

# Chhattisgarh Swami Vivekananda Technical University, Bhilai

**Semester: B.Tech – 3<sup>rd</sup>**

**Subject: Mathematics- III**

**Total Marks in End Semester Exam: 100**

**Minimum number of Class Tests: 02**

**Branch: All branches**

**Course Code: B000311(014)**

**L: 3 T: 1 P: 0 Credits 4**

## Course Objectives:

1. To provide knowledge of Laplace transform of elementary functions including its properties and applications to solve ordinary differential equations.
2. To have thorough knowledge of partial differential equations which arise in mathematical descriptions of situations in engineering.
3. To study about a quantity that may take any of a given range of values that can't be predicted as it is but can be described in terms of their probability.
4. To provide a thorough understanding of interpolation and methods to solve ordinary differential equation.

**UNIT-I Laplace transform:** Definition, Transform of elementary functions, Properties of Laplace transform, Transform of derivatives & integrals, Multiplication by  $t^n$ , Division by  $t$ , Evaluation of integrals, Inverse Laplace Transform, Convolution theorem, Unit step function, Unit impulse function, Periodic function, Application to solution of ordinary differential equations.

**UNIT- II Partial differential equation:** Formation, Solution by direct integration method, Linear equation of first order, Homogeneous linear equation with constant coefficients, Non- homogeneous linear equations, Method of separation of variables.

**UNIT- III Random variable:** Discrete and continuous probability distributions, Mathematical expectation, Mean and Variance, Moments, Moment generating function, probability distribution, Binomial, Poisson and Normal distributions.

**UNIT- IV Interpolation with equal and unequal intervals:** Finite differences, Newton's Forward & Backward Difference Formulae, Central Difference Formula, Stirling's Formula, Bessel's Formula, Lagrange's Formula and Newton's Divided Difference Formula.

**UNIT-V Numerical Solution of Ordinary Differential Equations:** Picard's Method, Taylor's Series Method, Euler's Method, Euler's Modified Method, Runge-Kutta Methods, Predictor-corrector Methods- Milne's Method, Adams-Bashforth Method.

## Text Books:

1. "Higher Engg. Mathematics", Dr. B.S. Grewal– Khanna Publishers.
2. "Advanced Engg. Mathematics", Erwin Kreyszig – John Wiley & Sons.
3. "Numerical Methods in Engineering and Science", Dr. B.S. Grewal, Khanna Publishers.
4. "Numerical Methods for Scientific and Engineering Computation", M .K. Jain, S. R. K

## Reference Books:

**Course outcomes:** After studying the contents of the syllabus in detail the students will be able to: Define (mathematically) unit step unit impulse, Laplace transform its properties, inverse and applications to solve ordinary differential equations and find Numerical solution of differential equations, which may be arising due to mathematical modelling based on engineering problems. Hands on these Mathematical topics will make them equipped to prepare for higher studies through competitive examinations.

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester-B.TECH-3<sup>rd</sup>

Subject-Strength of Materials

Total marks in End Semester Exam-100

Branch-Agricultural Engineering

Course Code B094312(037)

L:3 T:1 P:0

Credits-4 Minimum No.

of Class Test:02

## Course Objectives:

To understand various mechanical properties of materials.

To understand how and why the properties of materials are controlled by its structure at the microscopic and macroscopic levels.

To understand how and why the structure and composition of a material may be controlled by processing.

To understand the inter-relationship between composition, structure and properties of engineering materials.

Get knowledge about different materials, their properties and application.

<b>UNIT I</b>	<b>Introduction:</b> Basic of Stress & Strain, elastic constants, stress – strain diagram, Hooke’s law, Poisson’s ratio, shear stresses, stresses in the components subjected to multi-axial forces, thermal stresses, statically indeterminate systems.
<b>UNIT II</b>	<b>(A) Beams:</b> Introduction of Beams, Various type of Beams, Various type of Supports, Reactions at supports, Shear force and bending moment at any section of a beam, Methods for determination of S.F. and B.M. diagrams of beams (simply supported, overhang and cantilever) subjected to various loads, Relation between Shear Force and Bending Moment, Point of contra-flexure. <b>(B) Bending of beams:</b> Bending of beams with symmetric section, boundary conditions, pure bending, and bending equation problems of simple bending.
<b>UNIT III</b>	<b>Deflection of beam:</b> Relation between slope deflection and radius of curvature, solution of beam deflection, problem by Macaulay’s method, Direct integration method, Moment Area Method.
<b>UNIT IV</b>	<b>(A) Torsion:</b> Deformation in circular shaft due to torsion, basic assumptions, torsion equations, stresses in elastic range, angular deflection, hollow & stepped circular shaft. <b>(B) Springs:</b> Types of spring, Closed & Open Coil Helical Springs subjected to Axial Load, springs in parallel & series.
<b>UNIT V</b>	<b>(A) Principal stresses and strain:</b> Transformation of plane stresses, Principal stresses, Maximum shear stresses, Mohr’s circle for plane stresses, Plain strain and its Mohr’s circle representation, Principal strains, Maximum shear strain. <b>(B) Combined Loading:</b> Components subjected to bending, torsion & axial loads. Studies based on Agriculture Engineering Applications.

