

B. Tech Agricultural Engineering

Total Contact Hours = 30

Total Marks = 900

Total Credits = 25

SEMESTER 3 rd		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BAGE2-301	Agriculture for Engineers	3	1	0	40	60	100	4
BAGE2-302	Farm Machinery	3	1	0	40	60	100	4
BAGE2-303	Thermodynamics and Heat Engine	3	1	0	40	60	100	4
BAGE2-304	Wasteland Development	3	1	0	40	60	100	4
BAGE2-305	Irrigation Engineering	3	1	0	40	60	100	4
BAGE2-306	Agriculture for Engineers Lab	0	0	2	60	40	100	1
BAGE2-307	Farm Machinery Lab	0	0	2	60	40	100	1
BSOS0-F91	Soft Skills-I	0	0	2	60	40	100	1
BAGE2-308	4-Weeks Institutional Training (after 2 nd semester)	0	0	4	60	40	100	2
Total		15	5	10	440	460	900	25

B. Tech Agricultural Engineering

Total Contact Hours = 27

Total Marks = 900

Total Credits = 23

SEMESTER 4 th		Contact Hrs			Marks			Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.	Total	
BAGE2-409	Surveying and Levelling	3	1	0	40	60	100	4
BAGE2-410	Theory of Machines	3	1	0	40	60	100	4
BAGE2-411	Engineering Economics	4	0	0	40	60	100	4
BAGE2-412	Soil & Water Conservation Engineering	3	0	0	40	60	100	3
BAGE2-413	Farm Power	3	1	0	40	60	100	4
BAGE2-414	Surveying and Levelling Lab	0	0	2	60	40	100	1
BAGE2-415	Theory of Machines Lab	0	0	2	60	40	100	1
BAGE2-416	Soil & Water Conservation Engineering Lab	0	0	2	60	40	100	1
BSOS0-F92	Soft Skills-II	0	0	2	60	40	100	1
Total		16	3	8	440	460	900	23

Overall

Semester	Marks	Credits
3 rd	900	25
4 th	900	23
Total	1800	48

AGRICULTURE FOR ENGINEERS

Subject Code: BAGE2-301

L T P C

Duration: 48 Hrs.

3 1 0 4

Course Objectives

This course includes with a fairly good concept of the fundamentals of different topics related to Agriculture field like Soil Science, organic matter availability in soil, agronomy, horticulture and layout etc.

Course Outcomes:

The Students will understand the different types of soils, rocks, characteristics and Identifications.

i) The Students will understand the layout and planting methods of horticultural crops.

ii) Identify the different types of soil and organic matters.

iii) Identify the different types of equipment for tillage operations.

iv) The students will able to understand about the essential plants nutrients.

Unit - I (12 Hrs.)

Soil Characteristics- Nature and origin of soil, Soil forming rocks and minerals, their classification and composition, Soil forming processes, Classification of soils, Soil taxonomy orders, Important soil physical properties and their importance, Soil particle distribution, Soil inorganic colloids – their composition, Ion exchange in soil and nutrient availability.

Unit – II (12 Hrs.)

Soil Organic Matter- Its composition and decomposition, effect on soil fertility, saline and sodic soils Quality or irrigation water, Essential plants nutrients, Functions and deficiency symptoms in plants, Important inorganic fertilizers and their reactions in soils. Soil water plant relationship, Crop rotation, cropping systems, Mixed cropping, Relay cropping

Unit - III (10 Hrs.)

Agronomy- Definition and scope of agronomy, Classification of crops, Effect of different weather parameters on crop growth and development, Principles of tillage, Tilt and its characteristics, **Horticulture-** Scope of horticultural and vegetable crops, Soil and climatic requirements for fruits Soil and climatic requirements for Vegetables, improved varieties of horticulture crops High-tech horticulture- Poly-houses for flowers and vegetables.

Unit –IV (14 Hrs.)

Criteria for Site Selection of Horticulture Crops - Layout and planting methods, Nursery raising, Macro and micro propagation methods, Pant growing structures, Pruning & training, Fertilizer application process, Fertigation, Harvesting, Grading and packaging, Post-harvest practices, Garden tools, management of orchard, Extraction and storage of vegetables seeds.

