HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution, Affiliated to Anna University, Chennai
Approved by AICTE, New Delhi & Accredited by NAAC with 'A' Grade)
Coimbatore – 641 032

B.E. AGRICULTURE ENGINEERING

HINDUSTHAN EDUCATIONAL AND CHARITABLE TRUST

HICET

Curriculum & Syllabus

2018-2019

CHOICE BASED CREDIT SYSTEM

VISION AND MISSION OF THE INSTITUTION

VISION

To become a premier institution by producing professionals with strong technical knowledge, innovative research skills and high ethical values.

MISSION

1M1: To provide academic excellence in technical education through novel teaching methods.

1M2: To empower students with creative skills and leadership qualities.

1M3: To produce dedicated professionals with social responsibility.

VISION AND MISSION OF THE DEPARTMENT

VISION

To become a department of excellence in agricultural engineering by producing socially conscious professionals with good technical knowledge and innovative skill sets.

MISSION

MI: To impart strong technical knowledge in agricultural engineering through conducive learning environment.

M2: To empower students with innovative skill sets to address agricultural issues.

M3: To produce socially responsible agricultural professionals and provide sustainable solutions

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PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2. Problem analysis: Identify, formulate, review research literature, and analyze complex engmeenng problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineenng SCIences.

PO 3. Design/development o f solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modem engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

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PO 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engmeenng practice.

PO 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

POIO. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO l l Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

POI2.Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long leamin in the broadest context of tech

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PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1. Ability to understand agricultural scenario in World and India and superimpose agricultural engineering technologies for uplifting the agriculture.

PSO 2. Ability to solve various issues in agriculture by infusing farm mechanization, conservation strategies for soil, water and renewable energy, advanced irrigation techniques and post harvest technology.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1. Graduates shall exhibit their sound theoretical, practical skills and knowledge for being a successful professional.

PEO 2. Graduates shall be creative with leadership qualities and lifelong learning skills.

PEO 3. Graduates shall hold high ethical values and be able to devise sustainable solutions to address agricultural issue.

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DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS

CBCS PATTERN

UNDERGRADUATE PROGRAMMES

B.E. AGRICULTURE ENGINEERING

REGULATION-2016

For the students admitted during the academic year 2018-2019 and onwards

SEMESTER I

Sl.No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	16HE1101R	Essential English for Engineers - I	HS	3	1	0	4	25	75	100
2	16MA1101	Engineering Mathematics I Matrices and Calculus	BS	3	1	0	4	25	75	100
3	16PH1101	Engineering Physics	BS	3	0	0	3	25	75	100
4	16CY1101	Engineering Chemistry	BS	3	0	0	3	25	75	100
5	16GE1102	Engineering Graphics	ES	2	0	4	4	25	75	100
6	16GE1103	Problem Solving and Python Programming	ES	3	0	0	3	25	75	100
PRACTICAL										
7	16PS1001	Physical Sciences Lab-I	BS	0	0	2	1	50	50	100
8	16GE1004	Problem Solving and Python Programming Lab	ES	0	0	4	2	50	50	100
9	16GE1002	Engineering Practices Laboratory	ES	0	0	4	2	50	50	100
10	16GE1003	Value Added Course I: Language competency enhancement course - I	HS	0	0	2	1	0	100	100
			Total	**17**	**2**	**16**	**27**	**300**	**700**	**1000**

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SEMESTER II

Sl.No	Course Code	Course Title	Category	L	T	P	C	CIA	ESE	TOTAL
THEORY										
1	16HE2102R	Essential English for Engineers – II	HS	3	1	0	4	25	75	100
2	16MA2102	Engineering Mathematics-II (Vector Calculus, Complex Variables and Laplace Transforms)	BS	3	1	0	4	25	75	100
3	16CY2102	Environmental Sciences	BS	3	0	0	3	25	75	100
4	16EE2202	Basics of Electrical and Electronics Engineering	ES	3	0	0	3	25	75	100
5	16GE2101	Engineering Mechanics	ES	3	1	0	4	25	75	100
6	16AG2201	Principles and Practices of Crop Production	PC	3	0	0	3	25	75	100
PRACTICAL										
7	16PS2001	Physical Sciences Lab - II	BS	0	0	2	1	50	50	100
8	16AG2001	Crop Husbandry Laboratory	PC	0	0	4	2	50	50	100
9	16GE2001	Value Added Course – II: Language Competency Enhancement Course-II	HS	0	0	2	1	0	100	100
			Total	**18**	**3**	**8**	**25**	**250**	**650**	**900**

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Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	27	25	25	23	19	24	28	16	187

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SYLLABUS

SEMESTER I

Programme	Course code	Name of the course	L	T	P	C
B.E.	16HE1101R	ESSENTIAL ENGLISH FOR ENGINEERS – I	3	1	0	4

COURSE OBJECTIVES

- It fulfills the necessary skills needed in today's global workplaces.
- Student will be able to interpret and illustrate formal communication.
- It empowers students in choosing right lexical techniques for effective presentation
- It equips the learner to analyze and list out things in logical order
- The learner develops the ability to create and integrate ideas in a professional way.

UNIT	DESCRIPTION	Instructional Hours
I	Getting to know people – Introduction – Talking about jobs (Present Simple) – Talking about working conditions(Adverb of Frequency) - Talking about company history and structure (Past simple, Prepositions of Time) – Talking about company activities (Connectors of addition and contrast, Present Continuous) – Focus on language – Parts of Speech – Gerund and Infinitives – Instruction-General Vocabulary.	12
II	Vocabulary practice – (Telephoning Leaving and taking messages) – requests and obligation – Describing trends (Adjectives and Adverbs) – Talking about company performance (present perfect and past simple, Reasons and consequences) – Reading Test Practice Describing products Dimensions, (Comparatives and Superlatives, Question formation) – Talking about product development (Sequencing words, Present continuous and going to) – Articles – Prepositions- Synonyms – Antonyms-Recommendations-Interpretation of a chart.	12
III	Talking about business equipment (Giving Instruction) – Letter Phrases- Writing Test Practice- Talking about facilities(Asking for and giving direction)- Presentation on a general topic -Talking about traffic and transport(making predictions)-Discussion on current affairs– Tenses- Present –Past-Future-Forms of verbs- Word techniques-Formation-Prefixes-Suffixes.	12
IV	Talking about conference arrangement(checking and confirming) – Talking about a conference before, after, when, until etc. – Listening Test Practice- talking about production process – passive- Talking about quality control Conditional 1 (real) (Making suggestions) – Itinery- Jumbled sentences- Paragraph writing- Essay writing – Checklist- Letter to Inviting Dignitaries – Accepting invitation- Declining Invitation.	12
V	Talking about call centers, insurance and changes in working practices (future possibility/probability)- Talking about banking- Speaking Test practice – Talking about delivery services (preposition of Time)- Talking about trading (Tense review)-Talking about recruitment conditional 2 (hypothetical) – talking about job applications (indirect questions) – Reading, Writing and Listening Test – Job application Letter and Resume Writing- Permission letters.	12
	Total Instructional Hours	**60**

COURSE OUTCOMES

CO1: Recognize different parts of speech for better usage.
CO2: Interpret and illustrate formal communication
CO3: Choosing right lexical techniques for effective presentation.
CO4: Analyze and list out things in logical order.
CO5: Create and integrate ideas in a professional way.

TEXT BOOKS:

T1 Norman Whitby, "Cambridge English Business BENCHMARK Pre-intermediate to Intermediate", 2nd Edition. 2014.

T2 Ian Wood and Anne Willams. "Pass Cambridge BEC Preliminary", Cengage Learning press, 2013.

REFERENCE :

R1 Meenakshi Raman and Sangeetha Sharma, "Technical Communication-Principles and Practice", Oxford University Press, 2009.

R2 Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi. 2005.

R3 Kamalesh Sadanan "A Foundation Course for the Speakers of Tamil-Part-I &II", Orient Blackswan, 2010.