## Text Books:

1. Material Science & Engg. – A first course – V. Raghavan – PHI(P) Ltd., Delhi, 2003
2. A Text Book of Material Science & Science & Metallurgy, O.P. Khanna, Dhanpat Rai & Sons, New Delhi

## Reference Books:

3. Elements of Material Science & Engg. – Van Vlack. – Addison – Wesley Longman, 6<sup>th</sup> Edn., New York
4. Physical Metallurgy – Clark & Varney, East West Edn., New Delhi
5. Engineering Physical Metallurgy – Lakhtin – CBS Publishers & Distributors
6. Materials Science – Narang – CBS Publishers & Distributors
7. Engineering Materials – Woulf Series.

Physical Metallurgy Principles – Robert E Re3ed Hill – Affiliated East-West Press Pvt. Ltd., New Delhi, 2004

## Course outcomes:

Acquire knowledge and hands-on competence in applying the concepts of material science in the design and development of mechanical systems.

Demonstrate creativeness in designing new systems components and processes in the field of engineering.

Identify, analysis, and solve mechanical engineering problems useful to the society.

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester-B.TECH-3<sup>rd</sup>

Branch-Agricultural Engineering

Subject-Engineering Properties of Biological Materials and Food Quality

Course Code- B094312(094)

Total marks in End Semester Exam-100

L:3 T:1 P:0

Minimum No. of Class Test:02

Credits-4

## Course Objectives:

- To understand various engineering properties of biological materials
- To understand Application of engineering properties in handling processing machines and storage structures.
- To understand aspects of quality control related to food process and food quality
- To understand the Food Laws and Regulations in India

UNIT I	Importance of engineering properties of biological materials, Study of different physical and thermal characteristics of important biological materials like shape, size, volume, density, roundness, sphericity, surface area, specific heat, thermal conductivity, thermal diffusivity, etc.
UNIT II	Measurement of colour, flavor, consistency, viscosity, texture and their relationship with food quality and composition. Rheological characteristics like stress, strain time effects, rheological models and their equations. Aerodynamic characteristics and frictional properties.
UNIT III	Application of engineering properties in handling processing machines and storage structures. Concept, objectives and need of quality, quality control, methods of quality control, sampling.
UNIT IV	Purpose, sampling techniques, requirements and sampling procedures for liquid, powdered and granular materials, sensory quality control, panel selection methods, interpretation of sensory results in statistical quality control, TQM and TQC, consumer preferences and acceptance.
UNIT V	Food Laws and Regulations in India. Food grades and standards BIS, AGMARK, PFA, FPO, CAC (Codex Alimentarius Commission), sanitation in food industry, GMP, HACCP (Hazard analysis and critical control point) and ISO 9000 Series.

## Text Books:

1. Birch G G and Paiker K. J. (1990). Control of food quality and food analysis. Elsevier applied science.
2. Herschoerfer, S. N. (1980). Quality Control in Food Industry. Academic Press Inc.
3. Mohsenin, N. N. (1996). Electrical and Electro-magnetic radiation properties of food and Agricultural materials. Gordon & Breach publishers Inc. U.K.
1. Rao, M.A and Rizui, S.S.H. (1986). Engineering Properties of Foods. Marcell Dekker, New York.
2. Sara, M & Carol Wallace. (1993). HACCP – A Practical Approach. Chapman & Hall, U.K.
3. Singhal, O.P and Samuel, D.V.K. (2003). Engineering Properties of Biological Materials. Saroj Prakashan, Allahabad.

## Course outcomes:

1. Acquire knowledge and hands-on competence in applying the concepts related to Engineering properties of biological materials.
2. Demonstrate creativeness in designing new systems components and processes in the field of engineering.
3. Identify, analysis, and solve agricultural engineering problems useful to the society.

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester-B.TECH-3<sup>rd</sup>

Subject-Farm Power and Renewable Energy Sources

Total marks in End Semester Exam-100

Minimum No. of Class Test:02

Branch-Agricultural Engineering

Course Code- B094314(094)

L:2 T:1 P:0

Credits-3

## Course Objectives:

- To understand various Sources of farm power including conventional & non-conventional energy sources
- To understand Application and selection of engines and their components
- To understand Application and selection of non-conventional energy sources like Solar, biogas etc.