Recommended Books & References

1. T.D. Biswas and S.K. Mukherjee, 'Soil Science', TMH Publication.
2. T. Yellamanda and G.H. Sankara Reddy, 'Principle of Agronomy', Kalyani Publication.
3. Jitendra Singh, 'Basic Horticulture', Kalyani Publisher.
4. K.K. Mehta, 'Reclamation of Alkali Soil in India', Oxford & IBH.
5. Maharaj Singh, 'Education for Sustainable Agriculture', Indian J. Agronomy.

FARM MACHINERY

Subject Code: BAGE2-302

L T P C

Duration: 48 Hrs.

3 1 0 4

Course Objectives

Farm machinery is utilizing different sources of power and mechanization achieved through the design, development, testing and adaptation of farm implements and. Today farm labour is becoming scarce and expensive day by day. It is also necessary to reduce the cost of cultivation of Different crops.

Course Outcomes:

1. To identify the need of farm mechanization in India and evaluation of tillage, sowing in farming.
2. To abreast the students with mathematical, experimental and computational skills for solving
3. different field problems.
4. To develop skills in the students required to develop and modification of farm machineries.
5. To identify the need of earth moving equipment and their importance in farming.

Unit – I (12 Hrs.)

Tillage: primary and secondary tillage equipment, Zero and conservation tillage equipment Forces acting on tillage tools, Hitching systems and controls, Measurement of forces of tillage tools, Draft measurement of tillage equipment, Types of dynamometer; spring type, Hydraulic type and strain gauge types

Unit – II (10 Hrs.)

Objectives of farm mechanization- Classification of farm machines, Materials of construction and heat treatment, Principles of operation and selection of machines used for production of crops, field capacities and economics.

Unit – III (12 Hrs.)

Earth moving equipment - their construction & working principles, Bulldozer, Elevators, Scraper and Digger, Sowing, planting & transplanting equipment, various type Zero till ferti-drill Seed and planting metering devices, their calibration and adjustments. Furrow openers and covering devices, Fertilizer application equipment and their metering devices.

Unit – IV (14 Hrs.)

Weed control and Plant protection equipment- sprayers and dusters, their calibration selection, constructional features of different components, harvesting machinery- mowers, windrowers, reapers, reaper binders and forage harvesters, forage chopping & handling equipment, Description working principle of threshing machineries, grain and straw combine.

Recommended Books & References

1. R.A Kepner, Roy Bainer, 'Principle of Farm Machinery,' CBS Publication.
2. Radhey Lal, 'Agricultural Engineering', Saroj Publication.
3. Jagdishwar Sahay, 'Elements of Agricultural Engineering', Standard Publishers Distributors.
4. R. Suresh, 'Farm Power and Machinery Engineering', Standard Publishers Distributors.
5. Triveni Singh Prasad, 'Farm Machinery,' PHI, 2016.

THERMODYNAMICS AND HEAT ENGINE

Subject Code: BAGE2-303

**L T P C
3 1 0 4**

Duration – 46 Hrs.

Course Objectives

This course is designed for comprehensive study of combustion and thermal aspects in internal combustion engines, steam power plants and its allied components. This will enable the students to understand combustion phenomenon and thermal analysis of steam power plant components.

Course Outcomes:

The students will be able to-

1. Understand the Basic principles of thermodynamics like conservation of mass, conservation of energy
2. and the second law of thermodynamics.
3. Analyze the performance of various power cycles and to identify methods for improving thermodynamics performance.
4. Analyze the working, efficiency, process of Otto, diesel and dual cycle.
5. Carry out simple analysis on internal combustion engines.

Unit – I (10 Hrs.)

Thermodynamics Properties- Closed and open system Flow and non-flow processes Gas laws of thermodynamics Internal Energy Application of first law in heating and expansion of gases in non-flow processes First law applied to steady flow processes.

Unit – II (10 Hrs.)

Second Law of Thermodynamics - Kelvin-Planck statement, Clausius Statement, Reversible processes, Carnot cycle, Carnot theorem, Steam Generator- Classification of steam boilers, Lancashire boiler, Locomotive boiler, Boiler mountings, Boiler accessories, Desirable properties of working fluid used for power plants, Rankine cycle

Unit – III (12 Hrs.)

Entropy-Physical concept of entropy, Change of entropy of gases at constant volume, Change of entropy of gases at constant Pressure, Change of entropy of gases at constant Temperature, Change of entropy of gases at reversible adiabatic process Change of entropy of gases at poly tropic process.

Unit – IV (14 Hrs.)

