VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

B.E. in Agricultural Engineering

Scheme of Teaching and Examinations 2022

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2023-24)

III SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	PCC/BSC	BAG301	Basics Concepts and Applications of Agrochemicals	TD-PSB	3	0	0		03	50	50	100	3
2	IPCC	BAG302	Fundamentals of Agriculture & Crop Production Technology	TD: PSB	3	0	2		03	50	50	100	4
3	IPCC	BAG303	Soil Mechanics, Surveying & Levelling	TD: PSB	3	0	2		03	50	50	100	4
4	PCC	BAG304	Mechanics of Materials & Machine	TD: PSB	3	0	0		03	50	50	100	3
5	PCCL	BAGL305	Basic Workshop Practise Lab	TD: PSB	0	0	2		03	50	50	100	1
6	ESC	BAG306x	ESC/ETC/PLC	TD: PSB:	3	0	0		03	50	50	100	3
7	UHV	BSCK307	**Social Connect and Responsibility**	Any Department	0	0	2		01	100	---	100	1
8	AEC/ SEC	BAG358x	Ability Enhancement Course/Skill Enhancement Course - III		If the course is a Theory: 1	0	0		01	50	50	100	1
					If a course is a laboratory: 0	0	2		02				
9	MC	BNSK359	National Service Scheme (NSS)	NSS coordinator	0	0	2			100	---	100	0
		BPEK359	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		BYOK359	Yoga	Yoga Teacher									
									Total	**550**	**350**	**900**	**20**

PCC: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **MC**: Mandatory Course (Non-credit), **AEC**: Ability Enhancement Course, **SEC**: Skill Enhancement Course, **L:** Lecture, **T**: Tutorial, **P**: Practical **S= SDA**: Skill Development Activity, **CIE**: Continuous Internal Evaluation, **SEE**: Semester End Evaluation.K :This letter in the course code indicates common to all the stream of engineering. ESC: Engineering Science Course, ETC: Emerging Technology Course, PLC: Programming Language Course

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Engineering Science Course (ESC/ETC/PLC)			
BAG306A	Information Technology for Land and Water Management	BAG306C	Analog and Digital Electronics Circuit
BAG306B	Artificial Intelligence and Machine learning	BAG306D	Solid Waste And By-Product Utilization
Ability Enhancement Course – III			
BAGL358A	Advanced Python Programming [0-0-2]	BAGL358C	Spreadsheet for Engineers [0-0-2]
BAG358B	Fundamentals of Virtual Reality [0-2-0]	BAGL358D	Tools in Scientific Computing [0-0-2]

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practicals of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (B.E./B.Tech.) 2022-23 may please be referred.

National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE)(Sports and Athletics), and Yoga(YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

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Basics Concepts and Applications of Agrochemicals		Semester	III
Course Code	BAG301	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		

Course Objectives:

- To understand the basic concepts of agrochemicals and their applications in agriculture.
- To study naturally occurring and synthetic chemical agents used for protecting crops in field as well as in storage.
- To understand the role of naturally occurring crop protecting chemical agents in fostering organic farming.
- To understand the impact of agrochemicals on environmental, animal, and human health
- To understand the regulatory mechanism of agrochemicals at national and international levels
- To acquire necessary basic knowledge on agrochemicals so as to evolve engineering strategy for their optimal and judicial applications in field as well as storage conditions, based on integrated learning outcomes from other courses.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher 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 teaching basic concepts.
3. Arranging visits to farmers' fields to expose pupils to real time farming situations.
4. Adopt collaborative (Group Learning) Learning in the class.
5. By giving assignments and presentation tasks to students.
   Exploring information from research publications and regulatory documents

Module-1

Naturally Occurring Crop Protection Agents

Economic loss of agricultural produce due to pest problems: insects, diseases, rodents and weeds; Sources and utility of naturally occurring insecticides, bactericides, fungicides, nematicides, rodenticides; Role of naturally occurring pesticides in fostering organic farming; Working principles of botanical insecticides such as natural pyrethroids, nicotine, rotenone, neem and karanj; Pest control properties of plant hormones, phytoalexins and essential oils; Advantage and limitations of naturally occurring crop protection agents; juvenile hormones (JH), juvenile hormone mimics and anti-JH; chemosterilants, insect antifeedants, insect attractants and repellents; microbial pesticides and biocontrol agents.

Module-2

Synthetic Crop Protection Agents

History, scope and principles of chemical insect control; Synthetic insecticides, bactericides, fungicides, nematicides, rodenticides, weedicides; Classification of major groups of insecticides (organo-chlorine, organo-phosphorus, organo-carbamates, synthetic pyrethroids, neonicotinoids), fungicides (inorganics, dithiocarbamates, OP's, phenols, quinines, carboxamides, azoles, methoxyacrylates); Mode of action of different groups of insecticides, fungicides and nematicides; Chitin synthesis inhibitors, insecticide synergists, and fumigants; Plant growth regulators – auxins, gibberellins, cytokinins, ethylene, abscisic acid; Brassinolides;

Module-3

Chemicals used for storage and preservation

Major storage pests of economic importance causing damage during storage of food grains; Strategies involving storage bags, storage structures, and storage conditions; Pesticides and fumigants used in controlling insects and rodents during storage; Chemicals used for preserving freshness and promoting ripening in vegetables and fruits,respectively

Module-4

Agrochemical Formulations
Basic concepts of pesticide formulation - classification, solid and liquid formulations; preparation, properties, uses; controlled release formulations; Formulants - carriers/ diluents, surfactants, encapsulants, binders, anti-oxidants, stabilizers; Application - devices and quality of deposits; Types of spray appliances, seed treatment and dressing; nanotechnology in crop protection, Tools to develop and measure nanoparticles. Basic concepts of fertilizer formulations: enhancing fertilizer use efficiency and reducing environmental pollutions

Module-5

Agrochemicals – Regulation and Quality Control
Production, consumption and trade statistics of pesticides and fertilizers; banned and restricted pesticides, registration and quality control of insecticides; Laws, Acts and Rules governing registration and regulations of agrochemical production and use; key provisions of the Insecticides Act (1968), Environmental Protection Act (1986). Food Safety and Standards Act, WHO, FAO, CODEX and national/international guidelines.

