerPoint Presentation 2. Chalk and Talk are used for Problem Solving (In-general) 3. Video demonstration or Simulations 4. Laboratory Demonstrations and Practical Experiments

MODULE-3 **8 HOURS**

IoT Data link layer & network layer protocols: PHY/MAC Layer (3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, ZWave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7-Network Layer-IPv4,IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP.

Teaching- Learning Process	1. PowerPoint Presentation 2. Chalk and Talk are used for Problem Solving (In-general) 3.Video demonstration or Simulations 4.Laboratory Demonstrations and Practical Experiments

MODULE-4	**8 HOURS**
IoT Transport & session layer protocols: Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS)-Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT.	
Teaching- Learning Process	1. PowerPoint Presentation 2. Chalk and Talk are used for Problem Solving (In-general) 3.Video demonstration or Simulations 4.Laboratory Demonstrations and Practical Experiments

MODULE-5	**8 HOURS**
IoT SERVICE LAYER PROTOCOLS & SECURITY PROTOCOLS: Service Layer- oneM2M, ETSI M2M, OMA, BBF. Security in IoT Protocols- MAC802.15.4, 6LoWPAN, RPL, Application Layer, Smart City Security Architecture, Smart City Use-Case Examples.	
Teaching- Learning Process	1. PowerPoint Presentation 2. Chalk and Talk are used for Problem Solving (In-general) 3.Video demonstration or Simulations 4.Laboratory Demonstrations and Practical Experiments

Course outcome (Course Skill Set)

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

1. Comprehend the essentials of IOT and its applications
2. Understand the concepts of IOT Architecture Reference model and IOT reference architecture
3. Analyze various IOT Application layer Protocols.
4. Apply IP based protocols and Authentication Protocols for IOT
5. Design IOT-based systems for real-world problems.

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:

1. For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
2. 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
3. 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.

4. 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 20marks.
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 questionfrom each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The EvolvingWorld of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications ,2016
2. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand,StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet ofThings: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2015
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things",ISBN 978-3- 642-19156-5 e- ISBN 978-3-642-19157-2, Springer, 2016
4. N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers,2014.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=FRxRT0DjE7A
2. https://www.youtube.com/watch?v=7DZR5UaAM0E&list=PLEiEAq2VkUUImmTXP_YC2j5qIGOV9NPLy
3. https://www.youtube.com/playlist?list=PL5qVgQLbCu-NwgNMmfYHoJ4x8-lFiuNmj

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

AGRICULTURE STRUCTURES AND ENVIRONMENTAL CONTROL			
Course Code	**BSA613B**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 hours	Total Marks	100
Credits	03	Exam Hours	03

Course Objectives:

- To enable the student to understand the principles and acquire the knowledge on various aspects in farmstead design and construction
- Design and construction of farm structures like dairy barns, barn for poultry, compost pit, fodder silos, farm fencing, implement sheds
- Grain storage structures and the design and construction of silos and farm roads, sewage system, rural living anddevelopment
- To make students familiar with different farm structures with environmental control parameters

Teaching-Learning Process (General Instructions)

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

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. 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 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**

Planning and layout of farmstead: Physiological reactions of livestock to solar radiation and other environmental factors, Livestock production facilities, BIS, Standards for dairy, piggery, poultry and other farm structures.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-2 **8 HOURS**

Design, construction and cost estimation of farm structures: Animal shelters, compost pit, fodder silo, fencing and implement sheds, barn for cows, buffalo, poultry, etc. Design and construction of rural grain storage system, Engineering for rural living and development, rural roads, their construction cost and repair and maintenance.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-3 **8 HOURS**

Traditional storage structures and their improvements: Improved storage structures (CAP, hermetic storage, Pusa bin, RCC ring bins), Design consideration for grain storage godowns, Bag storage structures, Shallow and Deep bin, Calculation of pressure in bins, Storage of seeds.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or Simulations 4.Laboratory demonstrations and practical experiments

MODULE-4 **8 HOURS**

Sources of water supply: Norms of water supply for human being and animals, drinking water standards and water treatment suitable to rural community, Site and orientation of building in regard to sanitation, community sanitation system; sewage system its design, cost and maintenance, design of septic tank for small family.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-5 **8 HOURS**

Estimation of power requirement for domestic and irrigation: source of power supply, use of alternate source of energy, electrification of rural Housing, Scope, importance and need for environmental control, Renewable and non-renewable resources and their equitable use, concept of eco system, biodiversity of its conservation, environmental pollution and their control, solid waste management system, BOD and COD of food plant waste, primary and secondary treatment of food plant waste.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

Course outcome (Course Skill Set)

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

1. Understand the importance of planning and lay out of a farmstead
2. Know about various standards for various dairy, piggery, poultry and other farm structures.
3. Know about the different farm storage structures, silos, compost pit, implement sheds, farm houses, threshing floors, farm roads, fencing, water supply, sewage systems, and septic tanks
4. Know about rural electrification, concepts of eco system, bio-diversity, environmental pollution and control, solid waste, plant waste management
5. To prepare estimate for different farm buildings, structures, roads, fencing and construction, repair and maintenance of farm structures

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 allottedto 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:

1. For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
2. The first test will be administered after 40-50% of the syllabus has been covered, and thesecond test will be administered after 85-90% of the syllabus has been covered
3. 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.
4. 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 20marks.
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. Thestudents 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. Pandey, P.H. Principles and practices of Agricultural Structures and Environmental Control, Kalyani Publishers, Ludhiana
2. Ojha, T.P. and Michael, A.M. Principles of Agricultural Engineering, Vol.1, Jain Brothers, Karol Bag, New Delhi
3. Nathonson, J.A. Basic Environmental Technology, Prentice Hall of India, NewDelhi
4. Garg, S.K. Water Supply Engineering, Khanna Publishers, NewDelhi
5. Dutta, B.N. Estimating and Costing in Civil Engineering, Dutta & Co, Lucknow
6. Sahay, K.M. and Singh, K.K. Unit Operations of Agricultural Processing, Vikas pub.pvt. Ltd, Noida
7. Banerjee, G.C. A Text Book of Animal Husbandry, Oxford IBH Pub. Co., NewDelhi

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=8kBFgyNARms
2. https://www.youtube.com/watch?v=Z-8OC_WSpZM