Thermodynamic air Cycle- Air Standard efficiency, Engine efficiencies and terms, Otto cycle, Diesel cycle, Dual cycle, mean effective pressure, Measurement of IP and BP, HBC.

Recommended Books & References

1. D.S. Kumar, 'Thermodynamics', Katson Publication 1st Edition, 2009.
2. D.K. Jha, 'A Text Book of Thermodynamics', Discovery Publishing House.
3. R.S. Khurmi & J.K. Gupta, 'A Text Book of Thermal Engineering,' S. Chand & Company Limited, reprint 2002.
4. P.K. Nag, 'Engineering Thermodynamics', TMH Publication.
5. R. Yadav, 'Thermodynamics and Heat Engines', Central Publishing House, 2002.

WASTELAND DEVELOPMENT

Subject Code: BAGE2-304

**L T P C
3 1 0 4**

Duration: 46 Hrs.

Course Objectives

To improve resources conservation (soil and water) and land use and maximizing productivity per unit area, per unit time and per unit of water. This course includes the study of how to wasteland land Reclamation by the different ways like Afforestation, reforestation, topographic condition of soil, conservative structures etc.

Course Outcomes:

The students will able to-

- i) Theoretical knowledge of identifying the arid, semi-arid, humid and sub humid regions.
- ii) The students will able to conserving the land against its degradation.
- iii) The students will able to know about uses of structures in conservation of land.
- iv) The students will able to know about the wasteland treatment under micro irrigation.

Unit – I (10 Hrs.)

Land Degradation – Concept, classification - arid, semiarid, humid and sub-humid regions, denuded range land and marginal land, Wastelands - factors causing, classification and mapping of wastelands, planning of wastelands development - constraints, agro-climatic conditions, development options, contingency plans.

Unit – II (12 Hrs.)

Conservation Structures - Gully stabilization, ravine rehabilitation, sand dune stabilization, water harvesting and recycling methods (In brief). **Afforestation**-Agro-horti-forestry Silvopasture methods forage and fuel crops– socioeconomic constraints, Shifting cultivation, optimal land use options.

Unit – III (12 Hrs.)

Wasteland Development – Hills, semi-arid, coastal areas, water scarce areas, reclamation of waterlogged and salt-affected lands. Mine spoils- impact, land degradation and reclamation and rehabilitation, slope stabilization and mine environment management.

Unit-IV (12 Hrs.)

Micro-irrigation- Use in wastelands development, Sustainable wasteland development- drought situations, socio-economic perspectives. Government policies, Participatory approach. Preparation of proposal for wasteland development and benefit-cost analysis.

Recommended Books & References

1. I.P. Abrol and V.V. Dhruva Narayana, 'Technologies for Wasteland Development,' ICAR, New Delhi, 1998.
2. S.K. Ambast, S.K. Gupta and Gurbachan Singh, 'Agricultural Land Drainage – Reclamation of Waterlogged Saline Lands'.
3. H.R. Yadav, 'Management of Wastelands', Concept Publishing Company, New Delhi.
4. S.C. Kalwar, 'Wastelands and Planning for Development', Concept Publishing Company 2008.
5. C. Karthikeyan, K. Thangaraja, C. Cinthia Fernandez and K. Chandrakandon, 'Dryland Agriculture and Wasteland Management', Atlantic Publishers, New Delhi, 2009.

IRRIGATION ENGINEERING

Subject Code: BAGE2-305

L T P C

Duration: 46 Hrs.

3 1 0 4

Course Objectives

To study the techniques of irrigation methods and understand the various technologies of irrigation. This course learns about the acquire knowledge of irrigation water, use of irrigation water in field, understand different irrigation methods and effective usage of water resources.

Course Outcomes:

1. To provide a sound theoretical knowledge applied to water resources and agricultural engineering.
2. The students will able to understand the requirements of crop water.
3. The Students will understand the importance of water quality for beneficial uses, especially irrigation and its management.
4. To develop innovative capacity of students for increasing agricultural production with scarce water resources available.

Unit- I (10 Hrs.)

Source of irrigation water, measurement of irrigation water, infiltration, application of soil plant atmospheric continuum and principles of fluid mechanics to design of irrigation system, water balance equation and evaluation of different components; measurement of evaporation and evapo-transpiration.

Unit- II (12 Hrs.)

