DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO. ACAD / NP /S.Y. B.Tech. /Syllabi/87/2012

It is hereby notified for the information of all concerned that, the Academic Council at its meeting held on 06-07-2012 has accepted the following **syllabi in all Braches of S. Y. B.TECH.** under the Faculty of Engineering & Technology as appended herewith :-

Sr. No.	Revised Syllabi
[1]	Second Year B.Tech. [CIVIL ENGINEERING],
[2]	Second Year B.Tech. [MECHANICAL / PRODUCTION ENGINEERING],
[3]	Second Year B.Tech. [ELECTRONICS & TELECOMMUNICATION ENGINEERING],
[4]	Second Year B.Tech. [COMPUTER SCIENCE & ENGINEERING],
[5]	Second Year B.Tech. [AGRICULTURAL ENGINEERING],
[6]	Second Year B.Tech. [PLASTICS AND POLYMER ENGINEERING],
[7]	Second Year B.Tech. [INSTRUMENTATION & CONTROL ENGINEERING],

This is effective from the academic year 2012-2013 and onwards.

All concerned are requested to note the contents of this circular for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO. ACAD/ NP/ S.Y.B.TECH./
2012/19011-33
A.C.S.S. I.No.82

Date:- 31-07-2012.

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Director,
Board of College and
University Development.

Copy forwarded with compliments to :-

1] The Principals, affiliated concerned Colleges,
Dr. Babasaheb Ambedkar Marathwada University.

Copy to :-

1] The Controller of Examinations,
2] The Superintendent, [Engineering Unit],
3] The Superintendent, [Eligibility Unit] ,
4] The Record Keeper,
Dr. Babasaheb Ambedkar Marathwada University.

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S/310712/-*

Dr BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

Revised Syllabus of Second Year

B.TECH.

AGRICULTURAL ENGINEERING

EFECTIVE FROM - 2012-13 & ONWARDS

G. S. Mandal's
Maharashtra Institute of Technology, Aurangabad
Revised Syllabus Structure 2012-13
S. Y. B. Tech. Agricultural Engineering

Sub No.	SEMESTER-III	Contact Hrs / Week				Examination Scheme						
	Subject	L	T	P	Total	CT	TH	TA	P	Total	Credits	Duration of Theory Exam
BSH201	Engineering Mathematics-III	3	1	-	4	20	80	-	-	100	4	3 Hrs
AED202	Crop Production Technology	3	1	-	4	20	80	-	-	100	4	3 Hrs
AED203	Fluid Mechanics & Hydraulics	3	1	-	4	20	80	-	-	100	4	3 Hrs
AED204	Farm Power	3	1	-	4	20	80	-	-	100	4	3 Hrs
AED205	Heat Transfer & Refrigeration	3	1	-	4	20	80	-	-	100	4	3 Hrs
AED206	Surveying & Leveling	2	-	-	2	10	40	-	-	50	2	2 Hrs
AED221	Lab-I (Crop Technology)	-	-	2	2	-	-	50	-	50	1	
AED222	Lab-II (Fluid Mechanics & Hydraulics)	-	-	2	2	-	-	25	25	50	1	
AED223	Lab-III (Farm Machinery & Power Engineering)	-	-	2	2	-	-	25	25	50	1	
AED224	Lab-IV (Surveying & Levelling)	-	-	2	2	-	-	25	25	50	1	
BSH225	Lab-V (Development of Skill-II)	-	-	2	2	-	-	50	-	50	1	
	Total of Semester-III	**17**	**5**	**10**	**32**	**110**	**440**	**175**	**75**	**800**	**27**	

Sub No.	SEMESTER-IV	Contact Hrs / Week				Examination Scheme						
	Subject	L	T	P	Total	CT	TH	TA	P	Total	Credits	Duration of Theory Exam
BSH251	Engineering Mathematics-IV	3	1	-	4	20	80	-	-	100	4	3 Hrs
AED252	Renewable Energy Sources	3	1	-	4	20	80	-	-	100	4	3 Hrs
AED253	Soil Mechanics	3	1	-	4	20	80	-	-	100	4	3 Hrs
AED254	Strength of Materials	3	1	-	4	20	80	-	-	100	4	3 Hrs
AED255	Farm Implements and Machinery	3	1	-	4	20	80	-	-	100	4	3 Hrs
AED256	Dairy Technology	2	-	-	2	10	40	-	-	50	2	2 Hrs
AED271	Lab-VI (Soil Mechanics)	-	-	2	2	-	-	25	25	50	1	
AED272	Lab-VII (Strength of Materials)	-	-	2	2	-	-	25	25	50	1	
AED273	Lab-VIII (Farm Machinery & Power Engineering)	-	-	2	2	-	-	25	25	50	1	
AED274	Lab- IX (Dairy Technology)	-	-	2	2	-	-	50	-	50	1	
AED275	Lab X (Technical Report Writing)	-	-	2	2	-	-	50	-	50	1	
	Total of Semester-IV	**17**	**5**	**10**	**32**	**110**	**440**	**175**	**75**	**800**	**27**	
	Grand Total of III & IV									**1600**	**54**	

L: Lecture hours per week T: Tutorial hours per week P: Practical hours per week CT: Class Test
TH: University Theory Examination TA: Teacher's Assessment P: Practical/Oral Examination

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester-III

Code No.: BSH201
Teaching Scheme: 04Hrs/week
Theory: 03Hrs/week
Tutorial: 01Hr/week
Credits:04

Title: Engineering Mathematics –III
Class Test: 20
Theory Examination (Duration): 03 Hrs
Theory Examination (Marks): 80

Objectives	:	The contents aims to develop the knowledge of the student in the direction of solving the practical problem in the engineering and technology related to differential equation, Fourier Transforms, Statistical techniques Vectors and Probability.
Unit-I	:	**Linear Differential Equation:** Solution of linear differential equation of order n with constant coefficients: The complementary function, Method of finding particular integral: Short method, General method, Method of variation of parameters Equations reducible to linear form: i) The Cauchy's linear equation. ii) The Legendre's linear equation. Simultaneous differential equations. Application of linear differential equations to: i). Mechanical system. ii). Electrical System iii). Beam and Shafts (12+3 Hrs) Tutorials: Additional Practice Problems on each type of Application
Unit-II	:	**Vector Differentiation:** Differentiation of vectors, Radial, Transverse, Normal And tangential components of velocity and acceleration, Scalar and vector point function , Gradient of scalar point function , Divergence and curl of vector point function , Second order differentiation operator , Irrotational and solenoid fields. (7+3 Hrs) Tutorials: Additional Practice Problems on Irrotational and solenoid fields.
Unit-III	:	**Statistics:** Measures of central tendency: Mean Median, Quartiles and Mode. Measures of dispersion: Quartile deviation, Mean deviation, Standard deviation, coefficient of variation, Moments, Skewness, Kurtosis. (3+2 Hrs) Tutorials: Additional Practice Problems on coefficient of variation,Moments
Unit-IV	:	**Laplace Transform:** Definition, Laplace Transform of elementary function and its table, Theorem and properties of Laplace Transform: First shifting theorem, Second Shifting Theorem, Multiplication by t^n, Division by t, Change of scale property, Laplace Transform of integral, Laplace Transform of Derivative. Laplace Transform of some special functions: Bessel's function, Periodic function, Error Function, Heaviside Unit Step Function, Displaced Heaviside Unit Step Function Laplace Transform using Heaviside Unit function, Dirac delta function. Method to find inverse Laplace Transform: i. Use of Laplace Transform table ii. Use of Theorem and properties of Laplace iii. Use of partial fraction iv. Convolution theorem v. Use of development of Heaviside Unit Step Function Application of Laplace Transform to solve linear differential equation, Simultaneous differential equation. (13+2 Hrs) Tutorial: Additional Practice Problems on Solution of Linear Differential Equation, Simultaneous differential equation.
Unit-V	:	**Fourier Transform:** Fourier integral: Complex form of Fourier integral, sine and cosine integral, Fourier transform and inverse transform. D.U.I.S. rule (only statement), Fourier transform and inverse transform for even and odd function, Fourier sine and cosine transform and inverse transform. (7+3 Hrs) Tutorials: Additional Practice Problems Fourier sine and cosine transform