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Programme	Course code	Name of the course	L	T	P	C
B.E.	16PH1101	ENGINEERING PHYSICS	3	0	0	3

COURSE OBJECTIVES

Illustrate the fundamental knowledge in mechanical properties of matter and thermal physics.
Gain knowledge about laser and their applications.
Conversant with principles of optical fiber, types and applications of optical fiber.
Discuss the architectural acoustics and applications of Ultrasonics.
Extend dual nature of matter and the Necessity of quantum mechanics to explore the behavior of sub atomic particles.

UNIT	DESCRIPTION	Instructional Hours
I	**PROPERTIES OF MATTER AND THERMAL PHYSICS** Elasticity – Hooke's law – Stress-strain diagram - Relation between three modulii of elasticity (qualitative) — Poisson's ratio – Bending moment – Depression of a cantilever – Derivation of Young's modulus of the material of the beam by Uniform bending – I-shaped girder. Modes of heat transfer – Thermal conductivity – Newton's law of cooling - Lee are disc method - Conduction through compound media (series and parallel).	9
II	**LASER AND APPLICATIONS** Spontaneous emission and stimulated emission - Population inversion – Pumping methods – Derivation of Einstein's coefficients (A&B) – Types of lasers – Nd:YAG laser, CO2 laser, Semiconductor lasers:(homojunction and heterojunction) – Laser Applications – Industrial applications: laser welding, laser cutting, laser drilling – Holography – Construction and reconstruction of images.	9
III	**FIBER OPTICS AND APPLICATIONS** Principle and propagation of light through optical fibers – Derivation of numerical aperture and acceptance angle – Classification of optical fibers (based on refractive index, modes and materials) – Crucible-crucible technique for fiber fabrication – Sources (LED and LASER) and detectors (p-i-n photodiode and avalanche photodiode) for fiber optics - Fiber optical communication link –Fiber optic sensors – Temperature and displacement sensors.	9
IV	**ACOUSTICS AND ULTRASONICS** Classification of sound – Weber–Fechner law – Sabine's formula (no derivation) - Absorption coefficient and its determination –Factors affecting acoustics of buildings and their remedies. Ultrasonic Production – Magnetostrictive generator – Piezoelectric generator – Determination of velocity using acoustic grating – Non destructive testing – Ultrasonic pulse echo system.	9
V	**QUANTUM PHYSICS AND APPLICATIONS** Black body radiation – Planck's theory (derivation) –Compton effect experimental verification only - Matter waves – Physical significance of wave function – Schroedinger's wave equations – Time independent and time dependent wave equations –Particle in a box (One dimensional) – Scanning electron microscope – Transmission electron microscope.	9
	Total Instructional Hours	**45**

COURSE OUTCOMES

CO1: Enhance the fundamental knowledge in Properties of Matter and Thermal Physics.
CO2: Understand the advanced technology of LASER in the field of Engineering and medicine.
CO3: Exposed the fundamental knowledge of Optical fiber in the field of communication Engineering.
CO4: Understand the production of ultrasonics and its applications in NDT.
CO5: Impart the fundamental knowledge on Quantum Physics.

TEXT BOOKS:

T1 Rajendran V, "Applied Physics", Tata McGraw Hill Publishing Company Limited, New Delhi, 2011.

T2 Gaur R.K. and Gupta S.L., "Engineering Physics", 8th edition, Dhanpat Rai Publications(P) Ltd., New Delhi, 2013.

REFERENCE:

R1 Arthur Beiser, "Concepts of Modern Physics", Tata McGraw Hill, New Delhi – 2010.

R2 M.N Avadhanulu and PG Kshirsagar, "A Text Book of Engineering physics", S. Chand and Company Ltd., New Delhi 2014.

R3 Dr. G. Senthilkumar, "Engineering Physics – I", VRB publishers Pvt Ltd., 2013.

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TEXT BOOKS:

T1 P.C.Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub, Co., New Delhi, 2015.

T2 O.G.Palanna, "Engineering chemistry", McGraw Hill Education India , 2017.

REFERENCE :

R1 B.Sivasankar, "Engineering Chemistry" , Tata McGraw-Hill Picoult., New Delhi, 2008.

R2 B.K.Sharma, "Engineering Chemistry", Krishna Prakasan Media (P) Ltd., Meerut , 2005.

R3 S.S.Dara ,"A Text book of Engineering Chemistry", S.Chand & Co.Ltd., New Delhi,2010.

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Programme	Course code	Name of the course	L	T	P	C
B.E.	16GE1102	ENGINEERING GRAPHICS (FOR AERO, AUTO, CIVIL, MECH, MECTS, AGRI, BIO MED, & FOOD TECH)	2	0	4	4

COURSE OBJECTIVES

- To provide drafting skills for communicating the Engineering concepts and ideas.
- To expose to BIS and International standards related to engineering drawings

UNIT	DESCRIPTION	Instructional Hours
I	**PLANE CURVES** Importance of engineering drawing, drafting instruments, drawing sheets – layout and folding, Lettering and dimensioning, BIS standards and scales. Geometrical constructions, Construction of ellipse, parabola and Hyperbola by eccentricity method, construction of cycloids and involutes of square and circle – Drawing of tangents and normal to the above curves.	15
II	**PROJECTIONS OF POINTS, LINES AND PLANE SURFACES** Introduction to Orthographic projections- Projection of points. Projection of straight lines inclined to both the planes, Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to both the planes by rotating object method (First angle projections only).	15
III	**PROJECTIONS OF SOLIDS** Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is perpendicular and inclined to one plane and objects inclined to both the planes by rotating object method.	15
IV	**SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES** Sectioning of simple solids with their axis in vertical position when the cutting plane is inclined to one of the principle planes and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids, cylinder and cone. Development of lateral surfaces of truncated solids. Intersection of solids-cylinder vs cylinder.	15
V	**ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS** Isometric views and projections of simple and truncated solids such as - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions. Free hand sketching of multiple views from a pictorial drawing. Perspective projection of solids in simple position using visual ray method.	15
	TOTAL INSTRUCTIONAL HOURS	**75**

COURSE OUTCOMES

After learning the course, the students should be able to

CO1: To know the Importance of engineering drawing, BIS standards and scales.

CO2 Interpret engineering drawings using fundamental technical mathematics

CO3: Understand about simple solids with their axis and intersection of solids

CO4: Draw the orthographic and isometric views of regular solid objects including sectional views.

CO5: To improve their technical communication skill in the form of communicative drawings.

TEXT BOOKS:

T1 K.Venugopal, V.Prabu Raja, "Engineering Drawing, AutoCAD, Building Drawings", 5th Edition New Age International Publishers, New delhi, 2016.

T2 K.V.Natarajan, "A textbook of Engineering Graphics", Dhanalaksmi Publishers, Chennai, 2016.

REFERENCE :

R1 BasantAgrawal and C.M.Agrawal, "Engineering Drawing", Tata McGraw Hill Publishing Company Limited., New Delhi,2008.

R2 K. R. Gopalakrishnan, "Engineering Drawing" (Vol. I & II), Subhas Publications, Bangalore, 1998.

R3 M.B.Shah and B.C.Rana, "Engineering Drawing", Pearson Education, India, 2005.

R4 N.S. Parthasarathy, Vela Murali, "Engineering Drawing", Oxford University press, India 2015.

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Programme	Course code	Name of the course	L	T	P	C
B.E.	16GE1103	PROBLEM SOLVING AND PYTHON PROGRAMMING (COMMON TO ALL BRANCHES)	3	0	0	3

COURSE OBJECTIVES

- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures – lists, tuples, dictionaries.

UNIT	DESCRIPTION	Instructional Hours
I	**ALGORITHMIC PROBLEM SOLVING** Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudocode, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: To find the greatest among three numbers, prime numbers, find minimum in a list, Towers of Hanoi.	9
II	**DATA, EXPRESSIONS, STATEMENTS** Python interpreter and interactive mode; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, compute Simple interest for a given amount, Factorial of a given number ,distance between two points.	9
III	**CONTROL FLOW, FUNCTIONS** Conditionals: Boolean values and operators, conditional (if), alternative (if -else), chained conditional (if –elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.	9
IV	**LISTS, TUPLES, DICTIONARIES** Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing -list comprehension; Illustrative programs: selection sort, insertion sort, histogram.	9
V	**FILES, MODULES, PACKAGES** Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.	9
	TOTAL INSTRUCTIONAL HOURS	**45**

COURSE OUTCOMES

Upon completion of the course, students will be able to
CO1: Develop algorithmic solutions to simple computational problems
CO2: Structure simple Python programs for solving problems.
CO3: Decompose a Python program into functions.
CO4: Represent compound data using Python lists, tuples, dictionaries.
CO5: Read and write data from/to files in Python Programs.