Water resource development and utilization in India, Surface water resources ground water resources, India's water budget, utilization of water resources, factors a fleeting water utilization, major river basins of India

Unit- III (10 Hrs.)

History and development of Irrigation in India, Classification of irrigation projects, canal network, water distribution pattern, system of levying irrigation charges.

Unit- IV (14 Hrs.)

Estimation of irrigation water requirement and irrigation scheduling: efficiencies of irrigation systems, Hydraulics, Design and evaluation of surface, sub-surface, overhead and drip irrigation

systems; design of water conveyance systems including control structures, design principles, Selection of pumps and prime movers.

Recommended Books & References

1. A.M. Michael, 'Irrigation Theory and Practice', Vikas Publications, New Delhi.
2. S.K. Majumdar, 'Irrigation Engineering', Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1983.
3. Om Prakash, 'Irrigation and Water Management', Rama Publishing House, Meerut.
4. K.K. Schwab, 'Soil and Water Conservation Engg.' John Wiley and Sons Inc. New York.
5. R. Lal 'Irrigation Hydraulics', Saroj Prakashan, Allahabad, 1978.
6. N.N. Basak, 'Irrigation Engineering', McGraw Hill Education, 1999.

AGRICULTURE FOR ENGINEERS LAB.

Subject Code: BAGE2-306

**L T P C
0 0 2 1**

EXPERIMENTS

1. Study of Garden tools, implements and plant protection equipment.
2. Identification of rocks and minerals.
3. Study of manures and fertilizers.
4. Study of layout in different irrigation systems.
5. To study of Pruning and training of orchard trees.
6. Examination of soil profile in the field.
7. Determination of bulk density.
8. Identification of weeds.
9. Determination particle density and porosity of soil.
10. Study of different Cultivator.
11. Study of different weed control methods.
12. Determination of organic carbon of soil.
13. Fertilizer application methods.
14. Study of different orchard layout methods.
15. Identification of crops and their varieties seeds.

FARM MACHINERY LAB.

Subject Code: BAGE2-307

**L T P C
0 0 2 1**

EXPERIMENTS

1. To study animal drawn and tractor drawn mould Board ploughs.
2. Introduction to various farm machineries.
3. To study Indigenous or country plough.
4. To study the starting and stopping of Diesel Engine.
5. Introduction, construction and working of earth moving equipment.
6. To study four stroke cycle engine.
7. Construction and working of rotavator and other rotary tillers.
8. To study cultivators and its important functions.
9. Weeding equipment- their use and adjustment
10. Field operation of showing and planting equipment and their adjustments.
11. Field capacity and field efficiency measurement for at least two machines/implements.
12. Working of Paddy Transplanter and their calibration.
13. To Study the field capacity of sprayer and duster.
14. To study Air cooling system and its advantages.
15. Study on methods of repair, maintenance and off season storage of farm equipment.
16. Working of seed-cum-fertilizer drills and their calibration.

SURVEYING AND LEVELLING

Subject Code: BAGE2-409

L T P C
3 1 0 4

Duration: 48 Hrs.

Course Objectives:

This course introduces to students the theory and application of surveying and to make well understands the fundamentals of surveying knowledge and being familiar with various aspects of surveying practice. It has ability to apply the knowledge of mathematics science and engineering to understand the measurement technique and equipment used in land surveying.

Course Outcomes:

The students should be able to-

- i) Demonstrate knowledge of various surveying methods.
- ii) Conduct a chain survey and compass survey.
- iii) Conduct levelling survey and be able to do RL calculations.
- iv) Demonstrate knowledge of properties of various building materials.

Unit – I (12 Hrs.)

Surveying - Principle and basic concepts of surveying, Plans and maps, Classification of surveying, basic measurements, Units of measurement, Types of Scales, Recording the measurement, Principal of chain surveying, Types of Chains, Types of Ranging Chaining Chain and tape errors and corrections, Selection of survey station and lines, offset measurement, Obstacles in chaining and ranging.

Unit – II (12 Hrs.)

Traversing - Methods of traversing, Prismatic compass, Surveyors compass Angle and bearing, quadrantal system, Local attraction, Dip of angle, magnetic declination, Plotting a traverse survey, Errors In compass survey, Bow ditch's rule, Transit rule.

Unit – III (10 Hrs.)

