MAHAMAYA TECHNICAL UNIVERSITY,
NOIDA

Syllabus

(Effective from the Session: 2012-13)

B. TECH. FIRST YEAR COURSES

MAHAMAYA TECHNICAL UNIVERSITY

SCHEME OF EVALUATION B. TECH. FIRST YEAR (effective from the academic year 2012-13)

SEMESTER- I

S N	Code	Subjects	Periods			Evaluation Scheme						Total	Credit
			L	T	P	Sessional				End Semester			
						CT	TA	TOT	P	Th	P		
1	AS101*	Engineering Mathematics - I	3	1	0	30	20	50	-	100	-	150	4
2	AS102	Engineering Physics - I	3	0	2	15	10	25	15	80	30	150	4
3	CS101/ ME101*	Computer Programming/ Engineering Mechanics	3	1	2	20	10	30	15	100	30	175	5
4	EE101/ EC101	Electrical Engineering/ Electronics Engineering	3	1	2	20	10	30	15	100	30	175	5
5	AS103/ ME102	Engineering Chemistry/ Manufacturing Practices	3 2	0 1	2 2	15 15	10 10	25 25	15 25	80 50	30 50	150	4
6	**/ CE101	Branch Elective/ Energy, Environment and Ecology	3 3	0 0	0 0	10 10	10 10	20 20	- -	80 80	- -	100	3
7	AS105 / CE102	Professional Communication / Computer Aided Engineering Graphics	0 0	1 1	2 2	-	-		20		30	50	2
8	GP101	General Proficiency							50	-	-	50	-
			18/17	4/5	10							1000	27

*Syllabi of these courses are different for Biotechnology and Agricultural Engineering.

**LIST OF BRANCH ELECTIVES

AS104/AS204 Introduction to Bio Sciences (CS/EC/EE/EN/IC/EI/IT/BT/TE)
ME103/ME203 Manufacturing Science (ME/AU/MT/Chemical)
CE103/CE203 Geological Sciences (Civil Engineering)
AG102/AG 202 Material Science (Agriculture Engineering)

L: Lecture T: Tutorial P: Practical/Project CT: Class Test TA: Teacher's Assessment and Attendance Th: Theory TOT: Total

SEMESTER- II

S N	Code	Subjects	Periods			Evaluation Scheme						Total	Credits
			L	T	P	Sessional				End Semester			
						CT	TA	TOT	P	Th	P		
1	AS201*	Engineering Mathematics - II	3	1	0	30	20	50		100	-	150	4
2	AS202#	Engineering Physics – II /(E/M/C)	3	0	2	15	10	25	15	80	30	150	4
3	ME201* / CS201	Engineering Mechanics/ Computer Programming	3	1	2	20	10	30	15	100	30	175	5
4	EC201 / EE201	Electronics Engineering/ Electrical Engineering	3	1	2	20	10	30	15	100	30	175	5
5	ME202 / AS203	Manufacturing Practices / Engineering Chemistry	2 3	1 0	2 2	15 15	10 10	25 25	25 15	50 80	50 30	150	4
6	CE201 /**	Energy, Environment and Ecology / Branch Elective	3 3	0 0	0 0	10 10	10 10	20 20	- -	80 80	- -	100	3
7	CE202 / AS205	Computer Aided Engineering Graphics/ Professional Communication	0 0	1 1	2 2	-	-	-	20		30	50	2
8	GP201	General Proficiency							50	-	-	50	-
			17/18	5/4	10							1000	27

Engineering Physics II paper will have two parts; first three units will be common for all branches and fourth and fifth units will be branch specific.
Engineering Physics II (E) – for Electrical/ Electronic etc
Engineering Physics II (M) – for Mechanical / Automobile / Chemical / Civil /BT/Ag etc
Engineering Physics II (C) - CS/ IT etc

TA =10 (5 for teachers assessment plus 5 for attendance),

TA=15 (10 for teachers assessment plus 5 for attendance),

TA=20 (10 for teachers assessment plus 10 for attendance)

Note: *Grouping of batches will be done in a way that groups select either all subjects given in numerator or denominator, choice of mix of numerator and denominator is not permitted.*

B. Tech. I Semester

(Common to all branches except Biotechnology and Agricultural engineering branches)

1. Title of the course: AS 101 Engineering Mathematics – I

2. Work load per week

a. Lecture (L): 3 hrs/week Total Lecture Hours per Semester: 45

b. Tutorials (T): 1 hrs/week Total Tutorial Hours per Semester: 14

c. Total Credits: L+T+P 4

d. One credit is defined as one lecture load per week and two hours of self-study to be connected with tutorial and assignments.