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

EMERGING AGRICULTURAL TECHNOLOGY			
PEC Course Code	**BSA613C**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 hours	Total Marks	100
Credits	3	Exam Hours	03

Course objectives:

This course will enable students to

1. Understand about soil and water sensors, Weather tracking
2. Understand Satellite Imaging and its applications
3. Understand Pervasive Automation and RFID technology

Teaching-Learning Process (General Instructions)

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

1. Lecturer method (L) need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain the functioning of various concepts.
3. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
4. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it.
5. Introduce new software's in the field of farm management.
6. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

MODULE-1 **8 HOURS**

Soil and Water Sensors: Application of sensors in precision farming sensors to detect moisture and nitrogen levels, time of water application, Time of fertilizer application for efficient use of resources. **Weather Tracking:** Weather Tracking systems for tracking of frost, hail and other weather so that they can take precautions to protect the crops or at least mitigate losses to a significant degree.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-2 **8 HOURS**

Satellite Imaging: Application & Advantages of satellite Imaging in farming, Real-time crop imagery. images in resolutions of 5-meter-pixels and even greater, reviewing images, integration with crop, soil and water sensors.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-3	**8 HOURS**
Pervasive Automation: Technology that reduces operator workload, autonomous vehicles controlled by robotics, remotely through terminals and hyper precision, RTK (Real Time Kinematics) navigation systems, Farming equipment that adopts the ISOBUS standard.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**
Minichromosomal Technology: Use of genetic material Mini-chromosome in agricultural technology, use of Mini-chromosome technology, drought tolerance, nitrogen use, disease resistance, pest resistance. faster acceptance from consumers for the acceptance of above technology.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-5	**8 HOURS**
RFID Technology: Working of RFID, the soil and water sensors for traceability, information on farming yields, bar coding to access information about the soil that yielded them. Marketing of the farm yields, consumer confidence. **Vertical Farming:** Introduction to Vertical Farming, Types & methods of Vertical Farming, techniques, vertical farming in urban areas, popularity efficiency, advantages, disadvantages.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
Course outcome (Course Skill Set) At the end of the course the student will get familiarize with 1. Soil and water sensors 2. Weather tracking Satellite Imaging and its applications 3. Pervasive Automation and 4. RFID technology	

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:

1. For the Assignment component of the CIE, there are 25 marks and for the Internal AssessmentTest component, there are 25 marks.
2. 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
3. Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based the 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.
4. 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 20marks.
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. Thestudents 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. Emerging Technologies in Agricultural Engineering by Goyal Megh R
2. Sensing Agriculture from space by Dinesh KAR

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=Y7WX8G6enbc
2. https://www.youtube.com/watch?v=Y7WX8G6enbc
3. https://www.youtube.com/watch?v=Nqw1S4_6adg

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

PRINCIPLES OF ORGANIC FARMING			
PEC Course Code	**BSA613D**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 hours	Total Marks	100
Credits	3	Exam Hours	03

Course objectives: To enable students to learn about:

1. Organic farming, principles and its scope in India.
2. Organic ecosystem and their concepts.
3. Certification process and standards of organic farming.

Teaching-Learning Process (General Instructions)

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

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the architecture and pin functions of various Microcontroller.
3. Encourage collaborative (Group) Learning in the class
4. Ask at least three HOTS (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 multiple representations.
7. Show the different ways to think and write the same program with different algoritms, 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	**8 HOURS**
Organic farming: Principles and its scope in India; Initiatives taken by Government (central/state), NGOs and other organizations for promotion of organic agriculture.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-2	**8 HOURS**
Organic ecosystem and their concepts: Organic nutrient resources and its fortification; Restrictions to nutrient use in organic farming. vermicompost, Bio-fertilizers/bio-inoculants	

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-3	**8 HOURS**
Choice of crops and varieties in organic farming: Fundamentals of insect, pest, disease and weed management under organic mode of production.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**
Operational structure of NPOP: Certification process and standards of organic farming.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-5	**8 HOURS**
Processing, leveling, economic considerations and viability, marketing and export potential of organic products. Visit of organic farms to study the various components and their utilization.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

Course outcome (Course Skill Set)

At the end of the course the student will get familiarized with:

1. Organic Farming, use of Bio fertilizers.
2. Certification process and standards of organic farming.
3. Organic ecosystem and their concepts
4. Operational structure of NPOP

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:

1. For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
2. 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
3. Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based the

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.

4. 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 20marks.
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. Thestudents have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50marks

Suggested Learning Resources:

Books

1. Dhama, A.K. 2014. Organic Farming for Sustainable Agriculture (2nd edition), Agrobios (India), Jodhpur
2. Sharma, Arun K. 2013. A Handbook of Organic Farming, Agrobios (India), Jodhpur
3. Palaniappan, S.P. and Anandurai, K.1999. Organic Farming – Theory and Practice. Scientific Pub.Jodhpur
4. Thapa, U and Tripathy, P. 2006. Organic Farming in India, Problems and prospects, Agrtech, Publishing Academy, Udaipur.
5. Singh, S.P. (ed.) 1994. *Technology for Production of Natural Enemies*, Project Directorate Of Biological Control, Bangalore.
6. Veeresh, G.K., Shivashankar, K. and Singlachar, M.A. 1997. *Organic Farming and Sustainable Agriculture,* Association for Promotion of Organic Farming, Bangalore.

Web links and Video Lectures (e-Resources):

1. https://www.globallandscapesforum.org/video/what-is-organic-agriculture/
2. https://www.youtube.com/watch?v=34VSog58Rrs
3. https://www.youtube.com/watch?v=AfMVN_kqYDc

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

MICRO-IRRIGATION ENGINEERING			
PEC Course Code	**BSA654A**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 hours	Total Marks	100
Credits	3	Exam Hours	03

Course objectives: To enable students to learn about:

1. Understanding the Basics of Micro Irrigation
2. Design, Installation, Operation and Maintenance of drip irrigation system
3. Design, Installation, Operation and Maintenance of sprinkler irrigation system
4. Fertiliser suitable for micro irrigation and application methods
5. Need of automation in micro irrigation

Teaching-Learning Process (General Instructions)

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

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the architecture and pin functions of various Microcontroller.
3. Encourage collaborative (Group) Learning in the class
4. Ask at least three HOTS (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 multiple representations.
7. Show the different ways to think and write the same program with different algoritms, 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 **8 HOURS**

Micro-Irrigation: Introduction, overview, Status, merits and demerits of micro irrigation, Scope and Applications of Micro Irrigation. Government of India Financial Assistance for Promotion of Micro Irrigation in India, Types of Micro Irrigation Systems-Drip Irrigation, Spray Irrigation, Sub-Surface System, Bubbler System, Components of Micro Irrigation System (MIS).