Course outcome (Course Skill Set)

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

- Understand the basic concepts of agrochemicals and their applications in agriculture.
- Understand naturally occurring and synthetic chemical agents used for protecting crops in field as well as in storage.
- Understand the role of naturally occurring crop protecting chemical agents in fostering organic farming.
- Understand the impact of agrochemicals on environmental, animal, and human health
- Understand the regulatory mechanism of agrochemicals at national and international levels
- Acquire necessary basic knowledge on agrochemicals so as to evolve engineering strategies for their optimal and judicial applications in field as well as storage conditions, based on learning outcomes from other courses

Assessment Details (both CIE and SEE)
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

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

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

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

Suggested Learning Resources:
Books

1. **"Agrochemicals and Pest Management"** by T.V. Sathe. Daya Publishing House (2003)

ISBN: 8170353092, 9788170353096

2. "**Agrochemicals and Sustainable Agriculture**" By N.K. Roy. Associated Publishing Company (2021). **ISBN:** 9788186580110
3. "**Sittig's Handbook of Pesticides and Agricultural Cheamicals**" EdittedBy Stanley A. Greene and Richard P. Pohanish. Elsevier (2005). ISBN: 978-0-8155-1516-6
4. "**Agrochemicals**" By Singh Ranjit. LAP Lambert Academic Publishing. ISBN: 9786139851997
5. "The Complete Technology Book on Pesticides, Fungicides, Herbicides (Agrochemicals) with Formulae, manufacturing Process, Machinery and Equipment Details" By Himadri Panda. 2nd Revised Edition. Published by NIIR Project Consultancy Services (2022), ISBN: 9788195577538
6. "**A textbook of Fertilizers**" By Deepak Ranjan Biswas. New India Publishing Agency, New Delhi.

"**Pesticide Regulation Handbook**" By Greene Jan. Taylor and Francis Ltd, ISBN: 9781315896366, 9781315896366

Web links and Video Lectures (e-Resources):

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

- Quizzes
- Assignments
- Seminars

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FUNDAMENTALS OF AGRICULTURE & CROP PRODUCTION TECHNOLOGY (IPCC)		Semester	III
Course Code	BAG302	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 8-10 Lab slots	Total Marks	100
Credits	04	Exam Hours	3
Examination nature (SEE)	Theory		

Course objectives:

- Imparting knowledge on different crops, crop nutrition and growth
- Describing crop-water relations in association to crop growth and development
- Illustrating crop management, cropping pattern and weed management
- Imparting the fundamentals of crop production technology of crops
- Providing knowledge on the importance and practices followed in growing crops

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 Videodemonstrations 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 asevaluating, generalizing, and analysing information.
6. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills.

MODULE-1

Agronomy, its definition, scope and role of Agronomist. Tillage-objectives of tillage, types of tillage, tillage implements and factors affecting tillage, Effect of tillage on soil and crop growth. Tilth: its definition, characteristics and ideal tilth, Modern concepts of tillage, minimum, zero and stubble mulch tillage, importance of puddling. Conventional tillage practices and their effects, modern tillage practices and their advantages;

MODULE-2

Seed, its definition, characteristics of quality seed, seed treatment and its objectives. Seed dormancy, causes of seed dormancy and multiplication, stages of seed. Effect of plant population on growth and yield, Planting geometry viz., solid, paired and skipped row planting.

Importance of manures and fertilizers and its classification. Methods and time of application of manures, fertilizers andgreen manuring. Nutrient use efficiency and factors affecting nutrient use efficiency.

Scheduling of Irrigation and Fertilizers: Irrigation schedules for different crops in different soils and agro-climatic regions,fertigations, irrigation methods. Plant Protection Measures- Pesticides, types of weedicides and insecticides available tocontrol different weed flora, pests and diseases and their mode of action.

MODULE-3

Weeds, its definition, characteristics of weeds, merits and demerits of weeds, classification of weeds, meaning of crop weed competition and its period in different crops. Principles and methods of weed management viz., cultural, mechanical, chemical, biological weed control methods and integrated weed management. Classification of herbicides. Crop harvesting, signs of maturity in different field crops, Physiological and crop maturity, Method of harvesting.

MODULE-4

Introduction: Concepts in crop production; geographical distribution of crops and cropping systems; economic importance. Crop Classification: Cereals, pulses, oilseeds, fiber crops, forage crops, medicinal and aromatic crops and horticultural crops.

Cropping Systems for Major Agro-Ecological Regions: Detailed descriptions of rice based cropping

systems, sugarcane based cropping systems, cotton based cropping systems, pulses and oilseeds based cropping systems, their suitability in different agro-ecological regions. Crop rotation, its definition, principles and advantages of crop rotation.
MODULE-5
Modern Techniques of Raising Field and Horticultural Crops Techniques of nursery raising, method of planting, fertilization, irrigation scheduling, weed control, and other practices to optimize yield, economic evaluations. **Crop Growth Assessment**: Crop, growth parameters and their measurements.

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

Sl.NO	Experiments
1	Identification of crops, seeds, fertilizers, pesticides & Tillage implements
2	Effect of sowing depth on germination and seedling vigour
3	Study of yield contributing characters and yield estimation
4	Seed germination and viability test
5	Numerical exercises on fertilizer requirement
6	Plant Population and water requirement
7	Use of tillage implements (reversible plough, one way plough, harrow, leveller, seed drill)
8	Study of soil moisture measuring devices
9	Measurement of field capacity, bulk density and infiltration rate
10	Measurement of irrigation water
11	Study of crop varieties and agronomic experiments at experimental farm
12	Morphological description of Kharif season crops (rice).

Course outcomes (Course Skill Set):
At the end of the course, the student will be able to:

- Express knowledge gained on the principles of agronomy
- Recognize the various nutrients and their effects on plant health
- Plan irrigation measures for plant growth and development
- Manage weeds in a field
- Plan for sustainable agricultural production
- Apply scientific methods and tools in field preparation and for designing cropping
- Comprehend the fundamentals of crop production of cereals
- Decide on the crops, fertilizers and irrigation measures for production of pulses
- Plan for sustainable crop production of oilseeds
- Explain the techniques involved in crop production of fibre and forage crops
- Correlate parameters involved in crop cultivation and practices of crop cultivation

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**)

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

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

Suggested Learning Resources:

Books

1. Crop production and field experimentation by V.G. Vaidya, K.R. Sahastrabudhe and V.S. Khuspe. ContinentalPrakashan, Vijaynagar, Pune.
2. Hand book of Agriculture, ICAR Publication.
3. Modern techniques of raising field corps by Chidda Singh. Oxford and IBH Publishing Co. Ltd., Bangalore.
4. Principles of Agronomy by Sankaran S. and V.T. SubbiahMudliyar, 1991. The Bangalore Printing and Publishing Co.Ltd., Bangalore.
5. Agronomy by S.C. Panda, 2006. Agribios Publication, New Delhi.
6. Crop Production and Management by Y.B. Moranchan. Oxford and IBH Publishing Co. Ltd., Bangalore.
7. Principles of Agronomy by S.R. Reddy, Kalyani Publishers, Ludhiana, India.
8. Principles of Crop Production by Martin J.H. and Leonard W.H. the Mac Million Company, New York – 1962.
9. Scientific Crop Production (Vol. I and II). Thakur C. Metropolitan Books Co. Pvt. Ltd., New Delhi.
10. Fundamentals of Agronomy. Gopal Chandra De. 1980. Oxford and IBH Publishing Co. Ltd., Bangalore
11. Singh, Chidda "Modem technique of raising of field crops". Oxford and IBH Publishing Company Pvt. Ltd., 1994.
12. Suresh Singh Tomar, YagyaDev Mishra and Shailendra Singh Kushah. 2018. Production Technology of Rabi Crops.Biotech books, New Delhi, India.
13. Rajendra Prasad. 2017. Textbook of field crops production, Volume 1 and 2 (Foodgrain crops & Commercial Crops).ICAR, India.
14. ingh, R.P., Reddy, P.S. and Kiresur, V.(eds.). "Efficient Management of Dryland Crops in India". Indian Society ofOilseed Research, DOR Rajendra Nagar, Hyderabad, 1997.
15. Joshi M. 2015. Textbook of Field Crops. Prentice Hall India Learning Private Limited, India.