TEXT BOOKS:

T1 Ashok Namdev Kamthane , Amit Ashok Kamthane , " Programming and Problem solving with Python", Mc Graw Hill Education., Chennai, 2018.

T2 Sheetal Taneja, "Python Programming A Modular Approach With Graphics, Database, Mobile and Web Applications", PEARSON., 2017.

REFERENCE :

R1 Reema Thareja, "Python Programming Using Problem Solvimg Approach", OXFORD UNIVERSITY., First edition., 2017.

R2 E.Balagurusamy, "Problem solving and Python Programming", Mc Graw Hill Education., First edition., 2017.

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Programme	Course code	Name of the course	L	T	P	C
B.E.	16PS1001	PHYSICAL SCIENCES LAB-I (COMMON TO ALL BRANCHES)	0	0	2	1

COURSE OBJECTIVES

1. Evaluate the particle size of micro particles and acceptance angle of fibres.
2. Employ instrumental method to determine Young's modulus of a beam of metals.
3. Apply the concept of diffraction and getting ability to calculate the wavelength of the mercury spectrum

Expt. No.	Description of the Experiments
1.	Determination of Wavelength, and particle size using Laser
2.	Determination of acceptance angle and numerical aperature in an optical fiber.
3.	Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
4.	Determination of wavelength of mercury spectrum – spectrometer grating
5.	Determination of thermal conductivity of a bad conductor – Lee's Disc method
6.	Determination of Young's modulus by Non uniform bending method
7.	Determination of specific resistance of a given coil of wire – Carey Foster's Bridge.
8.	Post office box Measurement of an unknown resistance
TOTAL PRACTICAL HOURS	**30**

COURSE OUTCOMES

After learning the course, the students should be able to
CO1: Point out the particle size of micro particles and acceptance angle of fibres using diode laser.
CO2: Assess the Young's modulus of a beam using non uniform bending methods.
CO3: Illustrate the concept of diffraction and getting ability to calculate the wavelength of the mercury spectrum Using spectrometer.
CO4: Identify the velocity of ultrasonic in the given liquid.
CO5: Illustrate phenomena of thermal conductivity of a bad conductor.

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Programme	Course code	Name of the course	L	T	P	C
B.E.	16GE1004	PROBLEM SOLVING AND PYTHON PROGRAMMING LAB	0	0	4	2

COURSE OBJECTIVES

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python

Ex. No.	Description	Total Instructional Hours
1.	Compute the GCD of two numbers.	3
2.	Find the square root of a number	3
3.	Exponentiation (power of a number)	3
4.	Find the factorial of a given number	3
5.	Print prime numbers from 1 to n numbers	3
6.	Find the maximum of a list of numbers	3
7.	Linear search, Binary search	3
8.	Selection sort, Insertion sort	3
9.	First n prime numbers	3
10	Multiply matrices	3
11	Programs that take command line arguments (word count)	3
12	Find the most frequent words in a text read from a file	3
13	Simulate bouncing ball using Pygame	3
	TOTAL INSTRCTIONAL HOURS	**45**

PLATFORM NEEDED: Python 3 interpreter for Windows/Linux

COURSE OUTCOMES

CO1: Write, test, and debug simple Python programs.
CO2: Implement Python programs with conditionals and loops.
CO3: Develop Python programs step-wise by defining functions and calling them.
CO4: Use Python lists, tuples, dictionaries for representing compound data.
CO5: Read and write data from/to files in Python

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Programme	Course code	Name of the course	L	T	P	C
B.E.	16GE1002	ENGINEERING PRACTICES LABORATORY (COMMON TO ALL BRANCHES)	0	0	4	2

COURSE OBJECTIVES To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

Expt. No.	Description of the Experiments	Instructional Hours
I CIVIL ENGINEERING PRACTICE		
Study of plumbing and carpentry components of Residential and Industrial buildings.		
(A) PLUMBING WORKS:		
1	Study on pipe joints, its location and functions: Valves, taps, couplings, unions, reducers, elbows in household fittings.	
2	Study of pipe connection requirements for pumps.	
3	Preparation of plumbing line sketches for water supply and sewage works.	
	Hands-on-exercise:	14
4	Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.	
5	Demonstration of plumbing requirements of high-rise buildings.	
(B) CARPENTRY USING POWER TOOLS ONLY:		
1	Study of the joints in roofs, doors, windows and furniture.	
2	Hands-on-exercise in wood works by sawing, planning and cutting.	
II MECHANICAL ENGINEERING		
(A) Welding:		
1	Preparation of arc welding of Butt joints, Lap joints and Tee joints	
(B) Machining:		
1	Practice on Simple step turning and taper turning	
2	Practice on Drilling Practice	
(C) Sheet Metal Work:		
1	Practice on Models– Trays, cone and cylinder.	31
DEMONSTRATION		
(D) Smithy		
1	Smithy operations: Upsetting, swaging, setting down and bending. Demonstration of – Production of hexagonal headed bolt.	
(E)Gas welding		
(F) Foundry Tools and operations.		
	TOTAL INSTRCTIONAL HOURS	**45**

COURSE OUTCOMES

After learning the course, the students should be able to

CO1: To apply the knowledge of pipeline connections in household fittings and industrial buildings.

CO2: Prepare the different joints in roofs, doors, windows and furniture

CO3: Perform step turning operation in a lathe.

CO4: Understand the various welding processes and know about its applications.

CO5: Understand the foundry Tools and its operation

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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16GE1003	VALUE ADDED COURSE I: LANGUAGE COMPETENCY ENHANCEMENT COURSE- I (COMMON TO ALL BRANCHES)	0	0	2	1

Course Objective

- ✓ To enhance student language competency
- ✓ To identify individual students level of communication skills
- ✓ To develop English Vocabulary and spoken communication skills.
- ✓ To revive the fundamentals of English Grammar.

Unit	Description	Instructional Hours
I	**Listening** Language of Communication- English listening- Hearing Vs Listening- Verbal and Non-verbal communication – Listening strategies-Sounds of English.	3
III	**Reading** English Language Enhancement – Indianism in English – Role of Reading in effective communication – Techniques for good reading (skimming and scanning) Reading articles from newspaper, magazine. Reading and interpreting a passage.	3
III	**Speaking** Common errors in Pronunciation – Signposts in English (Role play) – Public Speaking skills – Social Phobia – Eliminating fear – Common etiquette of speaking - Debate and Discuss.	3
IV	**Writing** Writing genre – Enhancement of basic English Vocabulary; Parts of Speech, Noun, Verbs, and Tenses – combining sentences, sentence formation and completion.	3
V	**Art of Communication** Communication process – Word building and roleplay – Exercise on English Language for various situations through online and offline activities.	3
	Total Instructional Hours	**15**

Course Outcome

CO1- Trained to maintain coherence and communicate effectively.
CO2- Practiced to create and interpret descriptive communication.
CO3- Introduced to gain information of the professional world.
CO4- acquired various types of communication and etiquette.
CO5- Taught to improve interpersonal and intrapersonal skills.

REFERENCE BOOKS :

1. Verbal Ability and Reading Comprehension by Arun Sharma,9th edition,Tata Mc graw Hill
2. Word Power Made Easy by Norman Lewis,– Print, 1 June 2011.
3. High School English Grammar by Wren and Martin,S.CHAND Publications, 1 January 2017.
4. Practical course in Spoken English by J.K. Gangal,PHI Learning , Second edition, 1 January 2018.