3. Prerequisites of the course: Knowledge of mathematics of Intermediate of U.P. Board or equivalent.

4. Prerequisite for which next course: This course is prerequisite for

- AS-201 , Engineering Mathematics – II
- AS-301 , Engineering Mathematics – III

5. Why you need to study this course: Engineering Mathematics is one of the important tools of engineering .It is essential for an engineering student to know the mathematical terminology, concept and methods used in various engineering disciplines.

Course Objective:

Basic idea of the course will be to introduce the basic concept of differential calculus (ordinary and partial both), multiple integrals, vector calculus and matrices to understand the different subjects of engineering as well as basic sciences.

6. Learning outcomes expected from the course:

At the completion of this Course, student will have the basic skills required to:

a. Understand the concept of ordinary differential equation as well as partial differential equation which are useful to all branches of engineering.

b. The concept of "rank" in matrix will enable the students to obtain important results regarding linear dependence, and also regarding the existence and uniqueness of solutions of the linear system of equations.

c. The concept of vector calculus will enable the students to understand

fluid flow in mechanics, to understand heat flow, in potential theory to find the solution of Laplace equation.

d. Be able to understand the Fourier series, Special functions, Fourier Transforms and other functions in higher mathematics.

7. Details of the syllabi:

Unit	Topic	Text Book/Topic	Lectures
I	Differential Calculus-I • Determination of n^{th} derivative of standard functions-illustrative examples*. • Leibnitz's theorem (without proof) and problems. • Taylor's and Maclaurin's series for one variable (without proof). • Differential coefficient of length of arc (concept and formulae without proof). • Curvature – Cartesian formula for radius of curvature, centre of curvature. • Asymptotes for cartesian coordinates only. Curve tracing (cartesian & polar coordinates), simple problems. *Note:*in the case of illustrative examples, questions are not to be set.*	Text Book 1 2.1 2.2 2.8 2.10 2.11 5.1-5.3	9
II	Differential Calculus-II • Partial Differentiation. Euler's theorem. Change of variables. • Jacobians. • Approximation of errors.	Text Book 1 3.2-3.7 3.8	9

	• Expansion of functions of several variables (without proof). • Extrema function of several variables. • Lagrange's Method of Multipliers (simple problems only). • Envelopes. Evolutes.	3.10 4.1 4.2 4.3 2.12,2.13	
III	Multiple Integrals • Double Integral. • Triple Integral. • Change of Order of Integration. • Change of Variables. • Application of double and triple integrals to area and volume. • Beta and Gamma functions. • Dirichlet's integral and application.	Text Book 1 7.1 7.5 7.3 7.4 7.2,7.6 11.1,11.2 5.7	9
IV	Vector Calculus • Vector differentiation, Vector point function. • Gradient, divergence and curl of a vector point function and their physical interpretation. • Vector integration: Line, surface and volume integrals. • Statement of Green's, Stoke's and Gauss divergence theorems (without proof) and problems.	Text Book 1 15.1 15.2-15.5 16.2-16.4 16.5-16.7	9

V	Matrices • Elementary row and column transformation rank of a matrix. • Linear dependence, consistency of linear system of equations and their solution. • Characteristic equation .Cayley-Hamilton theorem. Eigen values and Eigen vectors, diagonalization. • Complex and unitary matrices. • Application of matrices to engineering problems.	Text Book 1 13.2-13.3 13.4-13.5 14.2-14.5 14.9 Ref. Book 1,8.2	8

Text Books:-

1. B. V. Ramana, Higher Engineering Mathematics, Tata Mc Graw-Hill Publishing Company Ltd., 2008.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher, 2005.
3. Babu Ram , Engineering Mathematics, Pearson.

Reference Books:-

1. E.Kreyszig, Advance Engineering Mathematics, John Wiley & Sons,2005.
2. Peter V. O'Neil, Advance Engineering Mathematics, Thomson (Cengage)Learning,2007.
3. Maurice D. Weir, Joel Hass, Frank R.Giordano, Thomas, Calculus, Eleventh Edition ,Pearson.
4. R. K. Jain & S. R. K. Iyenger , Advance Engineering Mathematics , Narosa Publishing -House, 2002.