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-2 **8 HOURS**

Drip Irrigation System design and Installation: Design considerations, emitter selection, hydraulics of drip irrigation system, pump selection, operation of drip Irrigation System, maintenance of drip irrigation system, response on different crops to drip irrigation, wetting patterns. Performance evaluation of drip irrigation system	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-3	**8 HOURS**
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	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**
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, fertilizers Application Methods	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-5	**8 HOURS**
Automation of Micro Irrigation System: Introduction, need for automation of irrigation, merits and demerits of automation, semiautomatic and fully automatic systems of automation, automatic controllers. hardware for micro irrigation Automation. Types of control automation in micro irrigation-Volume-Based Automated Irrigation System, Time Based Automated Irrigation System Real Time Feedback System, Sequential and Non-Sequential Automated Irrigation System.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
Course outcome (Course Skill Set) At the end of the course the student will able to: 1. Get familiarized about the micro-irrigation schemes 2. Hydraulic Measurements, irrigation methods 3. Sprinkler irrigation 4. 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 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:

1. For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
2. 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
3. Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based the 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.
4. 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. Thestudents 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. Irrigation and Drainage Engineering. 1." Drainage Engineering" by Luthin J N.
2. Irrigation Equipment, Drip and Sprinkler Technology. 1." Irrigation - Theory and Practice" by A M Michael.
3. Applied Irrigation Management. 1." Irrigation Management Transfer: Strategies and Best Practices" by Asian Development Bank.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=x7mbBpwVkwE
2. https://www.youtube.com/watch?v=gvlSY9sjlOc
3. https://www.youtube.com/watch?v=eO-SmudlKTg

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

HYDROLOGY, GROUND WATER AND WELL ENGINEERING			
PEC Course Code	**BSA654B**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 hours	Total Marks	100
Credits	3	Exam Hours	03

Course objectives:

To enable students to learn about:

1. To study occurrence movement and distribution of water, hydrological processes that is a prime resource for development of a civilization.
2. To know diverse methods of collecting the hydrological information, which is essential, to understand surface and ground water hydrology.
3. To know the basic principles and movement of ground water and properties of groundwater flow.
4. To understand the different water harvesting recharge methods and importance for ground water management
5. To Understanding well parameters and pump selection for groundwater exploration

Teaching-Learning Process (General Instructions)

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

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the architecture and pin functions of various Microcontroller.
3. Encourage collaborative (Group) Learning in the class
4. Ask at least three HOTS (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 analyse information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to think and write the same program with different algorithms 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	8 HOURS
Hydrologic cycle, Climate and water availability, Water balances, Precipitation: Forms, Classification, Variability, Measurement, Data analysis, Presentation of Rainfall Data, Estimation of Mean Areal Rainfall, Frequency Analysis of Point Rainfall, Hydrological Abstractions-Evaporation and its measurement, Evapotranspiration and its measurement, Penman Monteith method. Infiltration: Factors affecting infiltration, Horton's equation and Green Ampt method.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-2	**8 HOURS**
Runoff- drainage basin characteristics: estimation of runoff, Hydrograph concepts, SCS- CN method, base flow separation methods, assumptions and limitations of unit hydrograph, Derivation of unit hydrograph, synthetic unit hydrograph, S- hydrograph, Flow duration curve. Flood routing- hydrologic flood routing, hydraulic flood routing.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-3	**8 HOURS**
Groundwater & Well Hydraulics: Occurrence and movement of groundwater, Darcy's law, governing ground water flow equations, Factors governing ground water flow, Types of aquifers, porosity, specific yield, specific retention, storage coefficient, permeability, hydraulic conductivity, hydraulic transmissibility, Conjunctive use and its necessity.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**
Groundwater recharge: Factors affecting groundwater recharge, Subsurface investigation of Ground water: general, geophysical methods and its importance. Well-hydraulics, Well-losses, Yield, Pumping and recuperation test.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-5	**8 HOURS**
Principle, Design and Operation of Pumps- Centrifugal Pumps, Pump Installation and Head Calculation, Power Requirement and Efficiency of Centrifugal Pumps , Characteristic Curves of Centrifugal Pumps, Selection of Suitable Pumps. Water footprints-blue water footprint, green water footprint, grey water footprint.	

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

Course outcome (Course Skill Set)

At the end of the course the student will:

1. Provide a background in the theory of hydrological processes and their measurement
2. Apply science and engineering fundamentals to solve current problems and to anticipate, mitigate and prevent future problems in the area of water resources management
3. An ability to manipulate hydrological data and undertake widely-used data analysis.
4. Can define the key components of a functioning groundwater, can determine the main aquifer properties – permeability, transmissivity and storage Identify geological formations capable of storing and transporting groundwater.

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:

1. For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
2. 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
3. Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based the 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.
4. 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 20marks.
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. Engineering hydrology by K Subramanya.
2. Hydrology Principles Analysis Design by H M Raghunath.
3. Hydrology for Engineers by Linsley, Kohler and Paulus.
4. Applied Hydrology by Dawie Hane.
5. Ground water hydrology by Todd.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=ICyKK-wLWZ0
2. https://www.youtube.com/watch?v=NAAZnRWJV-k
3. https://www.youtube.com/watch?v=OAkZMGd4q9k

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

AGRICULTURAL MARKETING TRADE AND PRICES			
Course Code	**BSA654C**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 hours	Total Marks	100
Credits	3	Exam Hours	03

Course objectives:

This course will enable students to,

1. Understand about Agricultural marketing, Agri-commodities, Product life cycle
2. Understand about pricing considerations, Marketing process-concentration
3. Understand about buying and selling, packaging, branding, grading
4. Understand about risk in marketing; agricultural price policy

Teaching-Learning Process (General Instructions)

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

MODULE-1 **8 HOURS**

Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets; demand, supply and producer's surplus of Agri-commodities: nature and determinants of demand and supply of farm products, producer's surplus-meaning and its types,

marketable and marketed surplus, factors affecting marketable surplus of Agri-commodities; product life cycle (PLC) and competitive strategies. Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-2	**8 HOURS**
Pricing and promotion strategies: pricing considerations and approaches-cost based and competition based pricing; market promotion-advertising, personal selling, sales promotion and publicity-their meaning and merits & demerits; marketing process and functions: Marketing process-concentration, dispersion and equalization.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-3	**8 HOURS**
Exchange functions: Buying and selling; physical functions-storage, transport and processing; facilitating functions-packaging, branding, grading, quality control and labeling (Agmark); Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing; meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**
Integration, efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs; Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI-their objectives and functions; cooperative marketing in India;	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-5	**8 HOURS**
Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR.	