Unit-VI	:	**Probability:** Introduction, Probability Distribution: Binomial Distribution, Poisson Distribution, Normal Distribution (3+2 **Hrs**) Tutorials: Additional Practice Problems on each type of Distribution
Reference Books:	:	1. A Text Book Of Applied Mathematics Volume-III BY P.N. Wartikar J.N.Wartikar, Pune Vidyaryhi Griha Prakashan, Ninth edition. 2. Advanced Engineering Mathematics BY H. K. Dass, S. Chand and Co. Ltd, Eighteenth edition. 3. Higher Engineering Mathematics BY Dr. B..S. Grewal, Khanna Publishers, 46th edition. 4. Higher Engineering Mathematics BY B.V.Ramana, Tata McGraw-Hill Publishing Co. Ltd., First edition. 5. Solution to Higher Engineering Mathematics Volume –III BY C. P. Gandhi

Section A: Includes Unit I, II and III; Section **B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester-III

Code No : AED202

Title: Crop Production Technology

Teaching Scheme:
Theory : 3 hrs/week
Tutorial : 1 hr/week
Credits : 4

Class Test: 20 Marks.
Theory Examination (Duration) : 3 Hrs.
Theory Examination (Marks): 80 Marks.

Objectives	:	1. The subject intends to make the students aware about crop production & field management. 2. The subject also intends to make the student familiar about the scope, importance, management & raising of different horticultural crops 3. To develop basic understanding in students about soil forming processes and soil as natural body/medium for storage and movement of water, gases, heat, nutrients. To develop student understanding of the general physical and chemical properties of soil.
Unit-I	:	Plant and the ecosystem, plant parts-roots, stems, leaves. Pollination, fertilization, Fruits, seeds, embryo, germination and inflorescence. Descriptive only (07 Hrs) Tutorial (03 Hrs)
Unit-II	:	Soils and crops-Soil quality (texture, cation exchange capacity, Ph, organic matter, depth and topography). The soil profile, soil formation, soil classification, soil and plant nutrition, soil sampling and test analysis, conservation of soils. Descriptive and analytical (07 Hrs) Tutorial (03 Hrs)
Unit-III	:	Photosynthesis, characteristics of light, duration of light, the quality of light, temperature and plant classification. Crop damage associated with temperature, crops grown in Marathwada region. Descriptive only (08 Hrs) Tutorial (02 Hrs)
Unit-IV	:	Types of cropping system-Cover cropping, companion cropping, relay cropping, seed definition and different types of seeds. Value of inoculation. Seed bed preparation, seeding, calibration of seeders, harvesting seeds, testing rate of seed germination. Descriptive only (08 Hrs) Tutorial (02 Hrs)
Unit-V	:	Nursery work and plant propagation. Nursery raising for different fruits and flowers and techniques involved, plant propagation-Grafting, budding, thinning, plant tissue culture and its procedure, micro propagation, uses and methods. Descriptive only (08 Hrs) Tutorial (02 Hrs)
Unit-VI	:	Horticulture: Definition and scope of horticulture, horticultural and vegetable crops, soil and climatic requirements for fruits, vegetables and floriculture crops, improved varieties, criteria for site selection, layout and planting methods, pruning and training , garden tools, management of orchard, layout of *lawns* and kitchen gardens. Descriptive only (07 Hrs) ,Tutorial (03 Hrs)
Reference Books:	:	1. Principles of Agronomy by T.Yellamanda Reddy & G.H.Sankara Reddy. 2. Principles of Agronomy by Sankaren S. & V.T. Subbiah Mudaliyar. 3. Introduction to Horticulture by N.Kumar. 4. Preparation of Horticulture Plants by Adraine & Briso. 5. Vegetables in India by T.K.Bose & M. G. Som. 6. Principles of Soil Science by M.M.Rai (Fourth Edition)

		7. Soil fertility & Nutrient Management by S.S.Singh.

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V & VI

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively.

Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester-III

Code No :AED203

Title: Fluid Mechanics & Hydraulics

Teaching Scheme:
Theory : 3 hrs/week
Tutorial : 1 hr/week
Credits : 4

Class Test: 20 Marks.
Theory Examination (Duration) : 03 Hrs
Theory Examination (Marks): 80 Marks.

Objectives	:	1. To study the various properties of fluids in detail as a basic course of agricultural engineering. 2. To study in detail the measurement of flow, discharge & velocity through notches, weirs, pipes, channels etc. of an agriculture field
Unit-I	:	Properties of fluids: Ideal and real fluid. Pressure and its measurement, Pascal's law, pressure forces on plane and curved surfaces, centre of pressure, buoyancy, metacentre and metacentric height, condition of floatation and stability of submerged and floating bodies; (Descriptive & Analytical) (10 Hrs)
Unit-II	:	Kinematics of fluid flow: continuity equation, path lines, streak lines and streamlines, stream tube, stream function, velocity potential function, and flow net. Types of fluid flow, translation, rotation, circulation and yorticity, Vortex motion; Dynamics of fluid flow, Bernoulli's theorem, venturimeter, orifice-meter, Introduction to orifice and notch.(Descriptive & Analytical) (10 Hrs)
Unit-III	:	Laminar flow: shear stress distribution and velocity distribution in circular pipes and two parallel plates; kinetic energy correction factor and momentum energy correction factor, average velocity, shear stress and pressure gradient; Turbulent flow in pipes, Darcy equation (Descriptive & Analytical) (10 Hrs)
Unit-IV	:	Minor and major hydraulic losses through pipes and fittings, flow through network of pipes, hydraulic gradient and energy gradient, siphon; power transmission through pipe and nozzle; water hammer. (Descriptive & Analytical) (10 Hrs)
Unit-V	:	Internal flow: Laminar & turbulent flow in pipes, general equation for head loss-Daicy-Weisbach and Fanning's equations, Moody's diagram, energy losses through pipe fittings, flow through network of pipes (10 Hrs)
Unit-VI	:	Dimensional analysis and similitude: Rayleigh's method and Buckingham's π-theorem, types of similarities, dimensionless numbssers, model's law. (Descriptive & Analytical) (10 Hrs)
Reference Books:	:	1) Text Book fluid mechanics and machinery by R K Bansal,, Laxmi Publication 2) Fluid mechanics fluid power Egg by D S Kumar, Kaitson publication

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1) Minimum ten questions
2) Five questions in each section
3) Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4) Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester-III

Code No: AED204

Title: Farm Power

Teaching Scheme:
Theory : 3 hrs/week
Tutorial : 1 hr/week
Credits : 4

Class Test: 20 Marks.
Theory Examination (Duration) : 3 Hrs.
Theory Examination (Marks): 80 Marks.