10. Laboratory work: Not required.

11. Evaluation methodology to be followed:

The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.

b. Quizzes

c. Home-works and assignments

d. Sessional examinations

e. Final examination

12. Award classification

Assessment procedure will be as follows:

• Class attendance and participation in discussions will be based on:

a. Substantial in-class contribution about class topics and discussion questions.

b. Response to other students' queries

c. Contribution in discussion and chat sessions

• Quizzes

a. Quizzes will be of type multiple choice, fill-in-the-blanks or match the columns.

b. Quizzes will be held periodically

• Home works and assignments

a. The assignments/home-works may be of multiple choice type or comprehensive type.

b. They will be available online but submission will be carried out in handwritten form.

c. The grades and detailed solutions of assignments (of both types) will be accessible online after the submission deadline.

• Sessional and Final examinations

a. These will be comprehensive examinations held on-campus (Sessionals) or off-campus (External) on dates fixed by the Mahamaya Technical University.

B. Tech. I Semester

(Common to all branches)

1. Title of the course: AS102 Engineering Physics -I

2. Work load per week

a. Lecture (L): 3 hrs/week Total Lecture Hours per Semester: 42

b. Practicals (P): 2 hrs/week Total Lab Hours per Semester: 28

c. Total Credits: L+T+P based 4

d. One credit is defined as one lecture load per week and two hours of self-study to be connected with tutorial, practical work book and assignments.

3. Prerequisites of the course: As a prerequisite for this course on Engineering physics I, knowledge of elementary physics like Mechanics, Optics, Waves upto the level of 10+2 is essentially required.

4. Prerequisite for which next course: This course is prerequisite for

- AS-201 Engineering Physics II
- Optical Fiber Communication
- Laser System and Application
- Electromagnetic Waves and its applications

5. Why you need to study this course:

Engineering subjects cannot be understood without the sound knowledge of Physics. With proper understanding of this subject the knowledge gained can be applied for the development of new engineering devices. In the age of information technology, the knowledge of computing will remain unfulfilled till the quantum computing is fully understood and implemented for the further development of new computing devices. Optical fiber communication cannot be understood till the wave propagation mechanism with help of electromagnetic waves (Maxwell's Theory) is not properly understood.

Course Objective:

Basic idea of the course will be to introduce the basic concepts required to understand the formation of wave, characteristics of waves and its propagation, Fiber structure and relativistic mechanics. The course has been built for first year undergraduate students and targeted as general course for all branches of engineering.

6. Learning outcomes expected from the course:

At the completion of this Course, student will have the basic skills required to:

a) Understanding of different frame of reference, relativistic mechanics and its application

b) Understanding of basics vector calculus, formation and conduction of wave in different medium with application of Maxwell's equation

c) Understanding of physical optics and its application in devices

d) Basic understanding of principle of working of LASER and its basic industrial and scientific applications

e) Basic understanding of the structure of optical fiber, propagation mechanism of waves and its loss through the fiber. Industrial application of optical fiber

7. Details of the syllabi:

Unit	Topic	Text Book/ Topics	Lectures
I	Relativistic Mechanics • Inertial & non-inertial frames, • Galilean transformation equations, • Michelson-Morley experiment, Einstein's postulates, • Lorentz transformation equations, • Length contraction & time dilation, • Addition of velocities, Variation of mass with velocity, • Mass energy equivalence.		07
II	<u>Electromagnetics</u> • Recapitulation of vector product, Gradient, Divergence & Curl, • Statement and explanation of Gauss divergence & • Stokes theorems, useful vector identities. • Maxwell's equations (Integral and differential forms) • Equation of continuity, Transverse nature of EM waves, • EM - wave equation and its propagation characteristics in free-space, Poynting vector.		7
III	<u>Interference</u> • Spatial and temporal coherence • Interference in thin films of uniform thickness and in wedge-shaped film (qualitative), • Newton's rings, • anti reflection and high reflection coatings (qualitative), interference filters(qualitative).		8