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SEMESTER II

Programme	Course code	Name of the course	L	T	P	C
B.E.	16HE2102R	ESSENTIAL ENGLISH FOR ENGINEERS – II	3	1	0	4

COURSE OBJECTIVES

- ✓ The learner will be introduced to global corporate culture and professional communication.
- ✓ It helps the students to focus on organizing professional event and documentation.
- ✓ The student will be able to describe the events and process in an effective way.
- ✓ It trains the student to analyze the problems and to find solution to it.
- ✓ The learner will be familiar with business communication.

UNIT	DESCRIPTION	Instructional Hours
I	Introduction- talking about teamwork- Making arrangements- Improving Communication in spoken language – Taking and leaving Voice mail messages (present Tense, Past Tense and Present Perfect) Talking about Business Hotel- (Speaking Activity) Talking about Corporate Hospitality- Formal and Informal Language – Making accepting and declining invitations (Auxiliary Verb, Countable or Uncountable Nouns) – Focus on Language – Definitions and Extended Definitions- **Reading comprehension.**	12
II	Talking about orders – Clarity Written Language – Phone and Letter Phrases – Talking about Company Finances – Conditional 1 and 2 – Managing Cash Flow (Intention and Arrangements Conditional 1 and 2) – Talking about Brands and Marketing – Ethical Banking- Talking about Public Relations – Organizing a PR Event – Describing Duties and Responsibilities – (Future Tense and Articles) – Reported Speech – Modal Verbs and Passive, Impersonal Passive Voice-**interpretation of posters or advertisements.**	12
III	Talking about relocation – Report Phrases – Talking about Similarity and difference- Giving Directions- Asking for Information and Making Suggestions – Talking about Location (Comparatives and Superlatives, Participles) – Talking about Company Performances- Describing Trends – Describing Cause and Effect – Talking about Environmental Impact – Discussing Green Issues – Language of Presentations (Adjectives and Adverbs, Determiners)- Homophones – Homonyms- Acronyms- Abbreviations- British and American words.	12
IV	Talking about Health and Safety – Expressing Obligation- Discussing Regulations- Talking about personnel Problems – Passives – Talking about Problem at Work (modal Verbs, Passives)- Talking about Expenses Claims- Talking about Air Travel (Relative Pronoun, Indirect Questions) – E-mail Writing - Note completion- Transcoding.	12
V	Talking about staff Benefits- Talking about Appraisal Systems (gerunds and Infinitives, Reported Speech) – Talking about Marketing Disasters – Expressing hypothetical Situations- Talking about entering Foreign Market (Conditional 3, Grammar review) – Letter for calling quotations, Replying for quotations – Placing an order and Complaint and **reply to a complaint.**	12
	Total Instructional Hours	**60**

COURSE OUTCOMES

CO1: Introduced corporate culture and professional communication.
CO2: It focused on organizing a professional event and its documentation.
CO3: Improved the ability to describe the events and process in an effective way
CO4: Trained to analyze the problems and to find solution to it.
CO5: Practiced to make business communication.

TEXT BOOKS:

T1 Norman Whitby, " Business BENCHMARK Pre-intermediate to Intermediate", 2nd Edition, Cambridge English,2014.

T2 Ian Wood and Anne Willams, "Pass Cambridge BEC Preliminary", Cengage Learning press.,2013.

REFERENCE :

R1 Sunitha Misra & C.Murali Krishna , "Communication Skills for Engineers", Pearson Publishers., India. 2011

R2 Daniel G. Riordan , "Technical Communication", Cengage learning publishers., 2014.

R3 Kamalesh Sadanan, "A Foundation Course for the Speakers of Tamil-Part-I &II", Orient Blackswan,2010.

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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16MA2102	ENGINEERING MATHEMATICS – II (VECTOR CALCULUS, COMPLEX VARIABLES AND LAPLACE TRANSFORMS) (COMMON TO ALL BRANCHES)	3	1	0	4

Course Objective

- Learn the basics of vector calculus comprising gradient, divergence, Curl and line, surface, volume integrals.
- Understand analytic functions of complex variables and conformal mappings.
- Know the basics of residues, complex integration and contour integration.
- Apply Laplace transform techniques to solve linear differential equations.
- Know the effective mathematical tools for the solutions of partial differential equations that model several physical problems in mathematical physics

Unit	Description	Instructional Hours
I	**VECTOR CALCULUS** Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.	12
II	**ANALYTIC FUNCTIONS** Analytic function - Cauchy-Riemann equations - sufficient conditions (excluding proof) – Harmonic - conjugate harmonic functions– Construction of analytic functions (Milne-Thompson method) – Conformal mapping: $w = z+c$, cz, $1/z$ and bilinear transformation without problems related to the concept of conformal mapping.	12
III	**COMPLEX INTEGRATION** Complex integration – Statements of Cauchy's integral theorem – Taylor's and Laurent's series expansions - Singular points – Residues – Cauchy's residue theorem – Evaluation of real definite integrals as contour integrals around unit circle.	12
IV	**LAPLACE TRANSFORM** Laplace transform –Basic properties – Transforms of derivatives and integrals of functions - Transforms of unit step function and impulse function – Transform of periodic functions. Inverse Laplace transform - Convolution theorem (with out proof) – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.	12
V	**PARTIAL DIFFERENTIAL EQUATIONS** Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions-Solution of standard types of first order partial differential equations of the form $f(p,q) = 0$, Clairaut's type: $z = px + qy + f(p, q)$ – Lagrange's linear equation- Linear homogeneous partial differential equations of second and higher order with constant coefficient.	12
	Total Instructional Hours	**60**

Course Outcome

CO1: Know the gradient, divergence and curl of vectors useful for engineering application like fluid flow, electricity and magnetism.

CO2: Test the analyticity to construct the analytic function and transform complex functions from one plane to another plane graphically.

CO3: Evaluate real and complex integrals over suitable closed paths or contours.

CO4: Know the applications of Laplace transform and its properties and to solve certain linear differential equations using Laplace transform technique.

CO5: Solve the engineering problems using Partial Differential Equations.

TEXT BOOKS:

T1 Ravish R Singh, Mukul Bhatt, "Engineeing Mathematics", McGraw Hill education (India) Private Ltd.,Chennai,2017.

T2 Veerarajan T, "Engineering Mathematics–II", McGraw Hill Education(India) Pvt Ltd, New Delhi, 2016.

T3 Bali N.P & Manish Goyal, "A Text book of Engineering Mathematics", 8th Edition, Laxmi Pub. Pvt. Ltd. 2011.

T4 Grewal B.S, "Higher Engineering Mathematics", 42nd Edition, Khanna Publications, Delhi, 2012.

REFERENCE :

R1 Peter V. O'Neil, "Advanced Engineering Mathematics", 7th Edition, Cengage learning,2012.

R2 Sivarama Krishna Das P and Rukmangadachari E., "Engineering Mathematics" ,Vol II, Second Edition, Pearson publishing, 2011

R3 Wylie & Barett, "Advanced Engineering Mathematics", McGraw Hill Education, 6th edition, 2003.

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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16CY2102	ENVIRONMENTAL SCIENCES	3	0	0	3

Course Objective

1. To gain knowledge on the importance of environmental education, ecosystem and biodiversity.
2. To acquire knowledge about environmental pollution – sources, effects and control measures of environmental pollution.
3. To find and implement scientific, technological, economic and political solutions to environmental problems.
4. To study about the natural resources, exploitation and its conservation
5. To be aware of the national and international concern for environment and its protection.

Unit	Description	Instructional Hours
I	**ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY** Importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers- energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.	9
II	**ENVIRONMENTAL POLLUTION** Definition – causes, effects and control measures of: Air pollution – Air pollution standards – control methods- Water pollution – Water quality parameters- Soil pollution - Marine pollution - Noise pollution- Thermal pollution - Nuclear hazards–role of an individual in prevention of pollution – pollution case studies.	9
III	**NATURAL RESOURCES** Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and Desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.	9
IV	**SOCIAL ISSUES AND THE ENVIRONMENT** From unsustainable to sustainable development – urban problems related to energy-energy conversion – electrical energy calculations- environmental ethics: Issues and possible solutions – 12 Principles of green chemistry- Current Environmental issues at Country level – management of municipal sewage, municipal solid waste, Hazardous waste and Bio-medical waste – Global issues –Climatic change, Acid rain, greenhouse effect and Ozone layer depletion. Disaster management: floods, earthquake, cyclone and landslides.	9

V	**HUMAN POPULATION AND THE ENVIRONMENT** Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare –Environmental impact analysis (EIA)- GIS-remote sensing-role of information technology in environment and human health – Case studies.	9
	Total Instructional Hours	**45**

Course Outcome

CO1: Understand the natural environment and its relationships with human activities.