Web links and Video Lectures (e-Resources):

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

https://www.youtube.com/watch?v=8ulpy_GFLDk

https://www.youtube.com/watch?v=NCp93xbSwWM

https://www.youtube.com/watch?v=60qVUwLP1s8

https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg3-chapter8-1.pdf

https://ecourses.icar.gov.in/

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

- Quizzes
- Assignments
- Seminars
- Field Experiments
- Mini Projects

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Soil Mechanics, Surveying & Levelling		Semester	III
Course Code	BAG303	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 8-10 Lab slots	Total Marks	100
Credits	04	Exam Hours	3
Examination nature (SEE)	Theory		

Course objectives:

- Appreciate basic concepts of soil mechanics as an integral part
- Comprehend basic engineering and mechanical properties of different types of soil.
- Model and measure strength-deformation characteristics of soils
- Familiar with Soil mechanics problems such as flow though soils
- Study about assessing stability of slopes and earth pressure on rigid retaining structures
- Understand the basic principles of Surveying
- Learn Linear and Angular measurements to arrive at solutions to basic surveying problems.
- Employ conventional surveying data capturing techniques and process the data for computations.
- Analyze the obtained spatial data to compute areas and volumes and draw contours to represent 3D data onplane figures.

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 andVideo 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 asevaluating, generalizing, and analyzing information.
6. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills

MODULE-1

Engineering Properties of Soils-Water content; Unit weight of soil; Specific gravity; Void ratio; Porosity; Degree of saturation; Functional relationships; Determination of index properties; Liquid limit; Plastic limit; Shrinkage limit; Plasticity index; Particle size distribution curve. Classification of Soils and Clay Mineralogy-Particle size classification; Textural classification; Indian standards classification; Soil structure;

Soil Hydraulics-Modes of occurrence of water in soils; Stress condition in soil; Permeability; Factors affecting permeability;Laboratory and field methods of determining permeability coefficients.

Elasticity Applied to Soils- State of stress at a point; Strain components; Stress distribution;

Pressure distribution diagrams; Newmark's influence charts; Contact pressure; Principal stresses and maximum shear.Compression and Compressibility

MODULE-2

Strength and Stability-Shear strength; Mohr circle of stresses; Measurement of shear strength; direct shear tests; Tri-axial compression test; Unconfined compression test; vane shear test; Pore pressure parameters; Active and passive earth pressures; Stability of slopes; Taylors stability number and stability curves;

Bearing Capacity of Soil; Rankine analysis; Terzaghi analysis; General and local shear failure; Mayerhoeff's analysis; Effect of water table on bearing capacity; Stabilization of Soil and Site Investigation-Introduction; Method of Stabilisation; Site exploration; Depth of exploration; Methods of site exploration; Soil samples and samplers.

MODULE-3

INTRODUCTION: Overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications. Distance measurement conventional symbols and methods; use of chain and tape, Electronic distance measurements, Meridians, Azimuths and Bearings, declination, computation of angle.

LEVELING AND CONTOURING: Concept and Terminology, Temporary and permanent adjustments method of leveling. Contouring: Contours, Methods of contouring, Interpolation of contours, contour gradient, characteristics of contours and uses.

MODULE-4
COMPUTATION OF AREAS AND VOLUMES: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits. THEODOLITE & TACHEOMETRIC SURVEYING Theodolite, description, uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite. Trigonometrical leveling, Traversing. Stadia and tangential methods of Tacheometry.
MODULE-5
INDTRODUCTION TO ADVANCED SURVEYING: Introduction to geodetic surveying, Total Station and Global positioning system, Introduction to Geographic information system (GIS) & Modern Instruments and its applications. ModernSurveying Instruments Introduction, Electromagnetic spectrum, Electromagnetic distance measurement, Total station, Lidar scanners for topographical survey. Aerial Photogrammetry Introduction, Uses, Aerial photographs, Definitions, Scale of vertical and tilted photograph (simple problems), Ground Co-ordinates (simple problems), Relief Displacements (Derivation).

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

Sl.NO	Experiments
1	Special gravity of soil solids
2	Grain size distribution
3	Atterberg Limits
4	Field density Test (Sand replacement method)
5	Permeability determination (constant head and falling head methods)
6	Direct shear test in cohesion-less soil
7	Unconfined compression test in cohesive soil
8	a) Measurements of distances using tape along with horizontal planes and slopes, direct ranging. b) Setting out perpendiculars. Use of cross staff, optical square.
9	Measurements of bearings / directions using prismatic compass, setting of geometrical figures using prismatic compass.
10	Determination of reduced levels of points using dumpy level/auto level (differential leveling and inverted leveling).
11	To conduct profile leveling, cross sectioning and block leveling. Plotting profile and cross sectioning in excel. Block contour on graph paper to scale.
12	Measurement of horizontal angle by repetition and reiteration methods
13	Determination of horizontal distance to a base in accessible object using theodolite by single plane and double plane method.
14	To determine distance and elevation using tachometric surveying with horizontal and inclined line of sight.
15	Demonstration of Minor instruments like Clinometer, Ceylon Ghat Tracer, Box sextant, hand Level, Digital Planimeter and Pentagraph

Course outcomes (Course Skill Set):
At the end of the course, the student will be able to:

- Acquire an understanding of the procedures to determine properties of any type of soil, classify the soil based on its index properties.
- Able to determine permeability property of soils and acquires conceptual knowledge about stresses due toseepage and effective stress.
- Able to estimate seepage losses across hydraulic structures.
- Able to estimate shear strength parameters of different types of soils using
- the data of different shear tests and comprehend Mohr-Coulomb failure theory
- Ability to solve practical problems related to bearing capacity
- Able to plan and execute geotechnical site investigations for Hydraulic structures
- Possess a sound knowledge of fundamental principles Geodetics
- Measurement of vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basicsurveying problems.
- Capture geodetic data to process and perform analysis for survey problems]
- Analyse the obtained spatial data and compute areas and volumes. Represent 3D data on plane figures as contours