	• Diffraction • Single and N- slit diffraction, • Grating spectra, • Rayleigh's criterion of resolution, • Resolving power of grating		
IV	Polarization: • Polarization by reflection and refraction, Double refraction, • Nicol prism, Sheet polarizer, Production and analysis of plane, • circularly and elliptically polarized lights, • Basic concepts of optical activity, Polarimeter (Half shade). Laser: • Spontaneous and stimulated emission of radiation, • Einstein's coefficients, Construction and working of Ruby, • He-Ne and semiconductor lasers, Important laser applications(qualitative).		7
V	Fiber Optics : • Fundamental ideas about optical fibers, Types of fibers, • Acceptance angle and cone, Numerical aperture, • Propagation mechanism and communication in optical fiber, Attenuation, • Signal loss in optical fiber and dispersion. Holography • Basic principles of holography, Construction of hologram and wave reconstruction, • Applications of holography (qualitative).		6

9. Reference Material:

(i) J. W. Jewett Jr., R.A. Serway, Physics for scientists & engineers with modern physics (Cengage learning 2nd Indian reprint 2011).

(ii) A. Beiser,Concepts of Modern Physics, (Mc-Graw Hill).
(iii) Robert Resnick,Introduction to special theory of relativity (Wiley).
(iv) Ajoy Ghatak,Optics (Tata Mc-Graw Hill).
(v) Resnick, Hallidey and Walker Fundamental of Physics (Wiley).
(vi) David J. Griffith ,Introduction to Electrodynamics (Prentice-Hall India).
(vii) S. D. Jain and G. Sahasrabudhe, Engineering Physics (Universities Press).
(viii) K. Rajagopal, Engineering Physics (Prentice-Hall India).
(ix) G. Aruldhas, Engineering Physics (Prentice-Hall India).

10. Laboratory work: As per the Engineering Physics Lab Syllabus

11. Evaluation methodology to be followed:

The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.
b. Quizzes
c. Home-works and assignments
d. Projects
e. Sessional examinations
f. Final examination

12. Award classification

Assessment procedure will be as follows:

- Class attendance and participation in discussions will be based on:
  a. Substantial in-class contribution about class topics and discussion questions
  b. Response to other students' queries
  c. Contribution in discussion and chat sessions

- Quizzes
  a. Quizzes will be of type multiple choice, fill-in-the-blanks or match the columns.
  b. Quizzes will be held periodically

- Home works and assignments
  a. The assignments/home-works may be of multiple choice type or comprehensive type.
  b. They will be available online but submission will be carried out in handwritten form.
  c. The grades and detailed solutions of assignments (of both types) will be accessible online after the submission deadline.

- Projects
  a. Will be assigned in the mid-part of the course and should be completed and submitted before the end of the course.
  b. The presentation and grading will be available online.

- Sessional and Final examinations
  a. These will be comprehensive examinations held on-campus (Sessionals) or off-campus (External) on dates fixed by the Mahamaya Technical University.

AS102P ENGINEERING PHYSICS LAB

Course Objective:

1. To become familiar with various optical devices.
2. To become familiar with usage of data sheet of various components
3. To become familiar with circuit testing
4. To measure and calibrate basic electrical devices

Course Pre requisites:

Basic knowledge of Electricity, Magnetism, Semiconductor Physics and Optics

Course Content:

Exp. No.	Experiment	Objective	Expected Outcome
1	To determine the wavelength of monochromatic light by Newton's rings	• To visualize coherent sources • Measurement of Wavelength	Should learn to handle travelling microscope and form thin films and measure the wavelength
2	To determine the wavelength of monochromatic light with the help of Fresnel's biprism.	• Use of optical benches • Measurement of wavelength of monochromatic sources • Mechanism of formation of interference pattern	Should learn formation of interference pattern on the screen and measure wavelength
3	To determine the specific rotation of cane sugar solution using polarimeter	• To visualize the rotation of plane of vibration of polarized light • Handling of polarimeter	Should learn about rotation of plane of vibration of polarized light and measure its specific rotation
4	To determine the wavelength of spectral lines of mercury vapour lamp using plane transmission grating.	• Visualization of diffraction pattern • Use of optical spectrometer	Should learn the formation of diffraction pattern on optical spectrometer and measure the wavelength of different spectral lines
5	Measurement of wavelength of a laser light using single slit diffraction	• Formation of diffraction pattern using laser source • Handling of laser source	Should learn the formation of diffraction pattern on screen and measure the wavelength o spectral line of laser source
6	Measurement of fiber attenuation and aperture of fiber.	• Handling of optical fiber	Should learn the measuremen of attenuation