CO2: Characterize and analyze human impacts on the environment

CO3: Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes

CO4: Reflect critically about their roles and identities as citizens, consumers and environmental factors in a complex, interconnected world.

CO5: Understand and implement scientific research strategies, including collection, management, evaluation, and interpretation of environmental data.

TEXT BOOKS:

T1 Anubha Kaushik and C. P. Kaushik, "Environmental Science and Engineering", Fourth edition, New Age International Publishers, New Delhi, 2014.

T2 Deeksha Dave and S.S.Katewa, "Textbook of Environmental Studies", Second Edition, Cengage Learning, 2012.

T3 G.Tyler Miller, Jr and Scott E. Spoolman, "Environmental Science" Thirteenth Edition, Cengage Learning, 2010.

REFERENCE :

R1 Trivedi R.K, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.,2008

R2 Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2nd edition, Pearson Education, 2004

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Programme	Course code	Name of the course	L	T	P	C
B.E.	16EE2202	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	3	0	0	3

Course Objective

1. To apply the basic laws used in Electrical circuits and the different components.
2. To impart knowledge on construction and working of DC and AC machines
3. To provide knowledge on the fundamentals of semiconductor devices and their applications.
4. To impart knowledge on digital electronics and its principles.
5. To develop block diagrams for satellite and optical fiber communications.

Unit	Description	Instructional hours
I	**ELECTRICAL CIRCUITS AND MEASUREMENTS** Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase circuits - Three Phase Balanced Circuits. Operating Principles of Moving Coil and Moving Iron Instruments - Ammeters and Voltmeters, Dynamometer type Watt meters and Energy meters.	9
II	**ELECTRICAL MACHINES** Construction, Principle of Operation of DC Generators - EMF Equation - Construction, Principle of Operation of DC shunt and series Motors, Single Phase Transformer - EMF Equation, Single phase capacitor start - capacitor run – Construction, Principle of Operation of Three Phase Induction Motor – Applications - (Qualitative Approach only).	9
III	**SEMICONDUCTOR DEVICES AND APPLICATIONS** Characteristics of PN Junction Diode – Zener Diode and its Characteristics – Zener Effect – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor (BJT) – CB, CE, CC Configurations and Characteristics – FET – Characteristics.	9
IV	**DIGITAL ELECTRONICS** Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops (RS, JK, T & D), A/D and D/A Conversion (Dual Slope, SAR, Binary-weighted and R-2R).	9
V	**FUNDAMENTALS OF COMMUNICATION ENGINEERING** Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude and Frequency Modulations - Satellite and Optical Fibre communications (Block Diagram Approach only).	9
	TOTAL INSTRUCTIONAL HOURS	45

Course Outcome

CO1: Apply the KVL and KCL in Electrical circuits

C CO2: Explain the constructional features of AC and DC machines.

CO3: Identify electronics components and use of them to design circuits.

CO4: Use appropriate logic gates in circuit design.

CO5: Construct block diagram and explain satellite and optical Fibre communication systems.

TEXT BOOKS:

T1 Mittle N, "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 1990.

T2 Se Dha R.S., "Applied Electronics", S. Chand & Co., 2006.

T3 Thusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition, 2006.

REFERENCE :

R1 T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press, 2005

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Programme	Course code	Name of the course	L	T	P	C
B.E.	16GE2101	ENGINEERING MECHANICS (FOR AERO AUTO CIVIL MECH MECTS AGRI & BIO TECH)	3	1	0	4

COURSE OBJECTIVES

The main objectives of the course are to:

- Understand the vector and scalar representation of forces and moments
- Understand the static equilibrium of particles and rigid bodies both in two dimensions.
- Understand the principle of work and energy.
- Comprehend the effect of friction on equilibrium.

Unit	Description	Instructional hours
I	**BASICS & STATICS OF PARTICLES** Introduction – Units and Dimensions – Laws of Mechanics – Lame's theorem, Parallelogram and triangular Law of forces – Vectors – Vector representation of forces and moments – Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle –Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility.	12
II	**EQUILIBRIUM OF RIGID BODIES** Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis– Scalar component of a moment – Varignon's theorem – Single equivalent force – Equilibrium of Rigid bodies in two dimensions.	12
III	**PROPERTIES OF SURFACES AND SOLIDS** Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, - Angle section, Hollow section by using standard formula – Second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – PRINCIPAL/DEAN ACADEMIC moments of inertia of plane areas.	12
IV	**DYNAMICS OF PARTICLES** Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion – Newton's law – Work Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies. Co-efficient of restitution.	12
V	**FRICTION** Frictional force – Laws of Coloumb friction – Simple contact friction – Rolling resistance – Wedge friction - Belt friction, Applications of friction.	12
	Total Instructional Hours	**60**

Course Outcome

The outcomes of the course are the students shall have the ability:

CO1: To solve engineering problems dealing with force, displacement, velocity and acceleration.

CO2: To analyze the forces in any structure.

CO3: To solve rigid body subjected to dynamic forces.

CO4: Understand the dynamics of particles and Co-efficient of restitution

CO5: To solve the problems of simple system with friction

TEXT BOOKS:

T1 F.P.Beer, and Jr. E.R.Johnston., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 8th Edition, Tata McGraw-Hill Publishing company, New Delhi ,2004.

T2 S.Rajasekaran and G.Sankarasubramanian, "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.

REFERENCE :

R1 R.C.Hibbeller, and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education, 2010.

R2 S.S.Bhavikatti, and K.G.Rajashekarappa, "Engineering Mechanics", New Age International (P) Limited Publishers, 1998.

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Programme	Course code	Name of the course	L	T	P	C
B.E.	16AG2201	PRINCIPLES AND PRACTICES OF CROP PRODUCTION	3	0	0	3

Course Objective

1. To introduce the students to principles of agricultural and horticultural crop production and to introduce the production practices of crops.
2. To delineate the role of agricultural and irrigation engineers in relation to various crop production practices.

Unit	Description	Instructional Hours
I	**AGRICULTURE AND CROP PRODUCTION** Introduction to agriculture and its crop production sub-sectors - field crop production and horticulture; Factors affecting crop growth and production: genetic (internal) and environmental (external) factors; Crop management through environmental modification and adaptation of crops to the existing environment through crop cultural practices.	12
II	**CROP SELECTION AND ESTABLISHMENT** Regional and seasonal selection of crops; Systems of crop production; Competition among crop plants; Spacing and arrangement of crop plants; Field preparation for crops including systems of tillage; Establishment of an adequate crop stand and ground cover, including selection and treatment of seed, and nursery growing.	12
III	**CROP MANAGEMENT** Crop water Management; Crop nutrition management - need for supplementation to soil supplied nutrients, sources, generalized recommendations, methods and timing of application of supplemental nutrients including fertigation scheduling; Crop protection including management of 20 weeds, pests and pathogens; Integrated methods of managing water, nutrients and plant protection; Types and methods of harvest.	12
IV	**PRODUCTION PRACTICES OF AGRICULTURAL CROPS** Generalized management and cultivation practices for important groups of field crops in TamilNadu: cereal crops, grain legumes, oil seed crops, sugarcane, and fiber crops, and special purpose crops such as those grown for green manure and fodder.	12
V	**PRODUCTION PRACTICES OF HORTICULTURAL CROPS** Important groups of horticultural crops in Tamil Nadu such as vegetable crops, fruit crops, flower crops; Cultivation practices of representatives of each group; Special features of production of horticultural crops - green house cultivation.	12
	Total Instructional Hours	**60**

Course Outcome

CO1: Understanding the physical, biological, and economic factors influencing the crop production.

CO2: Understand the principles of crop growth and development.