Objectives	:	An Agricultural Engineer must know the operations control, maintenance and repairing idea of different sources of power used in Agricultural sector. For proper utilization of agricultural machinery in agricultural FARM with safety, this course is designed with following contents: 1. Idea of conventional animal, human, coal, fuel and non-conventional solar and wind power sources of energy used in agricultural sector. 2. Scope of mechanization, its availability and suitability in Indian condition. Principle of operation of different engines. 3. Different Engines system. 4. Different engine components, different control devices repair, maintenance & safety devices of engines. 5. Power estimation and power losses. 6. Introduction of tractors
Unit-I	:	Sources of farm power -conventional & non-conventional energy sources. Classification of tractors and IC engines. Review of thermodynamic principles of IC (CI & SI) engines and deviation from ideal cycle. (Descriptive and Analytical) (10 Hrs)
Unit-II	:	Study of engine components their construction, operating principles and functions. Engine systems: valves & valve mechanism. Firing order and diagram, criteria for firing order selection (Descriptive and Analytical) (10 Hrs)
Unit-III	:	Transmission systems of wheel and track type tractors: clutch, gear box, differential and final drive mechanism PTO system, type, standardization, belt and pulley on tractor and their standardization (Descriptive and Analytical) (10 Hrs)
Unit-IV	:	Fuel & air supply, cooling, lubricating, ignition, starting, Engine governing systems and electrical systems. Study of constructional details, adjustments & operating principles of these systems. (Descriptive and Analytical)(10 Hrs)
Unit-V	:	IC engine fuels - their properties & combustion of fuels, gasoline tests and their significance, diesel fuel tests and their significance, detonation and knocking in IC engines, study of properties of coolants, anti freeze and anti-corrosion materials, lubricant types & study of their properties. (Descriptive and Analytical) (10 Hrs)
Unit-VI	:	Farm Tractor; Classification and selection of tractors, Power transmission system of tractors, Transmission gears and torque converter, differential unit and final drive, hitch and control board of tractor, Estimating the cost tractor of tractor power, tractor testing and tractor engine performance. (Descriptive and Analytical) (10 Hrs)
Reference Books:	:	1.Tractors and their Power Units,John B. Lijiedahal, Paul K. Turnquist :CBS Publication 2.Farm Tractor maintenance and repair, S.C.Jain; Standard Publishers Distributors

		3. Elements of Agricultural Engineering, Dr. Jagdishwar Sahay; Standard Publishers Distributors

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV ,V & VI

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester-III

Code No :AED205

Title: : Heat Transfer & Refrigeration
Teaching Scheme:
Theory : 3 hrs/week
Tutorial : 1 hr/week
Credits : 4

Class Test: 20 Marks
Theory Examination (Duration): 3 Hrs
Theory Examination (Marks): 80 Marks

Objectives	:	1. The subject intends to make aware about fundamental laws and modes of heat and mass transfer for application in agricultural processing. 2. It also includes the need of refrigeration for perishable commodities of agriculture and its application to increase the shelf life of fruits and vegetables.
Unit-I	:	Introduction: Modes of heat transfer, Fourier's law of heat conduction, Stefan-Boltzman law, Newton's law of cooling, Electrical analogy, Thermal conductivity of materials & measurement. (06 Hrs)
Unit-II	:	Conduction: General differential equation of conduction. One dimensional steady state conduction through plane and composite walls, tubes and spheres. Insulation materials, critical thickness of insulation. (10 Hrs)
Unit-III	:	Convection: Free and forced convection, Heat transfer coefficient in convection. Dimensional analysis of free convection, Laminar forced convection on a flat plate and in a tube, combined free and forced convection, Steady state molecular diffusion in fluids at rest and in laminar flow. (14 Hrs)
Unit-IV	:	Radiation: Introduction, absorptivity, reflectivity and transmissivity of radiation, Black body and monochromatic radiation, Planck' s law, Kirchoff' s law, grey bodies and emissive power, solid angle, intensity of radiation. (09 Hrs)
Unit-V	:	Heat Exchanger: Types of heat exchangers, fouling factor, log mean temperature difference, Heat exchanger analysis restricted to parallel and counter flow heat exchangers. Mass Transfer: Fick's law, mass transfer coefficients, Types of mass transfer (10 Hrs)
Unit-VI	:	Thermodynamic cycles, mechanical vapour compression refrigeration, properties of refrigerants, thermodynamic cycle, calculations of single stage saturation and actual cycles, two stage cycles and cascade refrigeration system, heat pump. Compressors, expansion valves, evaporators and condensers, absorption system of refrigeration, ice manufacture.(11 Hrs)
Reference Books:	:	1. Thermal Engineering by P. L. Ballaney 2. Thermal Engineering by Domkundwar 3. Engineering Thermodynamics by P. K. Nag 4. Engineering Thermodynamics by T. P. Roy & Choudhary

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.
Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1) Minimum ten questions
2) Five questions in each section
3) Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4) Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester-III

Code No:AED206

Title: :Surveying & Leveling
Teaching Scheme:
Theory : 2 hrs/week
~~Tutorial : 0 hr/week~~
Credits : 2

Class Test : 10 Marks
Theory Examination (Duration) : 2 Hrs.
Theory Examination (Marks): 40 Marks.

Objectives	:	1. To study fundamental principles of Surveying and Leveling 2. Preparation plan and maps from surveyed data 3. To study of various types of minor instruments with their working principles used in Surveying and Leveling
Unit-I	:	Surveying: Introduction, classification and basic principles, point location, linear measurements. Scales, distance measurement, ranging, errors in chaining. (Analytical & Descriptive) (04 Hrs)
Unit-II	:	Chain Surveying: Land surveying, Survey stations, booking field notes, right angle setting, obstacles in chaining, cross staff survey. (Analytical & Descriptive) (05 Hrs)
Unit-III	:	Traversing: Compass traversing, types of compass, designation of bearings, examples, plotting, Theodolite, classification, terminologies, adjustments, measurement of angles.(Analytical & Descriptive) (06 Hrs)
Unit-IV	:	Plane table: Plane table surveying, merits & demerits, orientation, methods of plane tabling - Radiation, Intersection, Traversing. (Analytical & Descriptive) (04 Hrs)
Unit-V	:	Leveling: Basic terminologies, Level types, leveling staffs, adjustments of level, Principles of leveling, reduction of levels, classification of leveling, simple leveling, differential leveling, profile leveling, precise leveling, curvature & refraction, contouring, characteristics, uses, locating contours.(Analytical, graphical & Descriptive) (08 Hrs)
Unit-VI	:	Minor instruments: Clinometers, box sextants, hand levels, abney levels, Ceylon ghat tracer, pantagraph. (Descriptive only) (03 Hrs)
Reference Books:	:	1. Surveying & Levelling, Part-I by T. P. Kanetkar and S. V. Kulkarni,Pune Vidyarthi Griha Prakashan, Pune 2. Surveying, Vol-I by Dr.B.C.Punimia, Ashok K. Jain and Arun K. Jain, Laxmi Publications (P) Ltd. New Delhi 3. Surveying and Levelling by N N Basak, Tata McGraw Hill Publishing Company Ltd New Delhi.

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 40 marks Paper:

1. Minimum eight questions
2. Three questions in each section
3. Question no 1 from section A and Question no 5 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 07 marks each from remaining questions from each section A and B be asked to solve.

Dr.BabasahebAmbedkarMarathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester-III

Code No: AED221

Title: Lab-I (Crop Production Technology)
Teaching Scheme: 2 Hrs **Teachers Assessment : 50 Marks**
Credits: 1

Course Objectives	:	1. The subject intends to make the students aware about crop production & field management. 2.To study the fundamental Soil science to aware with soil formation and nutrients required by plant 3.The subject also intends to make the student familiar about the scope, importance, management & raising of different horticultural crops

List of Practicals (Minimum ten experiments to be performed)	:	01	Identifications of crops and their varieties seeds and weeds.
		02	Fertilizer application methods.
		03	Different weed control methods
		04	Different seed bed preparation methods
		05	Different methods of sowing and transplanting
		06	Preparation of nursery bed
		07	Study of horticultural tools and implements and their uses
		08	Methods of pruning and training
		09	Study of different garden tools and their uses
		10	Layout of kitchen garden
		11	Study of soil formation
		12	Study of essential plant nutrients
		13	Study of different nutrient deficiency symptoms in plants

List of Reference Books	:	1. Principles of Agronomy by T.Yellamanda Reddy & G.H.Sankara Reddy. 2. Principles of Agronomy by Sankaren S. & V.T. Subbiah Mudaliyar. 3. Introduction to Horticulture by N.Kumar. 4. Preparation of Horticulture Plants by Adraine & Briso. 5. Vegetables in India by T.K.Bose & M.G.Som. 6. Principles of Soil Science by M.M.Rai (Fourth Edition) 7. Soil fertility & Nutrient Management by S.S.Singh.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester-III

Code No:AED222

Title: Lab-II (Fluid Mechanics & Hydraulics)

Teaching Scheme: 2 Hrs — **Teachers Assessment : 25 Marks**
External Examination: 25 Marks

Practical(external) + TA (Internal) — **Credits: 1**

Course Objectives	:	1. To study the various properties of fluids in detail as a basic course of agricultural engineering 2. To study in detail the measurement of flow, discharge & velocity through notches, weirs, pipes, channels etc. of an agriculture field
List of Practicals (Minimum ten experiments to be performed)	:	1. Study of manometers and pressure gauges. 2. Verification of Bernoulli's theorem. 3. Determination of coefficient of discharge of venturimeter 4. Determination of coefficient of discharge of orifice meter. 5. Determination coefficient of velocity and coefficient of contraction for flow through orifice. 6. Determination of coefficient of friction in pipeline. 7. Determination of coefficient of discharge for triangular notch. 8. Determination of coefficient of discharge for rectangular notch. 9. Determination of coefficient of discharge for trapezoidal notch. 10. Determination of coefficient of discharge for mouth piece; 11. Determination of metacentric height; 12. Determination of mean velocity of flow by current meter 13. Velocity distribution in open channels 14. Determination of Manning's coefficient of roughness. 15. Visit to CADA
List of Reference Books	:	1. Hydraulics & Fluid Mechanics including Hydraulic Machines By Dr. P. N. Modi & Dr. S. M. Seth 2. Fluid Mechanics& Hydraulic Machines by R. K. Rajput. 3. Irrigation Engineering & Hydraulic structure By S. K. Garg 4. Engineering fluid mechanics by K. L. Kumar, Eurasia pub. House (p) Ltd.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr.BabasahebAmbedkarMarathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester-III

Code No:AED223

Title: Lab-III (Farm Machinery & Power Engineering)
Teaching Scheme: 2 Hrs — **Teachers Assessment : 25 Marks**
Practical(external)+TA (Internal) — **External Examination: 25 Marks**
Credits: 1

Course Objectives	:	An Agricultural Engineer must know the operations control, maintenance and repairing idea of different sources of power used in Agricultural sector. For proper utilization of agricultural machinery in agricultural farm with safety, this course is designed with following contents: 1. Idea of conventional animal, human, coal, fuel and non-conventional solar and wind power sources of energy used in agricultural sector. 2. Scope of mechanization, its availability and suitability in Indian condition. Principle of operation of different engines and Different Engines system. 3. Different engine components, different control devices repair, maintenance & safety devices of engines. Power estimation and power losses and Introduction of tractors
List of Practicals (Minimum ten experiments to be performed)	:	1. Familiarization with different engine parts viz stationary, reciprocating and rotating. 2. Study of two stroke and four stroke cycle engine. 3. Study of valves and valves arrangement. Determination of valve timing and firing orders of multi-cylinder engine. 4. Familiarization with carburetors adjustment and air supply system. 5. Diesel fuel supply system, injector adjustments and air bleeding. 6. Study of cooling system in stationary engines and moving engines like tractor. 7. Study of lubricating system. 8. Study of operation of power tillers. 9. Familiarization with different controls on the tractor and indicators with traffic signals. 10. Tractor driving practice in different gears without implements. 11. Study about periodic trouble shooting.
List of Reference Books	:	Principles of Agricultural Engineering, Vol. - I. Jain Brothers, New Delhi. A. M. Michel & T.P, Ojha
		Practical Agricultural Engineering Vol. - I & II. Naya Prakash 206, Bidhar Sarani, Kolkata. Ghosh and Swain
		Tractors and their Power Units. Wiley Eastern Private Ltd., New Delhi. E.L. Barger, J.B. Liljedahl, W.M. Carleton, E.G. Mokibben
		Farm Tractors Repair & Maintenance. Standard Publisher Distributors, New Delhi. S. C. Jain & C. M. Rai
		Tractor and Automobile. MIR Publication. V. Redichev
		Basic Automobile Engineering. Dhanpat Rai Publishing Company, New Delhi. C. P. Nakra
		Elements of Agricultural Engineering, Standard Publishers Distributers, 1705B, Nai Sarak, Delhi-110006 Dr. Jagdishwar Sahay

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester-III

Code No.:AED224

Title: Lab-IV (Surveying & Leveling)

Teaching Scheme: 2 Hrs — **Teachers Assessment : 25 Marks**
External Examination: 25 Marks

Practical(external) + TA (Internal) — **Credits: 1**

Course Objectives	:	a) To study fundamental principles of Surveying and Leveling b) Preparation plan and maps from surveyed data c) To study of various types of minor instruments with their working principles used in Surveying and Leveling
List of Practicals (Minimum ten experiments to be performed)	:	1. Study of instruments used for measurement of distance
		2. Study of ranging, chaining and offsetting
		3. Area computation by chain survey
		4. Study of cross staff surveying
		5. Traversing of prismatic compass
		6. Plane table survey- radiation and intersection method
		7. To determine reduced levels by simple and differential levelling
		8. Study of profile levelling
		9. Study of precise levelling
		10. Grid survey and interpretation of contour
		11. Study of Theodolite
		12. Measurement of angles by Theodolite
		13. Study of instruments such as hand level, abney level, box sextant, clinometers
		14. Study of minor instruments such as planimeter and pantagraph
List of Reference Books		
		1. Surveying & Levelling, Part-I & II by T. P. Kanetkar and S. V. Kulkarni
		2. Surveying, Part-I & II by S. K. Duggal
		3. Surveying, Part-I & II by B. C. Punmia

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester- IV

Code No.: BSH225
Teaching Scheme:(02) Hours per week
Practical: 02 Hours per week
Credits:01

Title: Lab V: DOS- II
Teacher's Assessment :50 marks
Practical :--
Total Examination (Marks): 50 marks