		• Using laser source	
7	To determine the specific resistance of a given wire using Carey Foster's bridge	• Understanding of balanced bridge condition • Use of standard cell	Should learn to calculate specific resistance of given sample
8	To study the variation of magnetic field along the axis of a current carrying circular coil and then to estimate the radius of the coil.	• Learning Biot-Savart Law • Study the bariation of magnetic field with distance	Should learn to calculate radius of given coil
9	To verity Stefan's law by electrical method	• Understanding of black body radiation	Should learn verify Stefan's law
10	To calibrate the given ammeter and voltmeter by potentiometer	• Understanding of electrical circuits • Concept of calibration of electrical devices	Should learn to calibrate given ammeter and voltmeter
11	To determine E.C.E. of copper using tangent galvanometer.	• Understanding of application tangent galvanometer • Understanding of point of magnetic meridian	Should learn to calculate ECE of copper
12	To determine the coefficient of viscosity of a liquid	• Understanding of stream line motion • Handling of Poiseuille's apparatus	Should learn to calculate coefficient of viscosity of liquid.

Outcome of the course:

The students are expected to compare experimental results with theoretical concepts, speculate reasons for discrepancies, and learn from deductive reasoning.

B. Tech. I/II Semester

(Common to all branches)

1. Title of the course: CS101/CS201 Computer Programming

2. Work load per week

a. Lecture (L): 3 hrs/week	Total Lecture Hours per Semester: 42
b. Tutorial (T): 1 hrs/week	Total Tutorial Hours per Semester: 14
c. Practicals (P): 2 hrs/week	Total Lab Hours per Semester: 28
c. Total Credits: L+T+P based	5

3. Contents

UNIT I:

Introduction to Computer System: Hardware, Software-system software, & application software; Introduction to Computing Environment; Introduction to Problem solving and notion of algorithm: Flow charting, Pseudo code, corresponding sample C-programme, Testing the code; Number Systems and their conversion: Decimal, Binary, Octal and Hexadecimal representations, bit, byte; Character representation: ASCII, sorting order; System software re-visited: machine language, symbolic language, higher lever languages, what is a compiler, what is an operating system, what is a linker, what is an editor, error handling; Introduction to programme development.

UNIT II:

Structure of a C-program, comments, identifiers; Fundamental Data Types: Character types, Integer, short, long, unsigned, single and double-precision floating point, complex, boolean, constants; Basic Input/Output: printf, formatting, scanf, eof errors; Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associatively, Functions in C: standard function, defining a function, inter-function communication- passing arguments by value, scope rules and global variables; Top-down program development.

UNIT III:

Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch; Program Loops and Iteration: Uses of while-do and for loops, multiple loop variables, assignment operators, using break and continue; Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size

UNIT IV:

Sequential search, Sorting arrays; Strings, Recursion; Text files, file Input/Output - fopen, fread, etc Structures: Purpose and usage of structures, declaring structures, assigning of structures, Pointers to Objects: Pointer and address arithmetic, pointer operations and declarations, using pointers as function arguments

UNIT V:

Familiarization with Linux OS environment: basic OS commands, directory creation, editing, storing and protecting access to files; Open-office; Text files in Indian languages: keyboarding, editing, searching; The

Standard C Preprocessor: Defining and calling macros, utilizing conditional compilation, passing values to the compiler, string handling functions,

Lecture-wise Breakup

Week	Lecture 1	Lecture 2	Lecture 3	Lab Meeting
Week-1	Introduction to Computer System: Hardware, Software-system software, & application software; Introduction to Computing Environment;	Introduction to Problem solving and notion of algorithm: Flow charting, Pseudocode,	corresponding sample C-programme, Testing the code;	Get familiar with OS and C compiler Implement and Test Small Routine in C
Week-2	Number Systems and their conversion: Decimal, Binary and Hexadecimal representations, bit, byte;	Number Systems and their conversion: Decimal, Binary and Hexadecimal representations, bit, byte;	Character representation: ASCII, sorting order	Implement and Test Small Routine in C
Week-3	System software re-visited: machine language, symbolic language, higher lever languages, what is a compiler, what is an operating system, what is a linker, what is an editor, error handling	Introduction to programme development; Structure of a C-program, comments, identifiers	Fundamental Data Types: Character types, Integer, short, long, unsigned,	Implement and Test a moderate size Routine in C
Week-4	Data Types and Variable single and double-precision floating point, complex, boolean, constants;	Basic Input/Output: printf, formatting, scanf, eof errors;	Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion,	Evaluation of Expression Basic I/O
Week-5	Logical operators, Bit operations, Operator precedence and associatively,.	Functions in C: standard function, defining a function,	Inter-function communication-passing arguments by value, scope rules and global variables; Top-down program development	Evaluation of Expression Function
Week-6	if and switch statements,	nesting if and else, restrictions on switch values,	use of break and default with switch;	Iteration
Week-7	Repetition structure in C: while-do	Repetition structure in C: for loops	Repetition structure in C: multiple loop variables,	Iteration, Function