UNIT I:	Sources of farm power – conventional & non-conventional energy sources. Classification of tractors and IC engines. Review of thermodynamic principles of IC (IC & SI) engines and deviation from ideal cycle. Study of engine components their construction, operating principles and functions.
UNIT II:	Engine systems: valves & valve mechanism. Fuel & air supply, cooling, lubricating, ignition, starting and electrical system. Study of constructional details, adjustments & operating principles of these systems.
UNIT III:	IC engine fuels – their properties & combustion of fuels, gasoline tests and their significance, diesel fuel test 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. Engine governing systems.
UNIT IV:	Energy sources, Introduction, Classification, Energy from Biomass, Types of biogas plants, constructional details, Principles of combustion, pyrolysis and gasification, Types of gasifiers, Briquetting, Types of Briquetting machines, Wind energy, Types of wind mills, Constructional details and application of wind mills; Modern applications and future potential of renewable energy sources.
UNIT V:	Solar energy, Solar flat plate and focusing plate collectors, Solar air heaters, Solar space heating and cooling, Solar energy applications/ Solar energy gadgets, Solar cookers, Solar water heating systems, solar grain dryers, Solar Refrigeration system, Solar ponds, Solar photo voltaic systems, solar lantern, Solar street lights, solar fencing, Solar pumping systems.

## Text books:

1. Ballaney, P.L.(1985). Thermal Engineering.KhannaPublishers, Delhi.
2. Donnel Hunt. Farm Power Machinery and management.Iowa State University Press. Ames, USA.
3. Gill Paul, W.,Smith James, H., and Ziurys Eugene, J. (1967)

## Reference Books:

1. Liljedahl John, B. Casleton Walter, M., Turnquist Paul, K., and Smith David, W. (1951). Tractors and Their Power Units, John Wiley & Sons, New-York.
2. Lysen, E.H. (1983). Introduction to Wind Energy. CWD, Netherlands. 3. Mathur, M.L., and Sharma, R.P. (1994).

## Course outcomes:

1. Acquire knowledge and hands-on competence in applying the concepts related to sources of power and related equipments for Agricultural engineering.
2. Demonstrate creativeness in designing new systems components and processes in the field of engineering.
3. Identify, analysis, and solve agricultural engineering problems useful to the society.

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester-B.TECH-3<sup>rd</sup>

Subject-Crop Production Technology

Total marks in End Semester Exam-100

Minimum No. of Class Test:02

Branch-Agricultural Engineering

Course Code- B094315(094)

L:2 T:0 P:0

Credits-2

## Course Objectives:

To introduce the students to principles of agricultural and horticultural crop production and to introduce the production practices of crops.

To delineate the role of agricultural and irrigation engineers in relation to various crop production practices.

UNIT I	Soils: Nature and origin of soil; soil forming rocks and minerals, their classification and composition, soil forming processes, classification of soils – soils taxonomy orders; important soil physical properties; and their importance; soil particle distribution; soil inorganic colloids – their composition, properties and origin of charge; ion exchange in soil and nutrient availability; soil organic matter – its composition and decomposition, effect on soil fertility; soil reaction – acid, saline and sodic soils.
UNIT II	Quality or irrigation water; essential plants nutrients – their functions and deficiency symptoms in plants; important inorganic fertilizers and their reactions in soils. Horticulture: Scope of horticultural and vegetable crops. Soil and climatic requirements for fruits, vegetables and floriculture crops, improved varieties.
UNIT III	Agronomy: Definition and scope of agronomy. Classification of crops, Effect of different weather parameters on crop growth and development. Principles of tillage, tith and its characteristics.
UNIT IV	Soil water plant relationship and water requirement of crops, weeds and their control, crop rotation, cropping systems, Relay cropping and mixed cropping. Garden tools, management of orchard, Extraction and storage of vegetables seeds.
UNIT V	Criteria for site selection, layout and planting methods, nursery raising, macro and micro propagation methods, plant growing structures, pruning and training, fertilizer application, fertigation, irrigation methods, harvesting, grading and packaging, post harvest practices.

## Text books:

1. Bose, T.K and S.K. Mitra. (1990). Fruits, Tropical and Subtropical. NayaPrakash, 206 Bidhan saran, Calcutta.
2. Brady, Nyle C. (1988). The nature and properties of Soils. Eurasia Publishing House Pvt Ltd. New Delhi.

## Reference books:

1. De, G.C. (1989). Fundamentals of Agronomy. Oxford & IBH Publishing Co Pvt Ltd, New Delhi.
2. Russel. Soil Condition and Plant Growth. ELBS, Longmans, U.K.

## Course outcomes:

Acquire knowledge on crop selection, crop production, crop management.