Plane Tabling - Plane tabling instruments and accessories, Methods and principal, two points problem, Three points problem, Errors in plane tabling, **Theodolite** - Theodolite traversing, Theodolite Surveying, Ranging by theodolite, Temporary and Permanent adjustment of theodolite.

Unit – IV (14 Hrs.)

Levelling - Definition, Basic principal of levelling, Benchmark, Types of levels optical, Principal causes telescopes sensitivity of bubble tubes, levelling staff, Temporary adjustment, Permanent adjustment of levels, Field book entries, types of levelling, Simple and differential levelling, Check levelling & reciprocal levelling, Precise levelling, profile levelling

Recommended Books & References

1. B.C. Punamia, 'Surveying and Levelling', Vol-I & Vol-II, Laxmi Publications, 2005
2. Kanetkar & Kulkarni, 'Surveying and Levelling Part-1', Pune Vidyarthi Griha Prakashan.
3. S.K. Duggal, 'Surveying', Vol I & II, Tata McGraw Hill, 2006.
4. R. Agor, 'Surveying', Khanna Publishers.
5. S.S. Bhavikatti, 'Surveying & Levelling', Vol. I & II, 2009.

THEORY OF MACHINES

Subject Code: BAGE2-410

L T P C
3 1 0 4

Duration: 46 Hrs.

Course Objectives

This course has been designed to cover the basic concepts of kinematic aspects of mechanical machines and major parts used in running of the machines. The students will understand the basic concepts of machines and able to understand constructional and working features of important machine elements.

Course Outcomes:

The students should be able to-

- i) Draw inversions and determine velocity and acceleration of different mechanisms.
- ii) Understand various parts involved in kinematics of machines.
- iii) Construct different types of cam profile for a given data.
- iv) Know about clutch, belt, gear system, governor system.

Unit – I (12 Hrs.)

Elements, links, pairs, kinematics chain, and mechanisms, classification of pairs and mechanisms, Lower and higher pairs, four bar chain, slider crank chain and their inversions, Degree of freedom, Determination of velocity and acceleration using graphical (relative velocity and acceleration) method. Instantaneous centres.

Unit – II (12 Hrs.)

Cam, Types of cam, Terminology used in cam-follower system, Cam profile, Gear train, Simple, compound, reverted, and epicyclical gear trains, Determination of velocity ratio and train value by tabular method

Unit – III (10 Hrs.)

Introduction to Belt drives, types of drives, belt materials, Length of belt, power transmitted, velocity ratio, belt size for flat and V belts. Effect of centrifugal tension, Creep and Slip on power transmission, Chain drives.

Unit – IV (12 Hrs.)

Introduction to Clutches, Types of clutches (Single disc, multiple disc, and cone clutches). Balancing of rotating masses in one and different planes, **Governor**- Introduction, Types, Constructional details and Analysis of Watt, Porter, Proell governor, Sensitiveness, stability, hunting, isochronisms, power and effort of a governor, flywheel.

Recommended Books & References

1. R.S. Khurmi, 'Theory of Machine', S. Chand Publication.
2. S.S. Rattan, 'Theory of Machine', 4th Edn., McGraw Hill Education Publication.
3. Jagdish Lal, 'Theory of Mechanisms & Machines', Metropolitan Book Co.
4. V.P. Singh, 'Theory of Machines', Dhanpat Rai Pub.
5. Thomas Beven, 'Theory of Machines', Longman's Green & Co., London.

ENGINEERING ECONOMICS

Subject Code: BAGE2-411

L T P C
4 0 0 4

Duration: 46 Hrs.

Course Objectives

This includes the study of trading, growth, money, income, depression, prices, and monopoly. Economics is important in the world because it can answer questions such as what causes of Inflation and why are people unemployed? Economics includes the study of labour, land, and investments, of money, income, and production etc.

Course Outcomes:

The Students should be able-

- i) Understand the concept of macroeconomic equilibrium and implications for the management of the business cycle.
- ii) Understand the costs of production and profit-maximization.
- iii) Understand and apply supply and demand analysis to relevant economic issues.
- iv) Distinguish between perfect competition and imperfect competition and be able to explain the welfare loss in non-competitive markets.

Unit – I (12 Hrs.)

Economics - Definitions, Nature, Scope, Difference between Microeconomics and Macroeconomics, theory of demand & supply; meaning, determinants, law of demand, law of supply Equilibrium between demand and supply elasticity, price elasticity, income elasticity, cross elasticity.