			assignment operators, using break and continue;	
Week-8	Arrays: Array notation and representation, manipulating array elements,	using multidimensional arrays, arrays of unknown or varying size	Sequential search, Sorting arrays	Arrays
Week-9	Sorting	Strings,	Recursion	Sorting & searching
Week-10	Recursion	Text files, file Input/Output - fopen, fread, etc	Structures: Purpose and usage of structures, declaring structures, assigning of structures,	Strings, Recursion
Week-11	Pointers to Objects: Pointer and address arithmetic,	pointer operations and declarations,	using pointers as function arguments	Pointers
Week-12	Linux OS environment: basic OS commands,	directory creation, storing and protecting access to files	editing, open-office	Use of Unix platform (making directory, copy edit and store file, running a sample program already developed)
Week-13	Text files in Indian languages: keyboarding,	Text files in Indian languages: editing, searching	The Standard C Preprocessor: Defining and calling macros,	Hindi text document processing
Week-14	utilizing conditional compilation, passing values to the compiler, string handling functions,	Std C Library	Std C Library	Macros, Library

Text Books :

1. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition [India Edition], 2007.

For Linux:

1. LINUX : LEARNING THE ESSENTIALS by K. L. JAMES, published by PHI
2. Guide to UNIX and LINUX by Harley Hahn published by TMH

A few web-links for tutorials/resources:

http://www.cprogramming.com/tutorial.html
http://www.pixel2life.com/publish/tutorials/760/_c_beginner_examples_tutorial/
http://www.loirak.com/prog/ctutor.php
http://www.ee.surrey.ac.uk/Teaching/Unix/
http://fclose.com/b/linux/3423/tutorials-for-linux-beginners/
http://www.linux-tutorial.info/
http://www.roseindia.net/linux/tutorial/
http://www.tdil.mit.gov.in/

B. Tech. I / II Semester

(Common to all branches except Biotechnology and Agricultural engineering branches)

1. Title of the course: ME101/ME201 Engineering Mechanics
2. Work load per week

a. Lecture (L): 3 hrs/week	Total Lecture Hours per Semester: 42
b. Tutorials (T): 1 hr/week	Total Tutorial Hours per Semester: 14
c. Practicals (P): 2 hrs/week	Total Lab Hours per Semester: 28
d. Total Credits: L+T+P based	5

e. One credit is defined as one lecture load per week and two hours of self-study to be connected with tutorial, practical work book and assignments.

3. Prerequisites of the course if any:

The subject requires basic knowledge of mathematics and elementary concept of Vector Calculus. Prior knowledge of Physics is useful but not indispensable

4. Prerequisite for which next course:

Engineering Mechanics is the fundamental subject for many engineering disciplines like Mechanical, Civil, Electrical, Chemical, Aeronautical and Naval Engineering etc. A thorough knowledge of this subject is a prerequisite for pursuing these disciplines as well as for other disciplines in their 1st year course as followed by most of the Indian universities. It lays the foundation for the subjects like Strength of Materials, Machine Design, Theory of Machine, Dynamics of Machines, Structure Mechanics etc.

5. Why you need to study this course.

Engineering Mechanics is both a foundation and provides a framework for most of the branches of engineering. Most of the subjects in areas such as Mechanical, Civil and Aerospace are based upon the subjects of Statics and Dynamics. Even in disciplines such as Electrical Engineering and Mechatronics the course is useful in understanding the working of Electrical/ Robotics devices. An added benefit of studying Engineering Mechanics is that it strengthens problem solving abilities of students.