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

Course outcome (Course Skill Set):

At the end of the course the student will get familiarize with

1. Agricultural marketing,
2. Agri-commodities, Product life cycle, pricing considerations,
3. Marketing process-concentration,
4. Buying and selling, packaging, branding, grading, risk in marketing; agricultural price policy

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:

1. For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
2. 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
3. Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based the 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.
4. 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 20marks.
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. Acharya S.S and Agarwal NL, 2006, Agricultural Marketing in India. Oxford & IBH Publishing Co.Pvt.Ltd. New Delhi ·
2. Kahlon, A.S and Tyagi.D S, 1983 Agricultural Price Policy in India. Allied Publishers Pvt. Ltd., New

Delhi. ·
3. Kulkarni, K R.1964, Agricultural Marketing in India. The Co-operators Books Depot, Mumbai. ·
4. Mamoria, C.B. and Joshi. R L.1995, Principles and Practices of Marketing in India, Kitab Mahal, Allahabad ·
5. Mamoria, C.B., 1973., Agricultural Problems in India, Kitab Mahal, Allahabad ·
6. Subba Reddy, S., P.Raghu Ram., P. Sastry, T.V.N. and Bhavani Devi I. 2010.
7. Agricultural Economics., Oxford & IBH Publishing Company Private Ltd., New Delhi, 2010

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=WOsln3jtRzM
2. https://www.youtube.com/watch?v=Lp1tL_P79I8
3. https://www.youtube.com/playlist?list=PLDm7aHv7RZijHD_VimPIfcshVRIc5LHiv

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

WATERSHED DEVELOPMENT			
PEC Course Code	**BSA654D**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 hours	Total Marks	100
Credits	3	Exam Hours	03

Course objectives:

To enable students to learn about:

1. To understand Watershed Hydrology
2. To understand sustainable measures for watershed management
3. To estimate water demand and learn, water conservation methods within the watershed
4. To evaluate watershed yield using modern watershed assessment tool
5. To understand application of Remote Sensing and GIS in watershed management Fertiliser suitable for micro irrigation and application methods
6. Need of automation in micro irrigation

Teaching-Learning Process (General Instructions)

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

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the architecture and pin functions of various Microcontroller.

3. Encourage collaborative (Group) Learning in the class
4. Ask at least three HOTS (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 multiple representations.
7. Show the different ways to think and write the same program with different algoritms, 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	**8 HOURS**
Principles of Watershed Management: Basics concepts, hydrology and water availability, surface water, ground water, conjunctive use, human influences in the water resources system. Water resources systems: Integrated water resources system, river basins. Watershed atlas of India	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-2	**8 HOURS**
Land Capability and its Classification, Watershed Characteristics: Physical and Geomorphologic Factors affecting Watershed Management, watershed management practices in arid and semi-arid regions, watershed management through wells, management of water supply, short term and long-term strategic planning.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-3	**8 HOURS**
Hydrologic Data for Watershed Planning, Watershed Delineation, Prioritization of Watersheds, Conservation of Water: Water Harvesting: Rainwater management, conservation, storage and effective utilization of rainwater, structures for rainwater harvesting, roof catchments system, check dams, aquifer storage.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-4	**8 HOURS**
Water Yield Assessment and Measurement: Rainwater Conservation Technologies and Water Harvesting Structures, Water Budgeting in a Watershed, Monitoring & Evaluation of Watershed Programs. Sustainable Watershed Approach: Sustainable integrated watershed management, natural resources management, agricultural practices, integrated farming, soil erosion and conservation.	

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-5 **8 HOURS**

Watershed modelling: definition, benefits of watershed modelling: Classification of watershed model: based on based on nature of input and uncertainty, Based on Nature of Spatial Representation, Based on type of Storm Event, steps in watershed modelling. Geographic information system (GIS): definition, components, watershed delineation in GIS, application of GIS and RS in watershed modelling.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

Course outcome (Course Skill Set)

At the end of the course the student will:

1. Discuss surface and ground water resources system and, human influences.
2. Integrate water resources system in arid and semi-arid regions and explain watershed aquifer for management.
3. Analyse water resources related issues for conservation and synthesize augmentation of water resources.
4. Design integrated watershed management system.
5. Apply modern tools in watershed 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:

1. For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
2. 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
3. Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based the 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.
4. 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 20marks.
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. Thestudents have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50marks

Suggested Learning Resources:

Books

1. Singh Vir, Raj., "Watershed Planning and Management", Yash Publishing House, Bikaner.3rd Revised Edition, 2016.
2. Suresh, R., 2012. *Soil and water conservation engineering*. Standard Publishers Distributors.
3. Murthy, J. V. S., "Watershed Management in India", New Age Publishers, New Delhi. 2nd Edition, 2017.
4. "Decision Support System for Integrated Watershed Management", Colorad State University. 2012.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=wkPu4LwRKro
2. https://youtu.be/wkPu4LwRKro
3. https://youtu.be/wkPu4LwRKro
4. https://youtu.be/wkPu4LwRKro

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

AI AND IMAGE PROCESSING LAB			
Course Code	**BSAL606**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	0:0:2:0	SEE Marks	50
Credits	01	Exam Hours	03

Course objectives:

1. Implement and evaluate AI algorithms in Python programming language.
2. Demonstrate the basic skills of image process
3. Demonstrate the application development skills
4. Design and develop the applications of images