CO3: To know various cultivation practices for important groups of field crops in Tamil Nadu

CO4: Understand the horticultural crops growth and importance of greenhouse cultivation

CO5: Understand the scientific principles and technologies can be applied to in-crop situations to optimize returns within best management practices.

TEXT BOOKS:

T1 Rajendra Prasad, Text Book of Field Crop Production. Directorate of Information and Publication, Krishi Anusandhan Bhavan, Pusa, New Delhi, 2015.

T2 Reddy T. Sankara G.H. Yellamanda Reddi, Principles of Agronomy, Kalyani Publishers, New Delhi, 2005.

T3 Handbook of Agriculture. ICAR Publications, New Delhi, 2011.

REFERENCE BOOKS:

R1 Bose T. K. and L.P.Yadav. Commercial Flowers, Naya Prakash, Calcutta.1989.

R2 Crop Production Guide, Tamil Nadu Agricultural University Publication, Coimbatore. 2005

R3 Kumar, N., Abdul Khader, M. Rangaswami, P. and Irulappan, I. Introduction to spices, plantation crops, medicinal and aromatic plants. Rajalakshmi Publications, Nagercoil. 1993.

R4 Kumar, N.,"Introduction to Horticulture", Rajalakshmi Publications. Nagercoil, 7th edition, 2015

R5 Shanmugavel, K.G. Production Technology of Vegetable Crops. Oxford India Publications, New Delhi. 1989

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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16PS2001	PHYSICAL SCIENCES LAB – II (COMMON TO ALL BRANCHES)	0	0	2	1

Course Objective

1. Evaluate the band gap of a semiconductor.
2. Apply the concept of interference and calculate the thickness of thin wire.
3. Acquire the practical skills in Young's modulus by uniform bending method.

Expt. No.	Description of the Experiments
1.	Determination of Young's modulus by uniform bending method
2.	Determination of band gap of a semiconductor
3.	Determination of Coefficient of viscosity of a liquid –Poiseuille's method
4.	Determination of Dispersive power of a prism – Spectrometer
5.	Determination of thickness of a thin wire – Air wedge method
6.	Determination of Rigidity modulus – Torsion pendulum
7.	Magnetic hysteresis experiment
8.	Calibration of ammeter using potentiometer

TOTAL PRACTICAL HOURS 30

Course Outcome

CO1: Experiment involving the physical phenomena of the Rigidity modulus of wire.

CO2: Determine the band gap of a semiconductor and variation of Energy Gap (E_g) with temperature.

CO3: Assess the Young's modulus of a beam using non uniform bending method.

CO4: Explain the concept of interference and calculate the thickness of thin wire and other fine objects.

CO5: Experiment provides a unique opportunity to validate Dispersive power of a prism using Spectrometer.

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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16AG2001	CROP HUSBANDRY LABORATORY	0	0	4	2

Course Objective: To introduce the different crop production practices in wet land, dry land and garden land through hands on experience and demonstrations.

S.No	Description Of The Experiments	Instructional Hours
1	Field preparation studies	
2	Seed selection and seed treatment procedures	
3	Seed bed and nursery preparation	
4	Sowing / Transplanting	
5	Biometric observation for crops	
6	Nutrient management studies	
7	Water management and irrigation scheduling	
8	Weed management studies	
9	Integrated Pest Management studies	
10	Harvesting	
	Total Instructional Hours	**60**

Basic Needs :
A wet land / garden land for a minimum of 5 cents area for each / group of students.
An open / borewell as water source to support cultivation

Course Outcome:

CO1: Developing the skill on crop-based plant nutrition and selecting suitable machinery for cultivation.
CO2: Ability in identifying weeds of crop fields and non- cropped areas, their management, herbicide types and their spraying techniques.
CO3: Students learned about basic idea about growth and development
CO4: Understand the soil-water-plant relationship, quality of irrigation water, irrigation scheduling, and different types of irrigation method.
CO5: To estimate cost cultivation ,harvesting and other losses

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Programme	Course Code	Name of the Course	L	T	P	C
B.E.	16GE2001	VALUE ADDED COURSE – II: LANGUAGE COMPETENCY ENHANCEMENT COURSE-II (COMMON TO ALL BRANCHES)	0	0	2	1

Course Objective

1. To improve communication skills and Professional Grooming.
2. To impart deeper knowledge of English Language and its practical application in different facets of life.
3. To equip the techniques of GD, Public Speaking, debate etc.

Unit	Description	Instructional Hours
I	**Listening** Listening for gist and respond – Listen for detail using key words to extract specific meaning – listen for phonological detail – Listen and identify the main points for short explanations and presentation.	3
II	**Reading** Strategies for effective reading – read and recognize different text types – Genre and Organization of Ideas – Quantifying reading – reading to comprehend – Interpreting sentences – contrasting, summarizing or approximating	3
III	**Speaking** Speak to communicate – Make requests and ask questions to obtain personal information – use stress and intonation – articulate the sounds of English to make the meaning understood – speaking to present & Interact – opening and closing of speech.	3
IV	**Writing** Plan before writing – develop a paragraph: topic sentences, supporting sentences – write a descriptive paragraph – elements of good essay – descriptive, narrative, argumentative – writing emails – drafting resumes – project writing – convincing proposals.	3
V	**Language Development** Demonstration at level understanding of application of grammar rules – revision of common errors : preposition, tenses, conditional sentences –reference words – pronouns and conjunctions.	3
	Total Instructional Hours	**15**

Course Outcome

CO1- Introduced to different modes and types of communication.
CO2- Practiced to face and react to various professional situations efficiently.
CO3- learnt to practice managerial skills.
CO4- Familiarized with proper guidance to writing.
CO5- Trained to analyze and respond to different types of communication.

REFERENCE BOOKS:

1. Verbal Ability and Reading Comprehension by Arun Sharma,9th edition,Tata Mc graw Hill
2. Word Power Made Easy by Norman Lewis,– Print, 1 June 2011.
3. High School English Grammar by Wren and Martin,S.CHAND Publications. 1 January 2017.
4. Practical course in Spoken English by J.K. Gangal,PHI Learning . Second edition, 1 January 2018.

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CO'S, PO'S & PSO'S MAPPING

Academic Year : 2018-2019

Semester – I

Course Code & Name: 16HE1101R – ESSENTIAL ENGLISH FOR ENGINEERS-I

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	1	1	1	2	-	1	2	1	2	3	1	3	3	2
CO2	1	2	1	1	1	2	1	1	1	3	1	2	2	3
CO3	1	2	1	1	1	2	1	1	2	3	1	2	2	2
CO4	1	1	-	1	1	1	1	1	2	3	1	2	3	3
CO5	-	1	1	1	1	1	1	2	2	3	1	2	2	2
Avg	1	1	1	1	1	1	1	1	2	3	1	2	2	2

Course Code & Name: 16MA1101 ENGINEERING MATHEMATICS – I MATRICES AND CALCULUS

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO2	3	3	3	3	3	-	-	-	-	-	-	2	2	3
CO3	3	3	3	3	3	-	-	-	-	-	-	2	1	2
CO4	3	3	3	3	3	-	-	-	-	-	-	2	2	1
CO5	3	3	3	2	3	-	-	-	-	-	-	2	2	2
Avg	3	3	3	3	3	-	-	-	-	-	-	2	2	2

Course Code & Name: 16PH1101 ENGINEERING PHYSICS

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	3	3	3	2	2	-	-	-	-	-	-	2	1	1
CO2	3	3	3	2	2	-	-	-	-	-	-	3	2	2
CO3	3	3	3	2	2	-	-	-		-	-	3	3	3
CO4	3	3	3	2	2	-	-	-	-	-	-	3	1	1
CO5	3	3	3	2	2	-	-	-	-	-	-	3	2	2
Avg	3	3	3	2	2	-	-	-	-	-	-	3	2	2

Course Code & Name: 16CY1101 ENGINEERING CHEMISTRY

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	3	2	2	-	2	1	1	-	-	-	-	1	1	1
CO2	3	2	2	-	2	1	-	-	-	-	-	1	1	-
CO3	3	2	2	-	2	1	1	-	-	-	-	1	1	-
CO4	3	2	2	2	2	1	-	-	-	-	-	1	1	1
CO5	3	2	2	-	2	1	-	-	-	-	-	1	1	1
Avg	3	2	2	2	2	1	1	-	-	-	-	1	1	1