Course Objectives	:	Students should adequately equip to face the highly competitive and very demanding corporate world of today.Soft skills encompass personal, social, communication, and self-management behaviors. They cover a wide spectrum of abilities and traits: being self-aware, trustworthiness, conscientiousness, adaptability, critical thinking, attitude, initiative, empathy, confidence, integrity, self-control, organizational awareness.
Unit-I		**Soft skills and Functional English.** Basic of soft skills Dimensions of soft skills, Misconception of soft skills. The changing business environment and its impact on soft skills, Presentation: Preparation, delivery, etc.Interview technique ,Group Discussion and Debate **5 hrs**
Unit-II		**Nonverbal Communication.** **And Corporate etiquettes.** Body Language and its different aspects, Voice dynamics and voice modulation, Professional Appearance, Clothing etiquettes and Corporate dressing, Dinning table etiquettes. etc. **06 hrs**
Unit-III		**Business Correspondence** Official Drafting:Letter writing, Inquiry, Request, Complain, Sales, Follow-up. etc. Office documents like circulars, notices, minutes, agenda and memos. Report Writings: Types of reports, Data Interpretation: Compréhension of data, Analyses and Interprétations of data **06 hrs**
Unit-IV		**E-communication** Email communication and Email etiquettes ,Video Conferencing, and other e- communication **04 hrs**
Unit-V		**Team work and team building** The elements of teamwork. The changing nature of team .The basics of team intelligence, Diversity awareness, Gender issues, what is an effective team? Essential building blocks of essential team. **04hrs**
Unit-VI		**Problem-Solving and self confidence** Collaborative problem-solving, Benefits of collaboration, Effective Conflict Communication, Conflict resolution styles, Defusing conflict, Evaluating the conflict, How to build confidence. How confident are you? Thinking like a confident person. **5Hrs**

List of Reference Books	1. Gopalaswamy Ramesh, Mahadevan Ramesh, "The Ace of soft skills"Pearson publications. 2. Jerry Weissman ,"Presenting to Win", Prentice Hall publications. 3. William Sanborn Pfeiffer,T.V.S.Padmaja, "Technical communication" Pearson publications. 4. "Presentation Skills for Managers"Mcgraw Hills brief case books. 5 .Personality Development and soft skills,Oxferd University Press 6 Technical Report Writing Today: Daniel G. Riordan, Steven E. Pauley 7 Technical Writing: B. N. Basu 8 David Lawrence Preston,"365 steps of self confidence", Published by How To Books Ltd,

The term work shall be done on the ten assignments based on the topics mentioned above .And oral examination would be conducted internally on the syllabus mentioned.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted (Internally) on the syllabus and term work mentioned above.

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. (Agricultural Engineering) Semester-IV

Code No.: BSH251
Teaching Scheme: 04Hrs/week
Theory: 03Hrs/week
Tutorial: 01Hr/week
Credits:04

Title: Engineering Mathematics -IV
Class Test: 20 M
Theory Examination (Duration): 03 Hrs
Theory Examination (Marks): 80

Objectives	:	The contents aims to develop the knowledge of the student in the direction of solving the practical problem in the engineering and technology related to Function of complex variable, transforms, Numerical Methods, Vectors.
Unit-I	:	**Function of complex variable :** Introduction , Analytic function ,Cauchy-Riemann equation in Cartesian and polar coordinates ,Harmonic function, orthogonal system , Integration in complex plane: Line integral, Contour integral, Cauchy's integral theorem , Cauchy's integral formula, Extension of Cauchy's theorem on multiply connected region Taylor's and Laurent's series(without proof), Singularities, Residues, Cauchy's residue theorem. (12+3 Hrs) Tutorials: Additional Practice Problems on Singularities, Residues, Cauchy's residue theorem.
Unit-II	:	**Application of Complex Variable:** Evaluation of real integrals: Integration along unit circle and along the upper half semi circle, Conformal Transformation, Bilinear transformation. (3+2 Hrs) Tutorials: Additional Practice Problems on Bilinear transformation and Integration
Unit-III	:	**Vector Integration:** Line integral, Surface integral, Gauss divergent theorem, Stoke's theorem, Green's theorem, Curvilinear coordinates: Cylindrical and Spherical polar coordinates. (7+3 Hrs) Tutorials: Additional Practice Problems Gauss divergent theorem, Stoke's theorem, Green's theorem.
Unit-IV	:	**Application of partial differential equation :** Solution of partial differential equation by method of separation variable Application to i. Vibration of a string (The wave equation), ii. One dimensional heat flow (The diffusion equation) iii. Two dimensional heat flow.(The Laplace equation) (8+2 Hrs) Tutorials: Additional Practice Problems on Wave, Heat and Laplace equation
Unit-V	:	**Z- transform :** Definition, Z-transform of elementary function , properties of Z-transform , Inverse Z-transform :Partial fraction method, inversion integral method(Residue method),Solution of Difference equation by using Z-transform. (6+2 Hrs) Tutorials: Additional Practice Problems on Solution of Difference equation by using Z-transform
Unit-VI	:	**Numerical Method:** Solution of algebraic and transcendental equation, Newton Raphson method, Lagrange's interpolation, Solution of linear simultaneous equation; by Gauss elimination method, The Guass-seidal method,Solution of ordinary differential equations: Taylor series method, Fourth order Runge-Kutta method. (9+3 Hrs) Tutorials: Additional Practice Problems on Solution of ordinary differential equations: Taylor series method, Fourth order Runge-Kutta method.
Reference Books:	:	1. A Text Book of Applied Mathematics Volume-II –by P.N. Wartikar and J.N.Wartikar. 2. A Text Book Of Applied Mathematics Volume-III-by P.N. Wartikar and J.N.Wartikar. 3. Advanced Engineering Mathematics-by H.K.Dass. 4. Higher Engineering Mathematics- by Khanna Publishers. 5. Higher Engineering Mathematics- by B.V.Ramana.
Additional Reference Books	:	1. Solution to Higher Engineering Mathematics Volume –III -by C.P.Gandhi

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester-IV

Code No: AED252
Title: Renewable Energy Sources
Teaching Scheme:
Theory : 3 hrs/week
Tutorial : 1 hr/week
Credits : 4

Class Test : 20 Marks
Theory Examination (Duration) : 3 Hrs
Theory Examination (Marks): 80 Marks

Objectives	:	Agricultural Engineering students must be familiar to renewable energy sources so that utilization of field inventories available will be done for energy conversion and conservation. Present course content enable them to understand various forms of renewable energy, bio-conversion processes, production of the biomass and learn energy potential of different energies with its current status.
Unit-I	:	Energy, forms of energy, Introduction to conventional & non-conventional energy sources, energy scenario: India & world. Conservation of energy: Bernoulli's Equation. (10 hrs)
Unit-II	:	Biomass & Bio-fuels: Sources of biomass, Classification, energy farming, Biogas, aerobic & anaerobic respirations, Types of biogas plant (its specifications, working, applications), Design of biogas plant. Gasifiers, types and its working. (10 hrs)
Unit-III	:	Solar energy: Introduction, solar constant, determination of solar time, measurement of solar radiation. Solar air collector, solar concentrator, evacuated –tube collector (10 hrs)
Unit-IV	:	Solar Thermal energy application gadgets: Solar water heating system, solar cooker, solar pond, solar crop drying, solar house. Solar photovoltaic application: photovoltaic effect, material, module, cell temperature and its application. (15hrs)
Unit-V	:	Wind Energy: potential, basis concept of lift and drag. Measurement & various types of wind mills and their application (5hrs)
Unit-VI	:	Energy auditing and energy management (Introduction). Economic analysis: cost analysis, cash flow diagram, cost comparison with equal duration, cc with unequal duration cost comparison of various renewable technologies, payback period, and benefit cost analysis. (10 hrs)
Reference Books:	:	1. Fundamentals of Renewable Energy Sources by G. N. Tiwari and M. K. Ghosal 2. Solar Energy Utilization by G. D. Rai 3. Renewable Energy Sources by J. W. Twidell and A. Weir 4. Solar Energy: Principles of thermal collection and Storage by S. P. Sukhatme 5. Non conventional energy Sources by G. D. Rai,

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part.