Sl.NO	Experiments
1	(a) Write a python program to print the multiplication table for the given number (b) Write a python program to check whether the given number is prime or not? (c) Write a python program to find factorial of the given number?
2	a) Write a python program to implement List operations (Nested List, Length, Concatenation, Membership, Iteration, Indexing and Slicing) b) Write a python program to implement List methods (Add, Append, Extend & Delete).
3	Write a python program to implement simple Chatbot with minimum 10 conversations
4	Write a python program to Illustrate Different Set Operations
5	a) Write a python program to implement a function that counts the number of times a string (s1) occurs in another string (s2) b) Write a program to illustrate dictionary operations ([], in, traversal) and methods: keys (), values (), items ()
6	Implementation of the problem-solving strategies: either using Forward Chaining or Backward Chaining (AI Problems to be implemented in Python)
7	Implement any Game and demonstrate the Game playing strategies
9	Write a Program to read a digital image. Split and display image into 4 quadrants, up, down, right and left
10	Write a Program to read a digital image. Split and display image into 4 quadrants, up, down, right and left
11	Write a program to show rotation, scaling, and translation of an image.
12	Read an image, first apply erosion to the image and then subtract the result from the original.
13	Demonstrate the difference in the edge image if you use dilation instead of erosion.
14	Read an image and extract and display low-level features such as edges, textures using filtering techniques
15	Demonstrate enhancing and segmenting low contrast 2D images.

Course outcomes (Course Skill Set):

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

1. Implement and demonstrate AI algorithms.
2. Evaluate different algorithms.
3. Image Segmentation algorithm development
4. Image filtering in spatial and frequency domain.
5. Morphological operations in analyzing image structures

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**.

1. 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.
2. Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
3. Total marks scored by the students are scaled downed to 30 marks (60% of maximum marks).
4. Weightage to be given for neatness and submission of record/write-up on time.
5. Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8^{th} week of the semester and the second test shall be conducted after the 14^{th} week of the semester.
6. 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.
7. The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book
8. The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).
9. 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 thestudent.

Semester End Evaluation (SEE):

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners, ***one internal and another one is the external examiner from other institute***, examiners are appointed by the University

1. All laboratory experiments are to be included for practical examination.
2. (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.
3. Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.
4. Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
5. 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)
6. 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. Image Processing and Computer Vision: Principles and Applications by Richard Szeliski
2. Computer Vision: Algorithms and Applications by Richard Szeliski
3. Computer Vision with OpenCV 3 and Qt5: Multi-Platform Computer Vision Application Programming by Amin Ahmadi Tazehkandi
4. Learning OpenCV 3: Computer Vision in C++ with the OpenCV Library by Adrian Kaehler and Gary Bradski
5. Image Processing and Computer Vision: An Introduction with OpenCV and Python by Robert Laganiere
6. OpenCV 3 Computer Vision with Python Cookbook by Alexey Spizhevoy and Aleksandr Rybnikov
7. Computer Vision: Models, Learning, and Inference by Simon J.D. Prince

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=MvPmQzks3cc
2. https://www.youtube.com/watch?v=AT7W-oAFRCA
3. https://www.youtube.com/watch?v=OHTHzRjoRvA

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

DIGITAL MARKETING			
Course Code	**BSA657A**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	25 hours	Total Marks	100
Credits	01	Exam Hours	01

Course objectives:

1. To provide with the knowledge about business advantages of the digital marketing andits importance for marketing success;
2. To develop a digital marketing plan;
3. To make SWOT analysis;
4. To define a target group;
5. To get introduced to various digital channels, their advantages and ways ofintegration;
6. To integrate different digital media and create marketing content;
7. To optimize a Website and SEO optimization;
8. To create Google AdWords campaigns; social media planning;
9. To get basic knowledge of Google Analytics for measuring effects of digital marketing and getting insight of future trends that will affect the future development of the digital marketing.

Teaching-Learning Process (General Instructions)

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

1. Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations orSimulations.
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 **8 HOURS**

Introduction to the Course and Work plan, Introduction of the digital marketing, Digital vs. Real Marketing, Digital Marketing Channels, Creating initial digital marketing plan, Content management, SWOT analysis, Target group analysis, Web design, Optimization of Web sites, MS Expression Web.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving (In-general) 3. Video demonstration or simulations 4. Laboratory demonstrations and practical experiments

MODULE-2 **8 HOURS**

SEO Optimization, Writing the SEO content. Google AdWords- creating accounts, Google AdWords- types Introduction to CRM, CRM platform, CRM models

Teaching- Learning Process	a. Power point presentation b. Chalk and talk are used for problem solving (In-general) c. Video demonstration or simulations d. Laboratory demonstrations and practical experiments

MODULE-3	**8 HOURS**
Introduction to Web analytics, Web analytics-levels, Introduction of Social Media Marketing Creating a Facebook page, Visual identity of a Facebook page, Types of publications. Business opportunities and Instagram options, Optimization of Instagram profiles, Integrating Instagram with a Web Site and other social networks, keeping up with posts	
Teaching- Learning Process	5. Power point presentation 6. Chalk and talk are used for problem solving (In-general) 7. Video demonstration or simulations 8. Laboratory demonstrations and practical experiments

MODULE-4	**8 HOURS**
Business tools on LinkedIn, Creating campaigns on LinkedIn, Analyzing visitation on LinkedIn Creating business accounts on YouTube, YouTube Advertising, YouTube Analytics Facebook Ads, Creating Facebook Ads, Ads Visibility	
Teaching- Learning Process	5. Power point presentation 6. Chalk and talk are used for problem solving (In-general) 7. Video demonstration or simulations 8. Laboratory demonstrations and practical experiments

MODULE-5	**8 HOURS**
E-mail marketing, E-mail marketing plan, E-mail marketing campaign analysis, Keeping up with conversions Digital Marketing Budgeting- resource planning, cost estimating, cost budgeting, cost control	
Teaching- Learning Process	5. Power point presentation 6. Chalk and talk are used for problem solving (In-general) 7. Video demonstration or simulations 8. Laboratory demonstrations and practical experiments

Course outcome (Course Skill Set)

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

1. To identify the importance of the digital marketing for marketing success,
2. To manage customer relationships across all digital channels and build better customer relationships,
3. To create a digital marketing plan, starting from the SWOT analysis and defining a target group, then identifying digital channels,
4. Advantages and limitations to perceive ways of the integration taking into consideration the available budget.

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 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.