Course Code & Name: 16GE1102 – ENGINEERING GRAPHICS

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	3	3	3	2	2	-	-	-	-	-	-	2	1	1
CO2	3	3	3	2	2	-	-	-	-	-	-	3	2	2
CO3	3	3	3	2	2	-	-	-		-	-	3	3	3
CO4	3	3	3	2	2	-	-	-	-	-	-	3	1	1
CO5	3	3	3	2	2	-	-	-	-	-	-	3	2	2
Avg	3	3	3	2	2	-	-	-	-	-	-	2	2	2

Course Code & Name: 16GE1103 PROBLEM SOLVING AND PYTHON PROGRAMMING

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	2	3	3	-	2	-	-	-	-	-	-	2	2	2
CO2	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO3	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO4	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO5	2	3	3	-	2	-	-	-	2	-	-	2	2	2
Avg	2	3	3	-	2	-	-	-	2	-	-	2	2	2

Course Code & Name: 16PS1001 PHYSICAL SCIENCES LAB – I

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	3	2	2	1	1	1	-	-	-	-	-	1	2	1
CO2	3	3	1	1	2	-	-	-	-	-	-	1	3	3
CO3	3	2	1	2	2	-	-	-	-	-	-	1	3	3
CO4	3	2	3	2	3	1	-	-	-	-	-	1	2	2
CO5	3	2	3	2	2	2	-	-	-	-	-	1	2	3
Avg	3	2	2	1	2	1	-	-	-	-	-	1	2	2

Course Code & Name: 16GE1004 PROBLEM SOLVING AND PYTHON PROGRAMMING LAB

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	2	3	3	-	2	-	-	-	-	-	-	2	2	2
CO2	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO3	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO4	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO5	2	3	3	-	2	-	-	-	2	-	-	2	2	2
Avg	2	3	3	-	2	-	-	-	2	-	-	2	2	2

Course Code & Name: 16GE1002 ENGINEERING PRACTICES LAB

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	2	3	2	-	1	-	1	-	-	1	1	1	1	2
CO2	3	3	2	1	1	-	1	-	-	1	1	1	1	2
CO3	3	3	3	-	1	1	1	-	-	1	1	-	1	1
CO4	3	3	3	1	1	2	1	-	-	1	1	1	1	1
CO5	3	3	3	1	1	3	1	-	-	1	1	1	1	1
Avg	2	3	2	1	1	2	1	-	-	1	1	1	1	1

SEMESTER II

Course Code & Name: 16HE2102R – ESSENTIAL ENGLISH FOR ENGINEERS – II

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	1	2	1	1	1	2	1	2	2	3	-	3	1	-
CO2	2	1	1	1	1	2	2	2	2	3	-	2	-	1
CO3	2	2	1	1	1	2	2	2	2	3	1	3	1	-
CO4	2	2	1	1	2	2	2	2	3	3	1	3	1	1
CO5	1	1	1	1	1	2	2	1	2	3	1	3	1	1
Avg	1	2	1	1	1	2	2	1	2	3	1	3	1	1

Course Code & Name: 16MA2102 ENGINEERING MATHEMATICS II

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO2	3	3	3	2	3	-	-	-	-	-	-	2	2	2
CO3	3	3	3	3	3	-	-	-	-	-	-	2	2	2
CO4	3	3	3	3	3	-	-	-	-	-	-	2	1	2
CO5	3	3	3	3	3	-	-	-	-	-	-	2	2	1
Avg	3	3	3	3	2	-	-	-	-	-	-	2	2	2

Course Code & Name: 16CY2102 ENVIRONMENTAL SCIENCES

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	2	-	-	-	-	2	3	3	2	-	-	2	-	-
CO2	2	-	-	-	-	2	3	3	2	-	-	2	-	-
CO3	2	1	1	-	-	2	3	3	2	-	-	2	-	-
CO4	2	1	2	-	-	2	3	3	2	-	-	2	-	-
CO5	2	1	2	-	-	2	3	3	2	-	-	2	-	-
Avg	2	1	2	-	-	1	2	3	2	-	-	2	-	-

Course Code & Name: 16EE2202 BASICS OF ELECTRICAL AND ELECTRONOICS ENGINEERING

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	3	3	3	2	2	1	1				1	2	3	3
CO2	3	3	2	2	2	1	1				1	2	3	2
CO3	3	2	3	2	2	1	1				1	2	2	2
CO4	3	3	3	2	2	1	1				1	2	3	2
CO5	3	3	3	2	2	1	1				1	2	3	2
Avg	3	3	3	2	2	1	1				1	2	3	2

Course Code & Name: 16GE2101 ENGINEERING MECHANICS

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO12
CO1	3	2	1	0	0	0	0	0	0	0	0	1	3	2
CO2	3	3	1	0	0	0	0	0	0	0	0	2	2	2
CO3	2	0	3	0	1	0	0	0	0	0	0	1	3	3
CO4	2	0	3	2	0	0	0	0	0	0	0	1	3	3
CO5	3	0	0	0	2	0	1	0	0	0	0	2	2	1
Avg	3	1	2	1	1	0	1	0	0	0	0	1	3	2

Course Code & Name: 16AG2201 PRINCIPLES AND PRACTICES OF CROP PRODUCTION

PO&PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS0 3
CO1	1	-	1	-	-	-	1	-	-	-	2	2	3	1	1
CO2	1	1	2	-	2	-	-	-	1	1	2	2	2	2	1
CO3	1	2	2	1	1	-	-	-	1	1	2	2	2	2	1
CO4	1	1	1	-	1	-	-	-	1	1	2	2	1	3	1
CO5	1	3	1	-	1	-	-	-	1	1	2	2	1	3	1
Avg	1	1	1	1	1		1		1	1	2	2	2	2	1

Course Code & Name: 16AG2001 - Crop Husbandry Laboratory

PO&PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS0 3
CO1	1	-	1	-	-	-	-	-	-	-	2	2	3	1	-
CO2	1	1	2	-	2	-	-	-	1	1	2	2	2	2	1
CO3	1	2	-	1	1	-	-	-	1	1	1	2	3	1	1
CO4	-	1	1	-	1	-	-	-	1	1	2	1	1	3	-
CO5	1	3	1	-	1	-	-	-	1	1	2	2	1	1	1
Avg	1	1	1	1	1	-	-		1	1	2	2	3	2	1

MAPPING OF COURSE OUTCOME AND PROGRAMME OUTCOME:

CBCS PATTERN

UNDERGRADUATE PROGRAMMES

B.E AGRICULTURE ENGINEERING (UG)

REGULATION-2019

Year	Sem	Course code & Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
I	I	19HE1101 & Technical English	1	1	1	1	1	1	1	1	2	3	1	2	2	2
		19MA1102 & Calculus and Linear Algebra	3	3	3	3	3	-	-	-	-	-	-	2	2	2
		19ME1101 & Basics of Civil and Mechanical Engineering	3	1	1	-	-	1	-	-	-	-	-	1	3	2
		19PH1151 & Applied Physics	3	2	2	2	2	1	-	-	-	-	-	1	2	2
		19CY1151 & Chemistry for Engineers	3	2	2	2	2	1	1	-	-	-	-	1	1	1
		19CS1151 & Python programming and practices	2	3	3	-	2	-	-	-	2	-	-	2	2	2
I	II	19HE2101 & Business English for Engineers	2	2	1	1	1	2	2	2	2	3	1	3	1	1
		19MA2101 & Differential Equations and Complex Variables	3	3	3	2	2	-	-	-	-	-	-	2	2	2
		19AG2104 & Principles of Food Science	1	1	1	1	1	1	1	-	1	-	-	-	1	2