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 scoredby 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 Mechanics and Foundation Engineering Murthy, V.N.S UBS Publishers and Distributors, New Delhi. 1996
2. Soil Mechanics and Foundation Punmia, B.C New Delhi STD Book House, 1987 2017
3. Basic and Applied Soil Mechanics Gopalrajan and Rao, A.S.R. New Age International (P) Ltd., New delhi. 2000
4. Soil Mechanics T.W. Lambe and R.V. Whitman John Wiley & Sons. 1969
5. Geotechnical Engineering Donald P Coduto Phi Learning Private Limited, New Delhi.
6. Surveying (Vol – 1, 2 & 3) B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain Laxmi Publications (P) ltd., NewDelhi
7. Surveying (Vol – 1 & 2) Duggal S K Tata Mc-Graw Hill Publishing Co. Ltd New Delhi 2004
8. Elements of Plane Surveying Arthur R Benton and Philip J Taety McGraw Hill 2000
9. Surveying Vol 1, 2 & 3 Arora K R Standard Book House, Delhi, 2004

Web links and Video Lectures (e-Resources):

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

- Quizzes
- Assignments
- Seminars
- Field Experiments
- Mini Projects

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Mechanics of Materials & Machine		Semester	III
Course Code	BAG304	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
Examination nature (SEE)	Theory		

Course objectives:

- To learn about simple stresses and strains and their applications.
- To learn how to find shear force and bending moment and construction of SFD & BMD
- To understand the concept of machines, mechanisms and to analyze a mechanism for displacement, velocityand acceleration at any point in a moving link.
- To understand the force-motion relationship in components subjected to external forces and analysis ofstandard mechanisms
- To understand the theory of gears and gear trains.

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 Videodemonstrations 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 asevaluating, generalizing, and analysing information.

Module-1

Simple Stresses and Strains: Elasticity and plasticity – Types of stresses and strains – Hooke's law – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them

Module-2

Shear Force and Bending Moments: Types of supports – Types of beams – Shear force and bending moment diagrams for simply supported - Cantilever and over hanging beams with point loads, uniformly distributed load, uniformly varyingloads and couples – Relationship between shear force and bending moment.

Module-3

Introduction: Mechanisms and machines, Kinematic pairs-types, degree of freedom, Kinematic chains and their classification, Kinematic inversions,

Velocity and Acceleration analysis of planar mechanisms Graphical method: Velocity and Acceleration Analysis ofMechanisms Velocity and acceleration analysis of four bar mechanism, slider crank mechanism.

Module-4

Static force analysis: Static equilibrium, analysis of four bar mechanism, slider crank mechanism.

Dynamic force analysis: D'Alembert's principle, analysis of four bar and slider crank mechanism.

Flywheel: Introduction to Flywheel and calculation of its size for simple machines like punching machine, shearing machine

Spur Gears: Gear terminology, law of gearing, path of contact, arc of contact, contact ratio of spur gear. **Gear Trains**: Simple gear trains, compound gear trains. Epicyclic gear trains.

Module-5

MACHINE DESIGN – Definition, Classification of machine design, General considerations in machine design, General procedure in machine design. Fundamental units, Mass and Weight, inertia, laws of motion, force, moment of force, couple mass density, torque, work, power and energy. **LEVERS** – Introduction, application of levers in

engineering practice, design of lever hand levers, foot lever, and cranked lever. Springs – Introduction, types of springs, material for helical springs, spring wire, terminology

Course outcome (Course Skill Set)

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

1. The students would be able to understand the behaviour of materials under different stress and strainconditions.
2. Knowledge of mechanisms and their motion and the inversions of mechanisms
3. Analyse the mechanisms for static and dynamic equilibrium.
4. Carry out the balancing of rotating and reciprocating masses
5. Analyse different types of governors used in real life situation.
6. Various basic terms related to machine design aspect

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

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

Semester-End Examination:

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

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

Suggested Learning Resources:

Books

1. R.S. Khurmi, Theory of Machines, Khanna Publishers, 2003.
2. S. S. Ratan, Theory of Machines, Tata McGraw Hill, 2nd Edition, 2005
3. Ghosh A. and Mallick A.K, Theory of Mechanisms and Machines, Affiliated East-West Press, 2nd Edition, 1988.
4. Thomas Bevan, Theory of Machines, CBS Publishers, 3rd Edition, 1984

J.S Rao. & R.V Dukkipati, Mechanism and Machine Theory, Newagepublishers, 2nd edition 1992

Web links and Video Lectures (e-Resources):

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

- Quizzes
- Assignments
- Seminars

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BASIC WORKSHOP PRACTICE LAB		Semester	III
Course Code	BAGL305	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	(0:0:2:0)	SEE Marks	50
Credits	01	Exam Hours	03
Examination nature (SEE)	Practical		

Course objectives:

- To identify tools, work material and measuring instruments useful for fitting, carpentry, Sheet metal workingand Smithy practice
- To handle tools and instruments and use them to prepare joints of specific shape and size

Sl.NO	Experiments
1	**Fitting:** Introduction, Various tools used in fitting shop- Holding tools; Marking and Measuring tools; Striking tools;Cutting tools; finishing tools
2	Preparation of Square fitting model in fitting shop
3	Preparation of V fitting model in fitting shop
4	**Carpentry:** Introduction, Timber, classification and characteristics; Various tools used in carpentry shop- Holding tools; Marking and Measuring tools; Striking tools; Planing tools; Cutting tools – saws and chisels
5	Preparation of T-Lap joint model in Carpentry shop
6	Preparation of Dove-tail Lap joint model in Carpentry shop
7	**Sheet metal working:** Introduction, Sheet metals used in metal work; Various tools used- Holding tools; Marking and Measuring tools;Striking tool – hammers and mallets; Snips; Stakes
8	Preparation of Open scoop model in Sheet metal shop
	Demonstration Experiments (For CIE)
9	Preparation of Rectangular tray model in Sheet metal shop
10	**Smithy:** Introduction, Principle of forging; Various tools used- Holding tools; Marking and Measuring tools; Striking tool –hammers; Flatters; Swage block; V-Block; Tongs, etc
11	To prepare S-Hook from a given round rod
12	To make a square rod from a given round rod

Course outcomes (Course Skill Set):

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

1. To select suitable tools and equipment to prepare joints using bench-work tools.
2. To produce joints using materials of specific shape and size by a suitable PO1,PO3, PO5, PSO1, set of operations and check the accuracy of shape and dimensions using suitable measuring tools..