OR

MCQ (Multiple Choice Questions) are preferred for 01 credit courses, however, if course content demands the general question paper pattern that followed for 03 credit course, then

1. The question paper will have ten questions. Each question is set for 10 marks.
2. There will be 2 questions from each module. Each of the two questions under a module may or may not have the sub-questions (with maximum sub-questions of 02, with marks distributions 5+5, 4+6, 3+7).
3. The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:

Books

1. Ryan, D. (2014). Understanding Digital Marketing
2. Marketing Strategies for Engaging the Digital Generation, Kogan Page Limited
3. The Beginner's Guide to Digital Marketing (2015). Digital Marketer
4. Pulizzi, J. (2014) Epic Content Marketing, Mc-graw Hill Education.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=h95cQkEWBx0
2. https://www.youtube.com/watch?v=bixR-KIJKYM

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

Define a Target Group; Creating Web Sites; Writing the SEO content; SEO Optimizacija; Google AdWords; CRM Platform; Social Media Marketing Plan; Making a Facebook page; Budgeting; Final presentation.

AGRI-INNOVATION AND START-UPS			
AEC Course Code	**BSA657B**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	25 hours	Total Marks	100
Credits	1	Exam Hours	1

Course objectives:

1. Agri-tech Startups are providing relevant and innovative solutions to a number of challenges faced all across the agricultural value chain.
2. A new wave of budding entrepreneurs and emerging startups in the country are leading the way in disrupting the age-old agriculture system with innovative ideas and affordable solutions.
3. These startups have become the missing link between the farmers, input dealers, wholesalers, retailers and consumers connecting each of them to each other and providing strong marketing linkages and quality produce on time

Teaching-Learning Process (General Instructions):

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

1. Instructions with interactions in classroom lectures (physical/hybrid).
2. Use of ICT tools, including YouTube videos, related MOOCs, AR/VR/MR tools.
3. Flipped classroom sessions (~10% of the classes).
4. Industrial visits, Guests talks and competitions for learning beyond the syllabus. Students' participation through audio-video based content creation for the syllabus (as assignments).
6. Use of gamification tools (in both physical/hybrid classes) for creative learning outcomes.
5. Students' seminars (in solo or group) /oral presentations

MODULE-1 **8 HOURS**

Defining a Start-up: The Meaning, Start-ups: Gateway to Innovations. Development of a Start-up: The Build Up, Start-up Funding: Putting the Fuel in the Startup Engine, Sources of Start-up Funding: The Fuel.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-2 **8 HOURS**

Start-up Ecosystem: Cultivating Ideas, Global Start-up Ecosystem. Indian Start-up Ecosystem:

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-3 **8 HOURS**

Agri-Tech Startups: Redefining Indian Agriculture through Technology Solution, Identification of

prevalent Agri-tech sub-sectors in Indian Startup Ecosystem.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**
Start-up Policy: Implementation by Central and State Governments to boost Indian Startup Ecosystem in agriculture.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-5	**8 HOURS**
Selective Case Studies. 1. To make every farm traceable and maximizing per acre value. 2. To provide more income to farmers and less price to retailers by creating an efficient supply chain 3. To increase and improve the quality of per acre yield 4. To develop cost-effective, smart mechanization solutions for India's small and marginal farmers, to reduce labour dependence and increase profitability. 5. To make every drop of water count with affordable, simple & reliable irrigation controllers for every farmer (marginal to large) which will save water and energy	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
Course outcome (Course Skill Set) At the end of the course the student will. 1. Know the concept of startup and current scenario of agritech start-ups. 2. Know the Government support /incubators / accelerators related to agritech start-ups. 3. Understand the Bottlenecks for agritech startups in India. 4. Know the innovative agritech solutions.	
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 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 ofthe 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 ofassessment.

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

OR

MCQ (Multiple Choice Questions) are preferred for 01 credit courses, however, if course content demands the general question paper pattern that followed for 03 credit course, then

1. The question paper will have ten questions. Each question is set for 10 marks.
2. There will be 2 questions from each module. Each of the two questions under a module may or may not have the sub-questions (with maximum sub-questions of 02, with marks distributions 5+5, 4+6, 3+7).
3. The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Books

Agritech Startups: The Ray of Hope in Indian Agriculture:

Discussion Paper 10 MANAGE-Centre for Agricultural Extension Innovations, Reforms, and Agripreneurship (CAEIRA)

1. Mr. Anupam Anand Dr. Saravanan Raj

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=ry9rnbsm_zc
2. https://www.youtube.com/watch?v=F9hPoWNUhrM

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

FUNDAMENTALS OF VIRTUAL REALITY ARP DEVELOPMENT			
Course Code	**BSA657C**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	25 hours	Total Marks	100
Credits	01	Exam Hours	01
Examination nature (SEE)	Theory		

Course objectives:

1. Describe how VR systems work and list the applications of VR.
2. Understand the design and implementation of the hardware that enables VR systems to be built.
3. Understand the system of human vision and its implication on perception and rendering.
4. Explain the concepts of motion and tracking in VR systems.
5. Describe the importance of interaction and audio in VR systems

Teaching-Learning Process (General Instructions)

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

1. Adopt different types of teaching methods to develop the outcomes through PowerPointpresentations and Video demonstrations or Simulations.
2. Chalk and Talk method for ProblemSolving.
3. Adopt flipped classroom teachingmethod.
4. Adopt collaborative (Group Learning) learning in the class.
5. Adopt Problem Based Learning (PBL), which fosters students' analytical skills and developsthinking skills such as evaluating, generalizing, and analyzing information.