Question paper should cover the entire syllabus.

For 80 marks Paper:

1) Minimum ten questions
2) Five questions in each section
3) Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4) Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester- IV

Code No: AED253
Title: Soil Mechanics
Teaching Scheme:
Theory : 3 hrs/week
Tutorial : 1 hr/week
Credits : 4

Class Test: 20 Marks
Theory Examination (Duration) : 3hrs
Theory Examination (Marks): 80 Marks.

Objectives	:	1. To make the students aware about elementary properties and classification of soil. 2. To inculcate about application of the laws of mechanics and hydraulics to solve engineering problems. 3. To study the strength and stability of soil for construction of various farm stead.
Unit-I	:	Introduction: Basic definition, Soil, Soil Mechanics, field of soil mechanics, Preliminary definitions and functional relationships. Descriptive (10 Hrs).
Unit-II	:	Elementary properties and classification of soils: Physical and chemical properties of soil, problems, soil classification, particles size, texture, HRB classification and Unified soil classification. Descriptive and analytical (10 Hrs)
Unit-III	:	Soil Hydraulics: Types of soil water, stress condition in soil, problems, Permeability and seepage, factors affecting, coefficient of permeability of stratified soil, problems, seepage analysis, two dimensional flow, flow net, problem. Descriptive and analytical (10 Hrs)
Unit-IV	:	Compressibility: one dimensional consolidation, spring analogy, Terzaghi's theory, Laboratory consolidation tests, calculation of void ratio and coefficient of volume change, problems, Compaction, standard and modified protector test, abbot compaction and Jodhpur mini compaction test, field compaction methods and control. Descriptive and analytical (10Hrs)
Unit-V	:	Strength and Stability: Shear strength Mohr's stress circle, theoretical relationship between principle stress circle, Mohr-Coulomb failure theory, effective stress principle. Shear strength measurement, problems, Earth pressure, Plastic equilibrium- Active and passive states in soils, Rankin's theory of active and passive earth pressure for cohesion less soils, Introduction to stability of slopes, analysis of infinite and finite slopes. Descriptive and analytical (10 Hrs)
Unit-VI	:	Foundation engineering: Bearing capacity, basic terminology, Rankin's analysis, Terzhaghi's analysis, shallow foundations, spread footing. Descriptive and analytical (10 Hrs)
Reference Books:	:	1. Soil Mechanics and Foundation by B. C. Punmia 2. Soil Mechanics by V. N. S. Murthy 3. Physical properties of soil by N. Narayan & C. C. Shah 4. Compendium on soil testing and fertilizer use published by Deptt. Of Soil Science & Agril. Chemistry, Mahatma Phule Agricultural University, Rahuri, Dist. Ahmadnagar

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1) Minimum ten questions
2) Five questions in each section
3) Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4) Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester-IV

Code No : AED254
Title: Strength of Materials
Teaching Scheme :
Theory : 3 hrs/week
Tutorial : 1 hr/week
Credits : 4

Class Test : 20 Marks
Theory Examination (Duration) : 3Hrs
Theory Examination (Marks): 80 Marks.

Objectives	:	The purpose of the subject of Strength of Materials is to make the students aware of the limiting values of stresses, safe carrying stresses and various mechanical properties of materials
Unit-I	:	Shear Force and Bending Moment: Concept, relation between load intensity, shear and bending moments and BM diagrams for various types of loadings like udl, uvl, bracket loads, point loads, moments etc. SF and BM for sections with varying Young's modulus and moment of inertia. Descriptive and analytical (08 Hrs) Tutorial on effect of point loads (02 Hrs)
Unit-II	:	Simple Stresses and Strains: Simple stress and strain due to axial tension and compression, shear, temperature stresses for simple and composite sections, elongation of uniform and tapering sections, lateral strains and linear strains, elastic constants. Descriptive and analytical (08 Hrs) Tutorial on Direct and bending stresses (02 Hrs).
Unit-III	:	Theory of Simple Bending: Pure bending, assumptions made in theory of simple bending, neutral axis, moment of resistance, section modulus, bending stress distribution diagrams for various end conditions and loading conditions of beams, fletched beams. Descriptive and analytical (08 Hrs). Tutorial on Bending combined with axial loads, (02 Hrs)
Unit-IV	:	Shear Stress Distribution: Shear stresses in beams, complimentary shear, various end conditions and loading conditions of beams. Direct and bending stresses: Bending combined with axial loads. Descriptive and analytical (08 Hrs) Tutorial on suddenly applied loads and impact loads (02 Hrs)
Unit-V	:	Principal Stresses and Strains: Concept, stress on oblique plane, two dimensional stress systems, planes of maximum shear stress Descriptive and analytical (07 Hrs) Tutorial on (03 Hrs), Mohr's circle diagram for principal stress.
Unit-VI	:	Theory of Torsion: Circular shafts subjected to torsion, torsional stresses, power transmission, torsion combined with bending and axial forces. Descriptive and analytical (08 Hrs). Tutorial on bending and axial forces on shafts (02 Hrs)
Reference Books:	:	1. Strength of Materials by S.Ramamrutham, Dhanpatrai and Sons publication. 2. Strength of Materials by R.K.Bansal, Laxmi Publications 3. Strength of Materials by R.S.Khurmi, S.Chand Publication 4. Mechanics of Structure, Vol-I, by Junnarkar.

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1) Minimum ten questions
2) Five questions in each section
3) Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4) Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech Semester- IV

Code No: AED255
Title: Farm Implements and Machinery
Teaching Scheme:
Theory : 3 hrs/week
Tutorial : 1 hr/week
Credits : 4

Class Test: 20 Marks
Theory Examination (Duration) : 3 Hrs
Theory Examination (Marks): 80 Marks