		19PH2151 & Material Science	**3**	**2**	**1**	**2**	**2**	**1**	**2**	**-**	**-**	**-**	**-**	**1**	**2**	**2**
		19CY2151 & Environmental studies	**2**	**1**	**1**	**-**	**-**	**1**	**2**	**3**	**2**	**-**	**-**	**2**	**-**	**-**
		19IT2151 & Programming in C	**2**	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**2**
		19ME2001 & Engineering Practices	**3**	**-**	**3**		**3**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**1**	**2**
II	**III**	**19MA3102 & Fourier Analysis and Transforms**	**3**	**3**	**3**	**1**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**2**
		19AG3201 & Soil Science and Engineering	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**2**	**1**	**2**	**1**	**1**
		19AG3202 & Fluid Mechanics and Hydraulics	**2**	**2**	**1**	**1**	**2**	**1**	**1**	**1**	**-**	**2**	**-**	**1**	**2**	**1**
		19AG3203 & Principles and practices of Crop Production	**1**	**1**	**1**	**1**	**1**	**-**	**1**	**-**	**1**	**1**	**2**	**2**	**2**	**2**
		19AG3251 & Unit Operations in Agricultural Processing	**3**	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**2**	**1**
		19AG3001 & Field Crop Production Practical	**1**	**1**	**1**	**1**	**1**	**-**	**1**	**-**	**1**	**1**	**2**	**2**	**2**	**2**
		19AG3002 & Soil Science Laboratory	**3**	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**2**	**1**	**1**
II	**IV**	**19AG4201 & Farm Tractors**	**2**	**1**	**1**	**2**	**2**	**1**	**1**	**2**	**1**	**1**	**1**	**2**	**1**	**2**
		19AG4202 & Thermodynamics	**3**	**1**	**2**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**
		19AG4203 & Irrigation and Drainage Engineering	**2**	**1**	**2**	**2**	**-**	**-**	**1**	**-**	**2**	**-**	**3**	**1**	**1**	**2**
		19AG4251 & Bio-Energy Resource Technology	**2**	**3**	**2**	**1**	**2**	**1**	**2**	**0**	**2**	**1**	**1**	**2**	**3**	**2**
		19AG4252 & Surveying	**3**	**1**	**2**	**2**	**2**	**3**	**1**	**1**	**0**	**0**	**0**	**1**	**1**	**1**

		and Leveling														
		19AG4001 & Irrigation Field Laboratory	**2**	**2**	**2**	**3**	**0**	**0**	**1**	**0**	**3**	**0**	**3**	**1**	**2**	**2**
III	**V**	**19AG5201 & Farm Machinery and Equipment**	**2**	**2**	**3**	**3**	**2**	**1**	**2**	**2**	**0**	**0**	**1**	**3**	**2**	**3**
		19AG5202 & Refrigeration and Cold Chain Management	**2**	**3**	**2**	**1**	**2**	**1**	**2**	**0**	**2**	**1**	**1**	**2**	**3**	**2**
		19AG5203 & Theory of Machines	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**2**
		19AG5301 & Systems Analysis and Soft Computing in Agricultural Engineering	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**1**
		19AG5302 & Sustainable Agriculture and Food Security	**2**	**2**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**2**	**2**
		19AG5303 & CDM and Carbon Trading Technology	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**2**
		19AG5304 & IOT in Agricultural Systems	**2**	**1**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**2**	**1**	**2**	**2**	**2**
		19AG5305 & Ergonomics and Safety in Agricultural Engineering	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**2**	**2**
		19AG5251 & Groundwater and Well Engineering	**3**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**2**	**2**	**3**
		19AG5252 & Soil and Water Conservation Engineering	**2**	**2**	**3**	**3**	**2**	**2**	**3**	**1**	**2**	**2**	**2**	**3**	**3**	**2**
		19AG5001 & Operation and Maintenance	**2**	**2**	**2**	**3**	**2**	**-**	**1**	**0**	**3**	**0**	**3**	**2**	**2**	**2**

		of Farm Machinery Laboratory														
		19AG5002 & CAD for Agricultural Engineering	**3**	**2**	**2**	**2**	**3**	**2**	**2**	**2**				**2**	**2**	**2**
III	**VI**	**19AG6201 Hydrology and Water Resources Engineering**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**2**	**2**	**3**
		19AG6202 Solar and Wind Energy Engineering	**2**	**2**	**2**	**3**	**-**	**1**	**2**	**1**	**-**	**-**	**1**	**2**	**2**	**2**
		19AG6181 Professional Ethics	**2**	**3**	**2**	**1**	**2**	**1**	**2**	**-**	**2**	**1**	**1**	**2**	**3**	**2**
		19AG6301 Climate change and adaptation	**2**	**2**	**2**	**1**	**2**	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**2**	**2**
		19AG6302 Heat and Mass Transfers for Agricultural Engineers	**1**	**2**	**2**	**1**	**1**	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**2**	**2**
		19AG6251 Food and Dairy Engineering	**1**	**2**	**2**	**1**	**1**	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**2**	**2**
		19AG6252 ICT in Agricultural Engineering	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**-**	**1**	**2**	**2**	**2**	**2**	**2**
		19AG6701 Industrial Training	**3**	**2**	**2**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**
		19AG6303 Disaster Management	**2**	**2**	**1**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**2**	**2**	**2**
		19AG6304 Horticultural Crop Processing	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**3**	**2**	**1**	**1**
		19AG6305 Organic Farming Technologies	**2**	**2**	**1**	**3**	**1**	**1**	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**1**
		19AG6401 Modern Agricultural Practices	**2**	**2**	**3**	**3**	**2**	**1**	**2**	**2**	**2**	**-**	**-**	**3**	**2**	**3**
IV	**VII**	**19AG7201 Agricultural Extension**	**1**	**1**	**1**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**2**

		19AG7202 Remote Sensing and Geographical Information System	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
		19AG7251 Precision Farming and Protected Cultivation	**3**	**2**	**2**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**3**
		19AG7001 Renewable Energy Laboratory	**2**	**3**	**2**	**1**	**2**	**2**	**2**	**-**	**2**	**1**	**1**	**2**	**2**	**2**
		19AG7002 GIS Laboratory for Agricultural Engineers	**2**	**2**	**1**	**1**	**2**	**1**	**2**	**-**	**2**	**1**	**1**	**2**	**3**	**2**
		19AG7901 Innovative Project	**1**	**1**	**1**	**-**	**-**	**1**	**-**	**1**	**1**	**1**	**1**	**1**	**1**	**2**
		19AG7301 Post-Harvest Technology	**2**	**2**	**1**	**2**	**1**	**1**	**2**	**1**	**1**	**2**	**2**	**1**	**1**	**1**
		19AG7302 Dairy Process Technology	**2**	**2**	**2**	**1**	**1**	**2**	**2**	**1**	**1**	**2**	**1**	**2**	**2**	**1**
		19AG7303 Storage and Packaging Technology	**3**	**2**	**1**	**3**	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**2**	**2**
		19AG7304 Process Engineering of Fruits and Vegetables	**1**	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**
		19AG7305 Fat and Oil Processing	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**2**	**2**	**1**
		19AG7401 Urban Agriculture and organic farming	**1**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**2**
IV	**VIII**	**19AG8901 Project work**	**1**	**2**	**1**	**-**	**-**	**1**	**-**	**1**	**1**	**1**	**1**	**1**	**1**	**2**
		19AG8301 Agricultural Business Management and Entrepreneurship	**2**	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**2**	**1**	**1**

		19AG8302 On-Farm Water Management	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**3**	**3**	**1**	**1**
		19AG8303 Intellectual Property Rights	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**1**	**2**	**2**	**3**	**1**	**2**
		19AG8304 Agricultural Waste Management	**1**	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**
		19AG8305 Energy Conservation in Agro based Industry	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**2**	**2**	**1**
		19AG8306 Special Farm Equipment's	**2**	**2**	**1**	**1**	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**2**	**1**	**1**
		19AG8307 Mechanics of Tillage and Traction	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**1**	**2**	**2**	**3**	**1**	**2**
		19AG8308 Watershed Hydrology and Management	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**3**	**3**	**1**	**1**
		19AG8309 Micro Irrigation System	**2**	**2**	**3**	**3**	**2**	**1**	**2**	**2**	**2**	**-**	**-**	**3**	**2**	**3**
		19AG8310 Agriculture Economics and Farm Management	**2**	**2**	**1**	**3**	**1**	**1**	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**1**