MODULE-1	**8 HOURS**
Introduction to Virtual Reality: Defining Virtual Reality, History of VR, Human Physiology and Perception, Key Elements of Virtual Reality Experience, Virtual Reality System, Interface to the Virtual World-Input & output- Visual, Aural & Haptic Displays, Applications of Virtual Reality.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-2	**8 HOURS**
Representing the Virtual World: Representation of the Virtual World, Visual Representation in VR, Aural Representation in VR and Haptic Representation in VR.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-3	8 HOURS
The Geometry of Virtual Worlds &The Physiology of Human Vision: Geometric Models, Changing Position and Orientation, Axis-Angle Representations of Rotation, Viewing Transformations, Chaining the Transformations, Human Eye, eye movements & implications for VR.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-4	**8 HOURS**
Visual Perception & Rendering: Visual Perception- Perception of Depth, Perception of Motion, Perception of Color, Combining Sources of Information. **Visual Rendering:** Ray Tracing and Shading Models, Rasterization, Correcting Optical Distortions, Improving Latency and Frame Rates.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments
MODULE-5	**8 HOURS**
Motion & Tracking: Motion in Real and Virtual Worlds- Velocities and Accelerations, The Vestibular System, Physics in the Virtual World, Mismatched Motion and Vection. Tracking- Tracking 2D & 3D Orientation, Tracking Position and Orientation, Tracking Attached Bodies.	
Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

Course outcome (Course Skill Set)

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

1. Describe how VR systems work and list the applications of VR.
2. Understand the design and implementation of the hardware that enables VR systems to bebuilt.
3. Understand the system of human vision and its implication on perception andrendering.
4. Explain the concepts of motion and tracking in VRsystems.
5. Describe the importance of interaction and audio in VR 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 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 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.

OR

MCQ (Multiple Choice Questions) are preferred for 01 credit courses, however, if course content demands the general question paper pattern that followed for 03 credit course, then

- The question paper will have ten questions. Each question is set for 10 marks.
- There will be 2 questions from each module. Each of the two questions under a module may or may not have the sub-questions (with maximum sub-questions of 02, with marks distributions 5+5, 4+6, 3+7).
- The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Books

1. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016
2. Understanding Virtual Reality: Interface, Application and Design, William R Sherman and Alan B Craig, (The MorganKaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002
3. Developing Virtual Reality Applications: Foundations of Effective Design, Alan B Craig, William R Sherman and Jeffrey DWill, Morgan Kaufmann, 2009.

Reference Books:

1. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.
2. Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, "3D User Interfaces,Theory and Practice", Addison Wesley, USA, 2005.
3. Oliver Bimber and Ramesh Raskar, "Spatial Augmented Reality: Meging Real and VirtualWorlds", 2005.
4. Burdea, Grigore C and Philippe Coiffet, "Virtual Reality Technology", Wiley Interscience, India, 2003.

Web links and Video Lectures (e-Resources):

1. https://nptel.ac.in/courses/106/106/106106138/
2. https://www.coursera.org/learn/introduction-virtual-reality.

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

- Quizzes
- Assignments
- Seminars
- Mini Projects

INTRODUCTION TO AUGMENTED REALITY			
Course Code	**BSA657D**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	25 hours	Total Marks	100
Credits	01	Exam Hours	01

Course objectives:

1. Describe how AR systems work and list the applications of AR.
2. Understand and analyze the hardware requirement of AR.
3. Use computer vision concepts for AR and describe AR techniques
4. Analyze and understand the working of various state of the art AR devices
5. Acquire knowledge of mixed reality

Teaching-Learning Process (General Instructions)

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

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 analyzing information.

MODULE-1 **8 HOURS**

Introduction to Augmented Reality (A.R): Defining augmented reality, history of augmented reality, The Relationship between Augmented Reality and Other Technologies-Media, Technologies, Other Ideas Related to the Spectrum between Real and Virtual Worlds, applications of augmented reality. **Augmented Reality Concepts**- Concepts Related to Augmented Reality, Ingredients of an Augmented Reality Experience.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-2 **8 HOURS**

Augmented Reality Hardware: Augmented Reality Hardware-Displays**-**Audio Displays, Haptic Displays, Visual Displays, Other sensory displays, Visual Perception, Requirements and Characteristics, Spatial Display Model. **Processors:** Role of Processors, Processor System Architecture, Processor Specifications. **Tracking & Sensors:** Tracking, Calibration, and Registration, Characteristics of Tracking Technology, Stationary Tracking Systems, Mobile Sensors, Optical
Tracking, Sensor Fusion.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-3 **8 HOURS**

Computer Vision for Augmented Reality & A.R. Software: Computer Vision for Augmented Reality**-** Marker Tracking, Multiple-Camera Infrared Tracking, Natural Feature Tracking by Detection, Simultaneous Localization and Mapping, Outdoor Tracking. **Augmented Reality Software-** Introduction, Major Software Components for Augmented Reality Systems, Software used to Create Content for the Augmented Reality Application.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-4 **8 HOURS**

AR Techniques-Marker based & Marker less tracking: Marker-based approach**-**Introduction to marker-based tracking, types of markers, marker camera pose and identification, visual tracking, mathematical representation of matrix multiplication. **Marker types:** Template markers, 2D barcode markers, imperceptible markers. **Marker-less approach**: Localization based augmentation, real world examples **Tracking methods:** Visual tracking, feature based tracking, hybrid tracking, and initialization and recovery.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

MODULE-5 **8 HOURS**

AR Devices & Components: AR Components-Scene Generator, Tracking system, monitoring system, display, Game scene. **AR Devices:** Optical See-through HMD, Virtual retinal systems, monitor bases systems, Projection displays, and Video see-through systems.

Teaching- Learning Process	1. Power point presentation 2. Chalk and talk are used for problem solving(In-general) 3.Video demonstration or simulations 4.Laboratory demonstrations and practical experiments

Course outcome (Course Skill Set)

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

1. Describe how AR systems work and list the applications of AR.
2. Understand and analyze the hardware requirement of AR.
3. Use computer vision concepts for AR and describe AR techniques.
4. Analyze and understand the working of various state of the art AR devices.
5. Acquire knowledge of mixed reality

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 Examination (CIE)

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
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- 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.

OR

MCQ (Multiple Choice Questions) are preferred for 01 credit courses, however, if course content demands the general question paper pattern that followed for 03 credit course, then

1. The question paper will have ten questions. Each question is set for 10 marks.
2. There will be 2 questions from each module. Each of the two questions under a module may or may not have the sub-questions (with maximum sub-questions of 02, with marks distributions 5+5, 4+6, 3+7).
3. The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Books

1. Allan Fowler-AR Game Development||, 1st Edition, A press Publications, 2018, ISBN 978- 1484236178.
2. Augmented Reality: Principles & Practice by Schmalstieg/Hollerer, Pearson Education India; First edition (12 October 2016), ISBN-10: 9332578494.

Reference Books:

1. Designing for Mixed Reality, Kharis O'Connell Published by O'Reilly Media, Inc., 2016, ISBN: 9781491962381.
2. Sanni Siltanen- Theory and applications of marker-based augmented reality. Julkaisija–Utgivare Publisher. 2012. ISBN 978-951-38-7449-0.