Knowledge in the area of production of agricultural and horticultural crops.

Demonstrate creativeness in designing new systems components and processes in the field of engineering.

Identify, analysis, and solve agricultural engineering problems useful to the society.

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester-B.TECH-3<sup>rd</sup>

Subject-Engg. Properties of Biological Materials and Food Quality Lab

Total marks in End Semester Exam-40

Branch-Agricultural Engineering

Course Code B094321(094)

L:0 T:0 P:2

Credits-1

*List of Experiments: (At least eight experiments are to be performed by each student)*

1. To find the shape and size of grains and fruits and vegetables.
2. To determine bulk density and angle of repose of grains.
3. To determine the particle density/true density and porosity of solid grains.
4. To find out the coefficient of external and internal friction of different crops;
5. To study the separating behaviour of a grain sample in a vertical wind tunnel (Aspirator column).
6. To find the thermal conductivity of different grains. To determine specific heat of some food grains.
7. To determine cooking quality of rice. To determine impurities and invisible stress cracks in grains.
8. Preparation of a ready reckoner of change in unit weight of food grains as affected by change in its moisture content (w.b.) (5% - 25%). Milling quality of paddy;
9. Determination of hardness of food material; Detection of adulteration in food products viz. milk, ghee, honey etc.

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester-B.TECH-3<sup>rd</sup>  
Subject-Farm Power And Renewable Energy Sources Lab  
Total marks in End Semester Exam-40

Branch-Agricultural Engineering  
Course Code-B094322(094)  
L:0 T:0 P:02 Credits-1

*List of Experiments: (At least Ten experiments are to be performed by each student)*

1. Introduction to different systems of CI engine; Engine parts and functions, working principles etc.
2. Valve system – study, construction and adjustments.
3. Air cleaning system and Fuel supply system of SI engine.
4. Diesel injection system & timing.
5. Cooling system and fan performance, thermostat and radiator performance evaluation; Part load efficiencies & governing.
6. Lubricating system & adjustments.
7. Starting and electrical system and Ignition system.
8. Tractor engine heat balance and engine performance curves.
9. Preparation of biomass sample and determination of calorific value.
10. Estimation of ash content and moisture content of biomass.
11. Estimation of fixed carbon and volatile matter of biomass.
12. Demonstration of down draft throatless and with throat rice husk gasifier.
13. Demonstration of working of a fixed dome type biogas plants.
14. Demonstration of working of a floating drum type biogas plants.
15. Demonstration of biodiesel preparation.
16. Measurement of basic solar parameters and demonstration of solar water heater.
17. Demonstration of solar cooker.

# Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester-B.TECH-3<sup>rd</sup>

Subject-Crop Production Technology Lab

Total marks in End Semester Exam-40

Branch-Agricultural Engineering

Course Code- B094323(094)

L:0 T:0 P:2

Credits-1

*List of Experiments: (At least Ten experiments are to be performed by each student)*

1. Field preparation studies
2. Seed selection and seed treatment procedures
3. Seed bed and nursery preparation
4. Sowing / Transplanting
5. Biometric observation for crops
6. Nutrient management studies
7. Water management and irrigation scheduling
8. Weed management studies
9. Integrated Pest Management studies
10. Harvesting
11. Post harvesting
12. A wet land / garden land for a minimum of 5 cents area for each / group of students.
13. An open / borewell as water source to support cultivation



# Chhattisgarh Swami Vivekanand Technical University, Bhilai

**Name of Program: Bachelor of Technology**

**Branch: Agricultural Engineering**

**Subject: SOFTWARE LAB(AutoCAD)**

**Total Lab Periods: 24**

**Maximum Marks -40**

**Semester: III**

**Subject Code: B094324(094)**

**Batch Size - 30**

**Minimum marks-20**

**List of Experiments:** *(At least ten experiments are to be performed by each student)*

1. Practicing basics in AutoCAD.
2. Drawing 2-D figures using AutoCAD
3. Learning different operations like threading, sweep and swept blend
4. Preparation of manual drawings with dimensions from Models and Isometric drawings of objects and machine components;
5. Preparation of sectional drawings of simple machine parts;
6. Drawing of riveted joints and thread fasteners;
7. Demonstration on computer graphics and computer aided drafting use of standard software;
8. Practice in the use of basic and drawing commands on auto cad;
9. Generating simple 2-D drawings with dimensioning using auto cad;
10. Practice in the use of modify and rebelling commands;
11. Practice in graphics mathematics,
12. Practice in curve fitting and transformations;
13. Demonstration on CNC machine

**Equipments:** Computers and Software

1. AutoCAD 2013
2. CREO 3.0

**Reference Book:**

1. Engineering graphics with AutoCAD – R.B Choudary / Anuradha publishers