Objectives	:	A Degree holder in Agricultural Engineering must know the agricultural operations, operation, control, maintenance and repairing idea of different machines used in Agricultural sector. For proper utilization of agricultural machinery, equipments in agricultural farm, this course is designed with following contents: 1. Idea of conventional & modern agricultural operations. Matching size of agricultural machines. 2. Material of construction, working principles, adjustments, capacities & efficiencies of different farm machines. 3. Cost of operation of different agricultural machines.
Unit-I	:	Introduction to Farm Machinery; Implement Types, Objectives of farm mechanization, Classification of farm machines. Materials of construction & heat treatment. Principles of operation and selection of machines used for production of crops. Field capacities & economics. . Descriptive and analytical (08 Hrs). Tutorial on status of farm power and its requirement on Indian farms. (02 Hrs)
Unit-II	:	Tillage; primary and secondary tillage equipment; Moldboard Plows; Disk Implements; Chisel-Type and Multi-powered Tillage Implements Forces acting on tillage tools. Hitching systems and controls. Draft measurement of tillage equipment: Measurement of forces of tillage tools, Types of dynamometer; spring, hydraulic, and strain gauge types. Descriptive and analytical (08 Hrs) Tutorial on importance of animal power and importance in rural areas. (02 Hrs)
Unit-III	:	Earth moving equipment - their construction & working principles viz Bulldozer, Elevators etc.; sowing, planting & transplanting equipment Seed and fertilizer metering devices, furrow openers and covering devices – their calibration and adjustments. Fertilizer application equipment. Descriptive and analytical (08 Hrs) Tutorial on importance of earth moving and land levelling machinery for increasing the percentage of cultivable area.(02 Hrs)
Unit-IV	:	Weed control and Plant protection equipment - sprayers and dusters, their calibration, selection. Flaming and Thinning; Applying Fertilizers and Granular Pesticides constructional features of different components and adjustments. Principles & types of cutting mechanisms. Construction & adjustments of shear & impact-type cutting mechanisms. Descriptive and analytical (08 Hrs) Tutorial on advantages and importance of manual fertilization application methods. (02 Hrs)
Unit-V	:	Crop harvesting machinery: mowers, windrowers, reapers, reaper binders and forage harvesters. Forage chopping & handling equipment. Threshing; threshers, straw combines & grain combines, Hay Harvesting: Cutting, Conditioning and Windrowing; Packaging and Handling Hay. Descriptive and analytical (08 Hrs) Tutorial on advantages and importance of manual fertilization application methods. (02 Hrs)
Unit-VI	:	Size selection of machinery - Timeliness - Duration of operation - optimum width - selection of proper power level -Economy decisions on used equipment, systems approach operational constraints - power constraints - weather constraints - Engineering economics - Incremental, differential costs, Economic efficiency - Time value of money - operation costs - production costs - income costs - uncertainty probability concepts and functions. Distributions - Feasible system design -optimum design. Descriptive and analytical (08 Hrs) Tutorial on economical life of farm machinery and its replaceable time. (02 Hrs)

Reference Books:	:	1. Principle of Farm Machinery by R.A Kepner and Roy Bainer, CBS Publication 2. Element of Agricultural Engg by J. Sahay, Standard Publication 3. Agricultural Engineering by Radhey Lal, Saroj Publication 4. Principles of Agricultural Engineering, Vol-I by A. M. Michel & T.P. Ojha, Jain Brothers, New Delhi. 5. Elements of Agricultural Engineering, Vol - I & II by W.M. Carleton, E.G. Mokibben ,-Agro Book Agency, New Area, Jakkanpur, Patna – 1. 6. Practical Agricultural Engineering Vol. - I & II by Ghosh and Swain ,Naya Prakash 206, Bidhar Sarani, Kolkata.

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 80 marks Paper:

1) Minimum ten questions
2) Five questions in each section
3) Question no 1 from section A and Question no 6 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for ten marks each. The Question no.1 and 6 should be of objective nature.
4) Two questions of 15 marks each from remaining questions from each section A and B be asked to solve.

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
(Faculty of Engineering & Technology)
Syllabus of S. Y. B. Tech. Semester- IV

Code No: AED256
Title : Dairy Technology
Teaching Scheme:
Theory : 2 Hrs/week
Tutorial : --1 Hr/week
Credits: 02.

Class Test: 10 Marks
Theory Examination (Duration) : 2 Hrs
Theory Examination (Marks): 40 Marks.

Objectives	:	As a part of agricultural processing, dairy industry, today a highly specialized field which involves production, procurement, storage, processing and distribution of dairy products. As the milk processing mainly deal with the technical and quality control aspect of the processing industry and also work to develop improved methods in processing, this subject fulfils following objectives 1. To get familiar with various milk animal varieties 2. To study methods production, preservation and utilization of milk and milk products. 3. To study processing, packaging, storage, transport of handling milk and milk products
Unit-I	:	Livestock and dairy buildings: - Importance of livestock, their important species and breeds. Functional requirements, site selection, production practices, environment favorable to livestock, sanitation condition, space requirement, types of dairy barn, planning, layouts and requirements of dairy barn . Descriptive and analytical (08 Hrs) Tutorial on importance of dairy animals in the economy of farmers. (02 Hrs)
Unit-II	:	Principles of feeding: - General principles of feeding, processing preservation, storage of feed and fodder, silo- types, design, environment control in silos. Descriptive and analytical (04 Hrs) Tutorial on fodder banks. (01 Hrs)
Unit-III	:	Milk:- basic terminologies, food and nutritive value of milk, physic-chemical properties of milk, microbiology of milk, judging and grading of milk . Descriptive and analytical (04 Hrs) Tutorial on milk production in different states of India (01 Hrs)
Unit-IV	:	Special milk:- flow charts for manufacture of Sterilized, homogenized, flavored, vitaminized, fermented, standardized, rehydrated, recombined, toned and double toned milk, methods of preparation of special milks. Descriptive and analytical (08 Hrs) Tutorial on milk production in different states of India (02 Hrs)
Unit-V	:	Dairy products and byproducts:- ice cream, butter, ghee, cheese, khava, curd, cream, milk powder, (only methods of preparation) . Descriptive and analytical (04 Hrs) Tutorial on basic requirements for setting up of a dairy plant (01 Hrs)
Unit-VI	:	Manufacturing of milk based sweets, infants foods, byproduct utilization of dairy industries, Legal standards (food laws) like PFA, AGMARK, BIS, etc. Descriptive and analytical (04 Hrs) Tutorial on basic requirements for setting up of a dairy plant (01 Hrs)
Reference Books:	:	1. A text book of Animal Husbandry by Banarjee G. C. 2. Principals of Practices of Dairy farm management by Jagdish Prasad, Kalyani Pub. New Delhi 3. Outline of Dairy Technology by Sukumar De, Oxford Univr. Press, New Delhi 4. A handbook of Dairy Science by Mahanta K. C. 5. Principles of Agricultural Engineering Vol. I by A. M. Michael & T. P. Ojha, Jain Brothers, New Delhi. 6. Food Engineering & Dairy Technology by Kessler V. A., Freizing, Germany 7. Farm Structures by Vasavada, ICAR Publication New Delhi

Section A: Includes Unit I, II and III; **Section B**: Includes Unit IV, V and VI.

Pattern of Question Paper:

The six/four units in the syllabus shall be divided in two equal parts i.e. 3 units respectively. Question paper shall be set having two sections A and B. Section A questions shall be set on first part and Section B questions on second part. Question paper should cover the entire syllabus.

For 40 marks Paper:

1. Minimum eight questions
2. Three questions in each section
3. Question no 1 from section A and Question no 5 from section B be made compulsory and should cover complete syllabus of the respective section and should be set for six marks each. The Question no.1 and 6 should be of objective nature.
4. Two questions of 07 marks each from remaining questions from each section A and B be asked to solve.