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation (CIE):

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

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

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

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

Semester End Evaluation (SEE):

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

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

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

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

The minimum duration of SEE is 02 hours

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Suggested Learning Resources:

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Artificial Intelligence and Machine learning		Semester	III
Course Code	BAG306B	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		

Course objectives:

1. Understands the basics of AI, history of AI and its foundations, basic principles of AI for problem solving
2. Explore the basics of Machine Learning & Machine Learning process, understanding data
3. Understand the Working of Artificial Neural Networks

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

Module-1

Introduction: What is AI, The foundation of Artificial Intelligence, The history of Artificial Intelligence, Intelligent Agents: Agents and Environments, Good Behaviour: The concept of rationality, the nature of Environments, the structure of Agents

Module-2

Problem solving by searching: Problem solving agents, Example problems, Searching for solutions, Uniformed search strategies, Informed search strategies, Heuristic functions

Module-3

Introduction to machine learning: Need for Machine Learning, Machine Learning Explained, and Machine Learning in relation to other fields, Types of Machine Learning. Challenges of Machine Learning, Machine Learning process, Machine Learning applications.

Understanding Data: What is data, types of data, Big data analytics and types of analytics, Big data analytics framework, Descriptive statistics, univariate data analysis and visualization

Module-4

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

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

Similarity-based learning: Introduction to Similarity or instance based learning, Nearest-neighbour learning, weighted k- Nearest - Neighbour algorithm.

VARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

B.E. in Agricultural Engineering

Scheme of Teaching and Examinations 2022

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2023-24)

IV SEMESTER

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Self -Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	PCC/BSC	BAG401	Thermodynamics & Fluid Mechanics		3	0	0		03	50	50	100	3
2	IPCC	BAG402	Tractor & Automotive Engines		3	0	2		03	50	50	100	4
3	IPCC	BAG403	Agricultural Process Engineering		4	0	0		03	50	50	100	4
4	PCCL	BAGL404	Machine Drawing and GD & T Lab		0	0	2		03	50	50	100	1
5	ESC	BAG405x	ESC/ETC/PLC		3	0	0		03	50	50	100	3
6	AEC/ SEC	BAG456x	Ability Enhancement Course/Skill Enhancement Course- IV	TD and PSB: Concerned department	If the course is Theory 1	0	0		01	50	50	100	1
					If the course is a lab 0	0	2		02				
4	BSC	BBOK407	Biology For Engineers	TD / PSB: BT, CHE,	3	0	0		03	50	50	100	3
7	UHV	BUHK408	Universal human values course	Any Department	1	0	0		01	50	50	100	1
9	MC	BNSK459	National Service Scheme (NSS)	NSS coordinator	0	0	2			100	---	100	0
		BPEK459	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		BYOK459	Yoga	Yoga Teacher									
									Total	**500**	**400**	**900**	**20**

PCC: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **MC**: Mandatory Course (Non-credit), **AEC**: Ability Enhancement Course, **SEC**: Skill Enhancement Course, **L:** Lecture, **T**: Tutorial, **P**: Practical **S= SDA**: Skill Development Activity, **CIE**: Continuous Internal Evaluation, **SEE**: Semester End Evaluation. K :This letter in the course code indicates common to allthe stream of engineering.

Ability Enhancement Course / Skill Enhancement Course - IV			
BAGL456A	Simulation and Analysis using Ansys workbench [0-0-2]	BAGL456C	Introduction to Data Analytics [0-0-2]
BAG456B	Economics for Engineers [0-2-0]	BAG456D	Human Engineering & Safety
Engineering Science Course (ESC/ETC/PLC)			
BAG405A	Tractor Systems and Controls	BAG405C	Non-Conventional Energy Resources
BAG405B	Industrial Instrumentation	BAG405D	Robotics and Automation

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practical of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (B.E./B.Tech.) 2022-23

National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE)(Sports and Athletics), and Yoga(YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses is mandatory for the award of degree.

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THERMODYNAMICS & FLUID MECHANICS		Semester	IV
Course Code	BAG401	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
Examination nature (SEE)	Theory		

Course objectives:
The course will enable the students to

- Acquire a basic understanding of properties of fluids and the measurement of pressure and fluid kinematics.
- Acquire a basic understanding of fundamentals fluid dynamics, and Benoulli's equation and flow meters.
- Acquire the basic concepts of flow through pipes and losses in pipe flows.
- Understand the basic concepts of flow over bodies and usefulness of dimensionless analysis.
- Acquire the fundamentals of compressible flow and the basic knowledge of working of CFD packages.
- Acquire the knowledge of simple fluid mechanics experimental setups and carry out the necessary analysis
  of these experiments
- Acquire knowledge experimental errors and the ability to estimate the experimental uncertainties.

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 type of teaching methods to develop the outcomes through Power-Point Presentation and Video demonstration or Simulations.
2. Chalk and Talk method for Problem Solving.
3. Arrange visits to show the live working models other than laboratory topics.
4. Adopt collaborative (Group Learning) Learning in the class.
5. Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information.
6. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills.

Module-1

Basic Concepts: Definitions of system, boundary, surrounding control volume. Types of thermodynamic systems, Properties of system, definitions for properties like pressure, volume, temperature, enthalpy, internal energy, density, with their units. State, Property, Process and Cycle, Quasi Static Process, Thermodynamic Equilibrium.
Work & Heat Transfer: Work transfer, Types of work transfers, Point and Path Functions, Heat transfer, Comparison of Work and Heat transfers.
Zeroth Law of Thermodynamics: Zeroth Law of Thermodynamics. Heat and temperature - concept of thermal equilibrium.

Module-2

First Law of Thermodynamics: First law of thermodynamics- simple problems on heat and work conversions in process and cycle. Limitations of First law of thermodynamics.
Second Law of Thermodynamics: Heat Engine, Refrigeration and Heat Pump. Statements of Second law and their equivalence, Reversibility and Irreversibility, availability and unavailability – concept of change in entropy.

Module-3

Introduction: Definition and properties, types of fluids, fluid pressure at a point in static fluid, variation of pressure, Pascals Law, (To be reviewed in class but not for examination)
Pressure- absolute, gauge, vacuum, pressure measurement by manometers and gauges, hydrostatic pressure on vertical plane surface submerged in liquid. Buoyance, centre of buoyancy and metacentre, Stability of

submerged body.

Fluid Kinematics: Introduction, methods of describing fluid motion, types of fluid flow. Continuity equation (simple problems), velocity and acceleration of fluid particle (simple problems), streamlines, pathlines and streaklines, strain rate, vorticity, velocity potencial function and stream function relation between stream function and velocity potential function and simple problems, Types of motion.

Module-4

Fluid Dynamics: Introduction, Forces acting on fluid in motion. The momentum equation, Moment of momentum equation, Euler's equation of motion along a streamline. Bernoulli's equation - assumptions and limitations (simple problems).

Fluid flow measurement: Venturimeters, orificemeters, pitot tube, rectangular and triangular notches and weirs (simple problems)

Viscous flow: Types of flow, Reynolds Experiments, Laminar flow through circular pipe, laminar flow between two parallel stationary plates, power absorbed in viscous flow in bearings (simple problems), Poiseuilli equcation for loss of head due to friction in pipes.