Web links and Video Lectures (e-Resources):
1. https://www.vttresearch.com/sites/default/files/pdf/science/2012/S3.pdf 2. https://docs.microsoft.com/en-us/windows/mixed-reality/ 3. https://docs.microsoft.com/en-us/archive/msdn-magazine/2016/november/hololens- introduction-to-the-hololens **MOOC Courses:** • https://www.coursera.org/learn/ar • https://www.udemy.com/share/101XPi/
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning • Course seminar • Term project

NATIONAL SERVICE SCHEME		**Semester**	**VI sem**
Course Code	**BNSK658**	CIE Marks	**25*4 = 100**
Teaching Hours/Week (L: T:P: S)	0:0:2:0	SEE Marks	------
Total Hours of Pedagogy	24 hours	Total Marks	**25*4 = 100**
Examination nature (SEE)	Activities Report Evaluation by College NSS Officer at the end of every semester (3^{rd} to 6^{th} semester)		
Credits	NCMC: Non-Credit Mandatory Course (Completion of the course shall be mandatory for the award of degree)		

Course objectives:

National Service Scheme (NSS) will enable the students to:

1. Understand the community in general in which they work.
2. Identify the needs and problems of the community and involve them in problem–solving.
3. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
4. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
5. Develop capacity to meet emergencies and natural disasters & practice national integrationand social harmony in general.

General Instructions-Pedagogy:

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

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so thatthe activities will develop students' theoretical and applied social and cultural skills.
2. State the need for NSS activities and its present relevance in the society and provide real-life examples.
3. Support and guide the students for self-planned activities.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documentingstudents' progress in real activities in the field.
5. Encourage the students for group work to improve their creative and analytical skills.

National Service Scheme (NSS) – Contents

==========

1. Organic farming, Indian Agriculture (Past, Present and Future) Connectivity formarketing.
2. Waste management– Public, Private and Govt organization, 5 R's.
3. Setting of the information imparting club for women leading to contribution in social andeconomic issues.
4. Water conservation techniques – Role of different stakeholders– Implementation.
5. Preparing an actionable business proposal for enhancing the village income and approachfor implementation.
6. Helping local schools to achieve good results and enhance their enrolment in Higher semesters.

YOGA		Semester	**VI sem**
Course Code	**BYOK559**	CIE Marks	100/sem
Teaching Hours/Week (L: T:P: S)	0:0:2:0	SEE Marks	000
Total Hours of Pedagogy per semester	24 - 28 hours (Theory + practical)	Total Marks	100/sem
Examination nature (SEE)	**Objective type Theory / Practical / Viva-Voce**		

Course objectives:

1) To enable the student to have good health.
2) To practice mental hygiene.
3) To possess emotional stability.
4) To integrate moral values.
5) To attain higher level of consciousness.

The Health Benefits of Yoga

The benefits of various yoga techniques have been supposed to improve

- body flexibility,
- performance,
- stress reduction,
- attainment of inner peace, and
- self-realization.

The system has been advocated as a complementary treatment to aid the healing of several ailments such as

- coronary heart disease,
- depression,
- anxiety disorders,
- asthma, and
- extensive rehabilitation for disorders including musculoskeletal problems and traumatic brain injury.

The system has also been suggested as behavioral therapy for smoking cessation and substance abuse (including alcohol abuse).

If you practice yoga, you may receive these physical, mental, and spiritual benefits:

- Physical
    1. Improved body flexibility and balance
    2. Improved cardiovascular endurance (stronger heart)
    3. Improved digestion
    4. Improved abdominal strength
    5. Enhanced overall muscular strength
    6. Relaxation of muscular strains
    7. Weight control
    8. Increased energy levels
    9. Enhanced immune system
- Mental
    1. Relief of stress resulting from the control of emotions
    2. Prevention and relief from stress-related disorders
    3. Intellectual enhancement, leading to improved decision-making skills
- Spiritual
    1. Life with meaning, purpose, and direction
    2. Inner peace and tranquility
    3. Contentment

Yoga Syllabus

Ashtanga Yoga 1. Dharana 2. Dhyana (Meditation) 3. Samadhi

Asana by name, technique, precautionary measures and benefits of each asana Different types of Asanas

a. Sitting 1. Bakasana
    2. Hanumanasana

3. Ekapada Rajakapotasana
4. Yogamudra in Vajrasana

b. Standing 1. Vatayanasana
2. Garudasana

c. Balancing 1. Veerabhadrasana
2. Sheershasana

d. Supine line 1. Sarvangasana
2. Setubandha Sarvangasana
3. Shavasanaa (Relaxation poisture).

Revision of Kapalabhati practice 80 strokes/min - 3 rounds

Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama 1. Bhastrika 2. Bhramari

Meaning, Need, importance of Shatkriya. Different types. Meaning by name, technique, precautionary measures and benefits of each Kriya 1. Jalaneti & sutraneti 2. Nouli (only for men) 3. Sheetkarma Kapalabhati

Course outcomes (Course Skill Set):

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

- Understand the meaning, aim and objectives of Yoga.
- Perform Suryanamaskar and able to Teach its benefits.
- Understand and teach different Asanas by name, its importance, methods and benefits.
- Instruct Kapalabhati and its need and importance.
- Teach different types of Pranayama by its name, precautions, procedure and uses
  Coach different types of Kriyas, method to follow and usefulness.

Assessment Details (both CIE and SEE)

- Students will be assessed with internal test by a. Multiple choice questions b. Descriptive type questions (Two internal assessment tests with 25 marks/test)
- Final test shall be conducted for whole syllabus for 50 marks.

Continuous Internal Evaluation shall be for 100 marks (including IA test)

Suggested Learning Resources:

Books:

1. Yogapravesha in Kannada by Ajitkumar
2. Light on Yoga by BKS Iyengar
3. Teaching Methods for Yogic practices by Dr. M L Gharote & Dr. S K Ganguly
4. Yoga Instructor Course hand book published by SVYASA University, Bengaluru
5. Yoga for Children –step by step – by Yamini Muthanna

Web links and Video Lectures (e-Resources): Refer links

1. **https://youtu.be/KB-TYlgd1wE**
2. **https://youtu.be/aa-TG0Wg1Ls**