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Code No:AED271

Title: Lab-VI (Soil Mechanics)
Teaching Scheme: 2 Hrs — **Teachers Assessment : 25 Marks**
Practical(external) + TA (Internal) — **External Examination: 25 Marks**
Credits: 1

Course Objectives	:	1. To make the students aware about elementary properties and classification of soil. 2. To inculcate about application of the laws of mechanics and hydraulics to solve engineering problems. To study the strength and stability of soil for construction of various farm stead.
List of Practical's (Minimum ten experiments to be performed)	:	1. Determination of water content of soil by oven-dry method
		2. Determination of specific gravity of soil by pycnometer
		3. Determination of field density of soil by core cutter method and sand replacement method
		4. Determination of grain size distribution by sieving
		5. Determination of liquid limit, plastic limit and shrinkage limit
		6. Determination of permeability by constant head test
		7. Determination of permeability by falling head test
		8. Determination of compaction properties by standard proctor test
		9. Determination of shear parameters by Direct shear test
		10. Collection and preparation of soil sample for soil testing
		11. Determination of soil pH and Electrical Conductivity
		12. Determination of free calcium carbonate from soil
		13. Determination of soil Available nitrogen
		14. Determination of soil Available Phosphorous
List of Reference Books		1. Soil Mechanics and Foundation by B. C. Punmia
		2. Soil Mechanics by V. N. S. Murthy
		3. Physical properties of soil by N. Narayan & C. C. Shah
		4. Compendium on soil testing and fertilizer use published by Deptt. Of Soil Science & Agril. Chemistry, Mahatma Phule Agricultural University, Rahuri, Dist. Ahmadnagar

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

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Code No :AED272

Title: Lab-VII (Strength of Materials)
Teaching Scheme: 2 Hrs
Practical(external) + TA (Internal)

Teachers Assessment : 25 Marks
External Examination: 25 Marks
Credits: 1

Course Objectives	:	The purpose of the subject of Strength of Materials is to make the students aware of the limiting values of stresses, safe carrying stresses and various mechanical properties of materials
List of Practical's (Minimum ten experiments to be performed)	:	1. Tension test on the ductile materials like mild steel and TOR steel
		2. Flexural test on timber beam
		3. Shear test on metals
		4. Testing on bricks-water absorption and compression.
		5. Transverse test on flooring tiles.
		6. Abrasion test on flooring tiles.
		7. Impact tests on metals-Izod and Charpy.
		8. Torsion test on steel.
		9. Hardness test
		10. Cold bend test on steel
		11. Pull out test
		12. Tension test on the ductile materials like mild steel and TOR steel
		13. Flexural test on timber beam
		14. Shear test on metals
List of Reference Books		
		1. Strength of Materials by S.Ramamrutham, Dhanpatrai and Sons publication.
		2. Strength of Materials by R.K.Bansal, Laxmi Publications
		3. Strength of Materials by R.S.Khurmi, S.Chand Publication
		4. Mechanics of Structure, Vol-I, by Junnarkar.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

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Code No:AED273

Title: Lab-VIII (Farm Machinery & Power Engineering)
Teaching Scheme: 2 Hrs — **Teachers Assessment : 25 Marks**
External Examination: 25 Marks
Practical (external) + TA (Internal) — **Credits: 1**

Course Objectives	:	A Degree holder in Agricultural Engineering must know the agricultural operations, operation, control, maintenance and repairing idea of different machines used in Agricultural sector. For proper utilization of agricultural machinery, equipments in agricultural FARM, this course is designed with following contents: 1. Idea of conventional & modern agricultural operations. Matching size of agricultural machines. 2. Material of construction, working principles, adjustments, capacities & efficiencies of different farm machines. 3. Cost of operation of different agricultural machines.
List of Practicals	:	1. Study of mould board plough. 2. Study of disc harrow. 3. Study of sowing machines. 4. Study of inter-cultivation tools. 5. Study of plant protection equipments. 6. Study of crop harvesting machines. 7. Study of threshing machines. 8. Study of combine harvester. 9. Calculation of cost for different agricultural operations. 10. Visit to agricultural machinery manufacturing industry 11. Study of mould board plough. 12. Study of disc harrow. 13. Study of sowing machines. 14. Study of inter-cultivation tools.
List of Reference Books	:	1. Principle of Farm Machinery by R.A Kepner and Roy Bainer, CBS Publication 2. Element of Agricultural Engg by J. Sahay, Standard Publication 3. Agricultural Engineering by Radhey Lal, Saroj Publication 4. Principles of Agricultural Engineering, Vol-I by A. M. Michel & T.P. Ojha, Jain Brothers, New Delhi. 5. Elements of Agricultural Engineering, Vol - I & II by W.M. Carleton, E.G. Mokibben , Agro Book Agency, New Area, Jakkanpur, Patna – 1. 6. Practical Agricultural Engineering Vol. - I & II by Ghosh and Swain ,Naya Prakash 206, Bidhar Sarani, Kolkata.

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

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Code No:AED274

Title: Lab-IX (Dairy Technology) — **Teachers Assessment : 50 Marks**

Teaching Scheme: 2 Hrs — **Credits: 1**

Course Objectives	:	As a part of agricultural processing, dairy industry, today a highly specialized field which involves production, procurement, storage, processing and distribution of dairy products. As the milk processing mainly deal with the technical and quality control aspect of the processing industry and also work to develop improved methods in processing, this subject fulfils following objectives 1. To get familiar with various milk animal varieties 2. To study methods production, preservation and utilization of milk and milk products. 3. To study processing, packaging, storage, transport of handling milk and milk products
List of Practicals (Minimum ten experiments to be performed)	:	1 Familiarity with animal breeds. 2 Design and layout of dairy barn. 3 Design and layout of silos. 4 Study of quality parameters of milk. 5 Determination of milk fats. 6 Study of pasteurization process of milk. 7 Study of homogenization process of milk. 8 Study of Preparation of standardized milk. 9 Study of Preparation of Ice cream. 10 Study of Preparation of khoya. 11 Study of Preparation of various milk based sweets. 12 Visit to Dairy industry.
List of Reference Books	:	1. A text book of Animal Husbandry by Banarjee G. C. 2. Principals of Practices of Dairy farm management by Jagdish Prasad, Kalyani Pub. New Delhi 3. Outline of Dairy Technology by Sukumar De, Oxford Univr. Press, New Delhi 4. A handbook of Dairy Science by Mahanta K. C. 5. Principles of Agricultural Engineering Vol. I by A. M. Michael & T. P. Ojha, Jain Brothers, New Delhi. 6. Food Engineering & Dairy Technology by Kessier V. A., Freizing, Germany 7. Farm Structures by Vasavada, ICAR Publication New Delhi

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above

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Code No:AED275

Title: Lab-X (Technical Report Writing)
Teaching Scheme: 2 Hrs **Teachers Assessment : 50 Marks**
Credits: 1

Course Objectives	:	The preparation of technical report is very important aspect for student and researcher. This subject is incorporated for the fulfillment of following objectives. 1. To study skill of technical writing. 2. To study the structure of technical report and its preparation 3. Study various forms of technical reports
List of Practicals (Minimum ten experiments to be performed)	:	1. Concept and significance of technical writing, basic aspects of technical writing. 2. Structural analysis of various forms of published technical reports. 3. Structure of technical report, preparation of cover page, preliminaries 4. Introduction 5. Review of literature & its mock preparation. 6. Material and methods. 7. Results and discussion Presentation of data, tables, illustrations, graphs, mock preparation of tables, illustrations and graphs. 8. Summary and conclusions, preparation of abstract. 9. Bibliography, abbreviations. Common errors, punctuations, language and vocabulary. 10. Mock preparation of investigative and functional technical report. 11. Oral presentation of technical report
List of Reference Books	:	1. Technical and Professional writing by Herman A. Estrain. 2. English for Engineering Students by G. V. L. N. Sharma. 3. Reports, Technical Writing and Specification by H. R. Glidden. 4. Technical Writing by Richard W. Smith. 5. Research and Report Writing by S. M. Gatner 6. Writing the Technical Report by J. R. Nelson 7. Effective Technical Writing and Speaking by Barry T. Tuner. 8. Scientific and Technical Report Writing by P.O.Ingle

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above