Module-5

Flow over bodies: Development of boundary layer, Lift and Drag, Flow around circular cylinders, spheres, aerofoils and flat plates, Streamlined and bluff bodies, boundary layer separation and its control.

Dimensional Analysis: Derived quantities, dimensions of physical quantities, dimensional homogeneity, Rayleigh method, Buckingham Pi-theorem, dimensionless numbers, similitude, types of similitude.

Compressible flows: Introduction, Thermodynamics realtions, Basic equcations of compressible flow, velocity sound or pressure wave in a fluid, match number

Course outcome (Course Skill Set)

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

1. Understand the basic principles of fluid mechanics and fluid kinematics
2. Acquire the basic knowledge of fluid dynamics and flow measuring instruments
3. Understand the nature of flow and flow over bodies and the dimensionless analysis
4. Acquire the compressible flow fundamental and basics of CFD packages and the need for CFD analysis.
5. Conduct basic experiments of fluid mechanics and understand the experimental uncertainties.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

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

Semester-End Examination:

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

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

Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. Fox, R. W., Pitchard,P. J.,and McDonald, A. T., (2010), Introduction to Fluid Mechanics, 7thEdition, John Wiley & Sons Inc.
2. Cimbala, J.M., Cengel, Y. A. (2010),Fluid Mechanics: Fundamentals and Applications, McGraw-Hill
3. Frank M White., (2016), Fluid Mechanics, 8thEdition , McGraw-Hill

Additional References:

1. A text book of Fluid Mechanics and Hydraulic Machines, Dr. R K Bansal, Laxmi publishers
2. Fundamentals of Fluid Mechanics, Munson, Young, Okiishi & Hebsch, John Wiley Publicationss, 7th Edition

Web links and Video Lectures (e-Resources):

1. https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-me22/
2. https://ocw.mit.edu/search/ocwsearch.htm?q=fluid%20mechanics
3. https://directory.doabooks.org/discover?query=Fluid+Mechanics&locale-attribute=en
4. http://elearning.vtu.ac.in/econtent/courses/video/CV/10CV35.html

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

- Quizzes
- Assignments
- Seminars

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TRACTOR & AUTOMOTIVE ENGINES		Semester	IV
Course Code	**BAG402**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	(3:0:2:0)	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 8-10 Lab slots	Total Marks	100
Credits	04	Exam Hours	03
Examination nature (SEE)	Theory		

Course Objectives:

- The objective of this subject is to impart the knowledge of tractor engine components, working principles of IC engines, auxiliary systems, the combustion aspects of SI and CI engines in addition to the methods of improving performance.
- The students shall become aware on the latest developments in the field of IC engines like MPFI, CRDI etc. The student also shall apply the thermodynamic concepts in IC engines.
- Basic understanding of fuel properties and its measurements using various types of measuring devices
- Energy conversion principles, analysis and understanding of I C Engines will be discussed.
- Application of these concepts for these machines will be demonstrated. Performance analysis will be carried out using characteristic curves.
- Exhaust emissions of I C Engines will be measured and compared with the standards.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teacher 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.

Module-1 **8 HOURS**

Introduction about design and development of Agril. Tractors

Introduction, different types of tractors available in india/abroad and its importance in agriculture. Selection of engines available in the market and their performance.

Farm power – Introduction, sources of farm power, merits and demerits of different forms of power, status of farm power in India. Conventional and non conventional energy sources, classification of tractor and I.C engines,

Module-2 **8 HOURS**

Study of I.C engine – Introduction, Thermodynamic cycle, Principle and working of IC engine. Comparison of 2-stroke and 4-stroke engine cycles and CI and SI engines. Engine components.

Study of Engine Valve systems, valve mechanism and Valve timing diagram. Study of importance of air cleaning system. Study of types of air cleaners and performance characteristics of various air cleaners.

Module-3 **8 HOURS**

Study of fuel supply system. Study of fuels, properties of fuels, calculation of air-fuel ratio. Study of tests on fuel for SI and CI engines. Study of detonation and knocking in IC engines. Study of carburetion system, carburetors and their main functional components.

Study of fuel injection system – Injection pump, their types, working principles. Fuel injector nozzles – their types and working principle. Fuel filter. (Simple problems)

Module-4 **8 HOURS**

Study of governor – Introduction, principle of governors, classification of governing system. Governor regulation and governor hunting

Study of lubrication system – Introduction, lubricating oil tests, types and functional components of governors. Study of lubricants – physical properties, additives and their application.

Study of cooling system – need, cooling methods and main functional components. Study of need and type of thermostat valves. Additives in the coolant.

Module-5	8 HOURS
Study of ignition system of SI engines – Introduction, types of iginition system and their components. Meassurement of engine power – Terminology connected with engine power (simple problems)	

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

Sl.NO	Experiments
1	Study of I.C. Engine parts and functions
2	Study of Working principle of Four stroke and Two stroke cycle I.C. Engine
3	Study of valve system and valve timing diagram
4	Determination of engine power
5	Study of Oil & Fuel system - determination of physical properties
6	Study of Air cleaning system
7	Study of Diesel injection system & timing
8	Study of Cooling system
9	Demonstration of working of governing system
10	Demonstration of working of Lubricating system
11	Demonstration of working of electrical and ignition system
12	Visit to engine manufacturer/ assembler/ spare parts agency. **(Optional)**

Course outcomes (Course Skill Set):

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

- Understand, discuss and describe the fundamentals and working of IC engine
- Apply their knowledge and identify the working mechanism of different components of IC engine.
- Analyse the problems in using right amount of fuel and lubricants for better efficiency and economy
- Evaluate and understand the heat engine balance of engine for maintaining at right temperature for different type of work
- Apply and understand ignition system and problems faced during starting of ignition system
- Apply and understand governing system and problems faced during running of governing system
- Perform experiments to determine the properties of fuels and oils.
- Conduct experiments on engines and draw characteristics.
- Test basic performance parameters of I.C. Engine and implement the knowledge in industry
- Identify exhaust emission, factors affecting them and exhibit his competency towards preventive maintenance of IC Engine

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

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

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

CIE for the practical component of the IPCC

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

SEE for IPCC

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks
   - **The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.**
   - The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.
   - SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

Suggested Learning Resources:

Books

1. Jagdishwar Sahay. 2015. Elements of Agricultural Engineering. Standard Publishers, New Delhi
2. Jain SC and CR Rai., 2008. Farm Tractor Maintenance and Repair. Standard Publishers, New Delhi
3. Jain, S.C., and Rai, C.R. (1984). Farm Tractor - Maintenance and Repair. Tata Mc Graw- Hill Publishing Company Ltd, New Delhi.
4. Liljedahl John, B., Casleton Walter, M., Turnquist Paul, K., and Smith David, W. (1951). Tractors and Their Power Units, . John Wiley & Sons, New-York.
5. Donnel Hunt. Farm Power Machinery and management. Iowa State University Press, Ames, USA.
6. Gill Paul, W., Smith James, H., and Ziurys Eugene, J. (1967). Fundamentals of Internal Combustion Engines. Oxford & IBE Publishing Company, New Delhi.
7. Gupta, R.B., and Gupta, B.K. (1987). Tractor Mechanic, Theory, Maintenance and Repair. Sathya Prakashan and Tech India Publications, New Delhi.
8. Mathur, M.L., and Sharma, R.P. (1994). A Course in Internal Combustion Engines. Danpat Rai & Sons, Delhi.
9. Gill Paul, W., Smith James, H., and Ziurys Eugene, J. (1967). Fundamentals of Internal Combustion Engines.