Unit – II (10 Hrs.)

Theory of production -Production function, meaning, factors of production (meaning & characteristics of Land, Labour, capital & entrepreneur), Law of variable proportions & law of returns to scale Cost; meaning, short run & long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost. Break even analysis; meaning, explanation, numerical.

Unit – III (14 Hrs.)

Markets - Meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Completion, Oligopoly). **National Income**- meaning, stock and flow concept, NI at current price, NI at constant price, GNP, GDP, NNP, NDP, Personal income, disposal income.

Unit –IV (10 Hrs.)

Unemployment- Meaning, types, causes, remedies, Inflation- meaning, types, causes, measures to control, Money- meaning, functions, types, Monetary policy and Fiscal policy - meaning, objectives and tools. Human Resource Management- Definitions, objectives of manpower planning, process, sources of recruitment, process of selection.

Recommended Books & References

1. R. Paneerselvam, 'Engineering Economics', PHI.
2. N. Gregory Mankiw, 'Principles of Economics', Cengage Learning.
3. L.M. Prasad, 'Principles and Practices of Management'.
4. Subba Reddy, 'Agricultural Economics', Oxford, 2008.
5. Tripathy and Redd, 'Principles of Management'.
6. K.K. Dewett & M.H. Navalur, 'Modern Economic Theory', S. Chand Publications.

SOIL AND WATER CONSERVATION ENGINEERING

Subject Code: BAGE2-412

L T P C

Duration: 44 Hrs.

3 0 0 3

Course Objectives

Designing soil conservation works, repairing sites of degradation, controlling water retention, water logging and soil salinity and providing advice on water quality and pollution issues. Carrying out environmental impact studies and monitoring construction sites for environmental problems and assessing of irrigation and drainage requirements of soils.

Course Outcomes:

The student will be able to

1. Know about the causes about water scarcity and their solution to fight against the damage effects through soil and water conservation technologies.
2. Recognize different types of erosion, rainfall and runoff.
3. Design and construct a simple earth dam and ponds for farm use,
4. Understand the concept of Universal Soil Loss Equation (USLE) with respect to soil loss.

Unit – I (10 Hrs.)

Introduction- Soil erosion - causes, types and agents of soil erosion; water erosion – forms of water erosion, mechanics of erosion; gullies and their classification, stages of gully development; characteristics of contours and preparation of contour maps.

Unit – II (12 Hrs.)

Erosion Control Measures – Agronomical measures - contour cropping, strip cropping, mulching; mechanical measures - terraces – level and graded broad base terraces and their design, bench terraces & their design, layout procedure, terrace planning, bunds - contour bunds, graded bunds and their design; gully and ravine reclamation.

Unit – III (10 Hrs.)

Wind Erosion - Factors affecting wind erosion, mechanics of wind erosion, soil loss estimation, wind erosion control measures - vegetative, mechanical measures, wind breaks and shelter belts, sand dunes stabilization.

Unit – IV (12 Hrs.)

Soil Loss Estimation - Universal soil loss equation and modified soil loss equation, determination of their various parameters, Sedimentation - sedimentation in reservoirs and streams, estimation and measurement, sediment delivery ratio, trap efficiency.

Design Principle of Channel- Most Economical trapezoidal, introduction to water harvesting techniques; introduction to stream water quality and pollution.

Recommended Books & References

1. Michael, 'Principles of Agricultural Engineering', Vol.-2, Jain Brothers, 2013.
2. R. Suresh, 'Soil & Water Conservation Engineering', Standard Publishers Distributors.
3. Ghanshyam Das, 'Hydrology and Soil Conservation Engineering: Including Watershed Management', 2nd Edn., PHI Publication, 2009.
4. V.V.N. Murthy, 'Land and Water Management Engineering', Kalyani Publishers, 2013.
5. R.P. Tripathi and H.P. Singh, 'Soil Erosion and Conservation', 1st Edn., New age Publishers, 1993.
6. Bimal Chandra Mal, 'Introduction to Soil and Water Conservation Engineering', Kalyani Publishers, 2011.

FARM POWER

Subject Code: BAGE2-413

L T P C

Duration: 46 Hrs.

3 1 0 4

Course Objectives

This course involves the use, maintenance, adjustment, calibration, and repair of the machines. The selection and operation of machines will be practiced. Safety will be stressed throughout and also Know the different power sources on a farm. In this subject learn the principles of operation of farm equipment.