Oxford & IBE Publishing Company, New Delhi.
10. Gupta, R.B., and Gupta, B.K. (1987). Tractor Mechanic, Theory, Maintenance and Repair. Sathya Prakashan and Tech India Publications, New Delhi.
11. Jain, S.C., and Rai, C.R. (1984). Farm Tractor - Maintenance and Repair. Tata Mc Graw- Hill Publishing Company Ltd, New Delhi.
12. Nakra C.P., 2009. Farm Machines and Equipments. Dhanpat Rai Publishers, New Delhi
13. Neil Southorn, Tractors, 1995. Operation, Performance and Maintenance, Inkata Press Australia.

Web links and Video Lectures (e-Resources):

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

- Quizzes
- Assignments
- Seminars

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AGRICULTURAL PROCESS ENGINEERING			
Course Code	BAG403	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	(4:0:0:0)	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 8-10 Lab slots	Total Marks	100
Credits	04	Exam Hours	03
Examination nature (SEE)	Theory		

Course Objectives:

- To train the students on unit operations of agricultural process engineering
- To acquaint with the engineering properties of agricultural materials
- Enable the students to understand the concepts of cleaning of cereals, size reduction and rice milling

Teaching-Learning Process (General Instructions)

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

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**

Physical characteristics of different food grains: fruits and vegetables – importance, Shape and size – criteria for describing shape and size, Roundness and sphericity – Volume and density – Specific gravity – Bulk density Porosity – surface area.

Rheology – basic concepts, ASTM standard definition of terms, Rheological Properties – Force deformation behavior, stress and strain behavior, Visco elasticity – time effects, Rheological models - Kelvin and Maxwell models, electrical equivalence of mechanical models.

Module-2 **8 HOURS**

Frictional Properties: Friction in agricultural materials – measurement – rolling resistance – angle of internal friction and angle of repose, Aerodynamics of agricultural products – drag coefficient and terminal velocity.

Electrical properties – Di electrical properties, Thermal Properties – specific heat – thermal conductivity-thermal diffusivity. Application of engineering properties in handling and processing equipment.

Module-3 **8 HOURS**

Theory of separation: Types of separators, Cyclone separators, Size of screens applications, Separator based on length, width and shape of the grains, specific gravity, density, Air-screen grain cleaner principle and types, Design considerations of air screen grain cleaners, Sieve analysis-particle size determination, Ideal screen and actual screen– effectiveness of separation and related problems, Pneumatic separator, Cleaning and separation equipment's.

Module-4 **8 HOURS**

Scope and importance of crop processing: Principles and methods of food processing- cleaning and grading of cereals, Size reduction –principle of comminution/ size reduction, mechanisms of comminution of food, particle shape, average particle size, Characteristics of comminuted products, crushing efficiency, Determination and designation of the fineness of ground material, screen analysis, Empirical relationships (Rittinger_s, Kick_s and Bond_s equations), Work index, energy utilization, Size reduction equipment – Principal types, crushers (jaw crushers, gyratory, smooth roll), Hammer mills, Attrition mills, Burr mill, Tumbling mills, Action in tumbling mills, Size reduction equipment –Ultra fine grinders (classification hammer mills, colloid mill), Cutting machines.

Module-5 **8 HOURS**

Milling - Rice milling: Principles and equipments, Paddy parboiling methods and equipment, Wheat milling, Milling of Pulses, wet millig, dry milling and milling efficiency. Theory of filtration, Rate of filtration, Applications, Constant rate filtration and Constant–pressure filtration derivation of equation, Filtration equipment, Plate and frame filter press, Rotary filters and tubular filters.

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

Sl.NO	Experiments
1	Preparation of flow charts and layout of a food processing plant
2	Mixing index and study of mixers
3	Determination of fineness modulus and uniformity index
4	Determination of mixing index of a feed mixer
5	Determination of the efficiency of cyclone separator
6	Tutorial on use of psychometric chart
7	Tutorial on power requirement in size reduction of grain using Ratzinger's law, Kicks law and Bond's law
8	Performance evaluation of hammer mill and attribution mill.
9	Separation behaviour in pneumatic separation

Course outcomes (Course Skill Set):

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

- Be proficient in the scope of the process engineering and the use of processing machinery
- Understand the physical properties, rheological properties and frictional properties of agricultural materials
- Summarising the thermal properties, electrical properties and the terms related to the machine design aspects
- Some of the basic concepts related to cleaning and size reduction equipments
- To acquaint the students with the milling of rice, parboiling technologies and milling of pulses and oil seeds
- Understand the filtration equipments

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

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

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

CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous

evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.

- The laboratory test **(duration 02/03 hours)** after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks.**
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks.**
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

SEE for IPCC

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

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

- **The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.**
- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

Suggested Learning Resources:

Books

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

Web links and Video Lectures (e-Resources):

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

- Quizzes
- Assignments
- Seminars

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MACHINE DRAWING AND GD & T		Semester	IV
Course Code	BAGL404	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2*:0	SEE Marks	50
Credits	01	Exam Hours	03
Examination nature (SEE)	Practical		
* One additional hour may be considered wherever required			

Course objectives:

- To acquire the knowledge of limits, tolerance and fits and indicate them on machine drawings.
- To make drawings using orthographic projections and sectional views
- To impart knowledge of thread forms, fasteners, keys, joints, couplings and clutches.
- To understand and interpret drawings of machine components leading to preparation of assembly drawings manually and using CAD packages.

Module 1 (only for CIE) **01 Sessions**

Review of basic concepts of Engineering Visualization

Geometrical Dimensioning and Tolerances (GD&T): Introduction, Fundamental tolerances, Deviations, Methods of placing limit dimensions, machining symbols, types of fits with symbols and applications, geometrical tolerances on drawings. Standards followed in industry.

Module 2 (only for CIE) **02 Sessions**

Sections of Simple and hollow solids: True shape of sections.

Module 3 (only for CIE) **03 Sessions**

Thread Forms: Thread terminology, sectional views of threads. ISO Metric (Internal & External), BSW (Internal & External) square and Acme. Sellers thread, American Standard thread, Helicoil thread inserts

Fasteners: Hexagonal headed bolt and nut with washer (assembly), square headed bolt and nut with washer (assembly), simple assembly using stud bolts with nut and lock nut. Flanged nut, slotted nut, taper and split pin for locking, countersunk head screw, grub screw, Allen screw

Rivets Keys: Parallel key, Taper key, Feather key, Gib-head key and Woodruff key.

Module 4 **03 Sessions**

Assembly of Joints, couplings and clutches (with GD&T) using 2D environment

Joints: Like Cotter joint (socket and spigot), knuckle joint (pin joint).

Couplings: Like flanged coupling, universal coupling

Module 5 **05 Sessions**

Assembly of Machine Components (with GD&T) using 3D environment

(Part drawings shall be given)

1. Bearings
2. Valves
3. Safety Valves
4. I.C. Engine components
5. Lifting devices
6. Machine tool components
7. Pumps

Course outcomes (Course Skill Set):

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

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

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

CO3: Illustrate various machine components through drawings

CO4: Create assembly drawings as per the conventions.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks) and that for SEE minimum passing mark is 35% of the maximum marks (18 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation (CIE):

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

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

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

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

Semester End Evaluation (SEE):

SEE marks for the practical course is 50 Marks.

- The duration of SEE is 03 hours. **Questions shall be set worth of 3 hours**
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University.
- SEE shall be conducted and evaluated for maximum marks 100. Marks obtained shall be accounted for SEE final marks, reducing it to 50 marks.
- Question paper shall be set jointly by both examiners and made available for each batch as per schedule. **Questions are to be set preferably from Text Books.**
- Evaluation shall be carried jointly by both the examiners.
- Scheme of Evaluation: *To be defined by the examiners jointly and the same shall be submitted to the university along with question paper.*
- One full question shall be set from Modules 3 and 4 as per the below tabled weightage details. ***However, the student may be awarded full marks, if he/she completes solution on computer display without sketch.***

Suggested Learning Resources:

Books:

- K L Narayana, P Kannaiah, K Venkata Reddy, "Machine Drawing", New Age International, 3rd Edition. ISBN-13: 978-81-224-2518-5, 2006
- N D Bhatt , "Machine Drawing", Charotar Publishing House Pvt. Ltd.,50th Edition, ISBN-13: 978-9385039232, 2014

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TRACTOR SYSTEMS AND CONTROLS		Semester	IV
Course Code	BAG405A	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
Examination nature (SEE)	Theory		

Course objectives:

The course will enable the students to

- Acquire a basic understanding the concepts of transmission system in a tractor, major functional systems, Gearing theory, principle of operation, gear box types, functional requirements.
- Understand the study of brake system, familiarization with the hydraulic system adjustments and Study of tractor mechanics.

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 type of teaching methods to develop the outcomes through Power-Point Presentation and Video demonstration or Simulations.
2. Chalk and Talk method for Problem Solving.
3. Arrange visits to show the live working models other than laboratory topics.
4. Adopt collaborative (Group Learning) Learning in the class.
5. Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information.
6. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills.

Module-1

Study of need for transmission system in a tractor. Transmission system – types, major functional systems. Study of clutch – need, types, functional requirements, construction and principle of operation. Familiarization with single plate, multi-plate, centrifugal and dual clutch systems.

Module-2

Study of Gear Box – Gearing theory, principle of operation, gear box types, functional requirements, and calculation for speed ratio. Study of differential system – need, functional components, construction, calculation for speed reduction. Study of need for a final drive.

Module-3

Study of Brake system – types, principle of operation, construction, calculation for braking torque. Study of steering system – requirements, steering geometry characteristics, functional components, calculation for turning radius. Familiarization with Ackerman steering. Steering systems in track type tractors. Study of Hydraulic system in a tractor – Principle of operation, types, main functional components, functional requirements.

Module-4

Familiarization with system the Hydraulic adjustments and ADDC. Study of tractor power outlets – PTO. PTO standards, types and functional requirements. Introduction to traction. Traction terminology. Theoretical calculation of shear force and rolling resistance on traction device. Study of wheels and tyres – Solid tyres and pneumatic tyres, tyre construction and tyre specifications. Study of traction aids.

Module-5

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

Course outcome (Course Skill Set)

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

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

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

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

Semester-End Examination:

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

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

Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Text Books

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

Reference Books:

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

Web links and Video Lectures (e-Resources):

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

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- Seminars

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Introduction to Data Analytics		Semester	IV
Course Code	BAGL456C	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Total Hours of Pedagogy	14 sessions	Total Marks	100
Credits	01	Exam Hours	03
Examination nature (SEE)	Practical		

Course objectives:

- Gather sufficient relevant data, conduct data analytics using scientific methods, and make appropriate and powerful connections between quantitative analysis and real-world problems.
- Demonstrate a sophisticated understanding of the concepts and methods; know the exact scopes and possible limitations of each method; and show capability of using data analytics skills to provide constructive guidance in decision making.
- Use advanced techniques to conduct thorough and insightful analysis, and interpret the results correctly with detailed and useful information.
- Show substantial understanding of the real problems; conduct deep data analytics using correct methods; and draw reasonable conclusions with sufficient explanation and elaboration.
- Write an insightful and well-organized report for a real-world case study, including thoughtful and convincing details.
- Make better business decisions by using advanced techniques in data analytics.

Sl.NO	Experiments
1	Data Analytics Overview
2	Importance of Data Analytics
3	Types of Data Analytics
4	Descriptive Analytics
5	Diagnostic Analytics
6	Predictive Analytics
7	Prescriptive Analytics
8	Benefits of Data Analytics
	Demonstration Experiments (For CIE)
9	Data Visualization for Decision Making
10	Data Types, Measure Of central tendency, Measures of Dispersion
11	Graphical Techniques, Skewness & Kurtosis, Box Plot
12	Descriptive Stats and Sampling Funnel, Sampling Variation, Central Limit Theorem, Confidence interval

Course outcomes (Course Skill Set):

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

1. Student will understand what data are, how they are collected, the role of metadata in understanding a given set of data, and how to assess the quality/reliability of data.
2. Student will have intermediate proficiency in the acquisition and organization of data.
3. Students will demonstrate intermediate proficiency in the visualization of data to communicate information and patterns that exist in the data.
4. Students will be able to use at beginning level of proficiency the tools of statistics and machine learning to ask questions of and explore patterns in data.
5. For a given exploration of data, students will be able to communicate both in writing and verbally the limitations of data, the methods of acquisition, the interpretation of visualized data, and the results of statistical analysis.
6. In the context of data analysis, students will be able to reflect on the ethics of the questions asked of data, the methods of acquiring the data, the mode of data analysis/visualization, and the rhetoric used in communicating findings with data.