Course Outcomes:

1. The students will be able to learn about different sources of farm power, construction and ii) functioning of CI and SI engines.
2. Identify all the power sources for farm operations.
3. Introduce students to the available power sources for farm operations.
4. Introduce students to selection and management of farm tractors and implements.

Unit – I (10 Hrs.)

Sources of farm power - conventional & non-conventional energy sources and their utilization, classification of tractors and IC engines, Review of thermodynamic principles of IC (CI &SI) engine and deviation from ideal cycle.

Unit – II (12 Hrs.)

Engine & their components, their construction, operating principles and functions, valves and valve mechanism, Firing order and diagram, criteria for selection. Study of constructional details, adjustments and operating principles of fuel and air supply, cooling, lubricating, ignition, governing and electrical systems.

Unit – III (12 Hrs.)

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, Properties of coolants, anti-freeze and anti-corrosion materials, lubricant types & study of their properties.

Unit – IV (12 Hrs.)

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. Preventive maintenance of various systems

Recommended Books & References

1. Jagdishwar Sahay, 'Elements of Agricultural Engineering,' St. Publishers Distributors.
2. John B. Lijiedahal, Paul K. Turn quist, 'Tractors and their Power Units,' CBS Publication.
3. S.C. Jain, 'Farm Tractor maintenance and repair,' Standard Publishers Distributors.
4. Donnell Hunt, 'Farm Power and Machinery Management', Medtech, 10th Edn., 2013.
5. Suresh, 'Farm Power and Machinery Engineering', Standard Publishers Distributors.

SURVEYING & LEVELLING LAB.

Subject Code: BTAG-414

L T P C

0 0 2 1

EXPERIMENTS

1. Chain survey of an area and preparation of map
2. Measurement of distance, ranging a line.
3. Compass survey of an area and plotting of compass survey.
4. Contour survey of an area and preparation of contour map.
5. Introduction of software in drawing contour.
6. Plane table survey, different methods of plotting, two point & three-point problem.
7. Measurement of bearing and angles with compass, adjustment of traverse by graphical method.
8. To study of different methods of levelling, height of instrument, rise & fall methods.
9. Advancement of Total stations.
10. Measurement of horizontal and vertical angle by theodolite.
11. Determination of height of an inaccessible object.
12. 12. Determination of area of irregular figure by using planimeter.
13. 13. Height of object by using theodolite.
14. Setting out of circular curves in the field using different methods.
15. Determination of tachometric constants and determination of reduced levels by tachometric observations.

THEORY OF MACHINE LAB.

Subject Code: BAGE2-415

L T P C

0 0 2 1

EXPERIMENTS

1. To study the various inversions of kinematic chains.
2. Conduct experiments on various types of governors.
3. Demonstration of static and dynamic balancing in the laboratory.
4. Determination of gyroscopic couple (graphical method).
5. Balancing of rotating masses (graphical method).
6. Cam profile analysis (graphical method)
7. Motion analysis of Epicyclical gear trains using tabular and formula methods.
8. Analysis of 4-bar mechanism slides crank mechanism and their inversions.
9. Draw graphs between height and equilibrium speed of a governor.
10. To draw circumferential and axial pressure profile in a full journal bearing.
11. To determine coefficient of friction for a belt-pulley material combination.
12. Determination of moment of inertia of flywheel.
13. To study the flywheel and governor action in laboratory.
14. To study the static and dynamic balancing using rigid blocks
15. To draw displacement, velocity & acceleration diagram of four bar mechanism.

SOIL AND WATER CONSERVATION ENGINEERING LAB.

Subject Code: BAGE2-416

L T P C

0 0 2 1

EXPERIMENTS

1. Study of different types of conservation measures.
2. Design of drop spillway.
3. Design of drop inlet spillway.
4. Design of farm pond.
5. Demonstration of Bench Terrace in the farming.
6. Study of USLE/MUSLE parameter.
7. Study about the Contour farming.
8. Determination from nutrient availability in soil.
9. To demonstrate the conservation of tillage.
10. Study of erosion checked by row cropping pattern.
11. Study of contour cropping effect on soil erosion.
12. Study of bund /graded/contour bund.
13. Design of grassed water ways.
14. Computation of soil erosion by USLE/MUSLE.
15. Design of Trapezoidal water ways.

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