6. Learning outcomes expected from the course:

1. The ability to understand basic concepts of force systems, motion, work and energy.
2. The ability to visualize, formulates, analyze and solve engineering problems.
3. The ability to understand scientific principles and apply them to the practice of engineering problems
4. The ability to predict the applications of force and motion while carrying out the design of engineering members.
5. The ability to design and conduct experiments, as well as to analyze and interpret data

7. Details of the syllabus:

Unit	Topic	Text Book/ Topics	Lectures
I	Two Dimensional Concurrent Force Systems: • Basic concepts • Units • Force System • Law of motion • Moment and couple • Vectors - Vectorial representation of forces and moments • Vector operations • Principle of Transmissibility of forces • Resultant of a force system • Equilibrium and Equations of Equilibrium • Equilibrium conditions • Free body diagrams • Determination of reaction • Resultant of Two dimensional concurrent forces, Applications of concurrent forces	Text Book 1 1.1 to 1.4 1.5 3.4 1.7 4.2, 4.4 2.2, 4.2 2.4 3.3 3.5 5.1 5.3, 5.3.1, 5.3.3 5.2 5.3.3 3.6, 5.3.1	8
II	Two Dimensional Non-Concurrent Force Systems: • Basic concepts • Varignon's theorem • Transfer of a force to parallel position • Distributed force system • Converting force into couple and vice-versa, applications • Types of supports and their reactions Friction: • Introduction • Laws of Coulomb Friction • Equilibrium of Bodies involving Dry-friction • Ladder friction • Belt friction Structure: • Plane truss • Perfect and imperfect truss • Assumption in the truss analysis • Analysis of perfect plane trusses by the method of joints • Method of section	Text Book 1 4.1 4.2.2 4.5 4.6 4.6, 4.7 Text Book 2 3.8 Text Book 1 6.1 to 6.7 6.3 6.8, 6.9 6.10 7.4, 7.4.1, 7.4.6 7.5 4.1 4.2 4.3 4.6 4.7	10
III	Centroid and Moment of Inertia: • Centroid of plane, curve, area, volume and composite bodies • Moment of inertia of plane area • Parallel Axes Theorem • Perpendicular axes theorems • Mass moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their Axis of Symmetry • Polar moment of inertia	Text Book 1 8.4, 8.5.1 to 8, 8..7 9.6.1 to 4 9.4 9.5 10.5.2,10.6.1, 10.6.3, 10.6.4 9.5	8

IV	Kinematics of Rigid Body: • Introduction • Plane rectilinear motion of rigid body • Plane curvilinear Motion of Rigid Body • Velocity and Acceleration under Translation and Rotational Motion • Relative velocity	Text Book 1 12.1 12.2, 12.4 13.1 12.5, 12.5.1, 12.6, 13.5, 13.6 Text Book 2 12.1 to 12.5	8
V	Kinetics of rigid body: • Introduction • Force, Mass and Acceleration • Work and Energy • Impulse and Momentum • D'Alembert's Principles and Dynamic Equilibrium	Text Book 1 14.1 14.2,14.3,14.4 15.1 to 15.8 16.1, 16.2, 16.3 14.5	5
	Virtual work: • Virtual displacement and virtual work • Principle of virtual work • Stability of equilibrium • Application of virtual work on frames • Lifting machines and ladders	Text Book 1	3

8. Text books to be used:

1. A. Nelson "Engineering Mechanics : Statics and Dynamics", The McGraw-Hill Companies., 4th Reprint , 2012
2. S. S. Bhavikatti "Engineering Mechanics", New Age International Publishers, Second Edition, July 1998.

9. Reference materials including web sources

1. "Engineering Mechanics Statics" , J.L Meriam , Seventh Edition, Wiley
2. "Engineering Mechanics Dynamics" , J.L Meriam , Seventh Edition Wiley
3. "Engineering Mechanics", V. Jayakumar, Prentice Hall of India Private Limited.
4. " Engineering Mechanics", D. S. Kumar, S. K. Kataria and Sons Publications
5. "Engineering Mechanics" Irving H. Shames, Prentice Hall of India
6. "Engineering Mechanics : Statics and Dynamics", R. C. Hibbler, Twelfth Edition , Prentice Hall
7. "Mechanics of Solids", Abdul Mubeen, Pearson Education Asia.
8. "Mechanics of Materials", E.P.Popov, Prentice Hall of India Private Limited.
9. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/engg_mechanics/index.htm
10. http://nptel.iitm.ac.in/video.php subjectId=112103108
11. http://www.youtube.com/watch?v=LG0YzGeAFxk
12. http://www.youtube.com/watch?v=eQfjGnCHBzc
13. http://www.nptelvideos.com/engineering_mechanics/
14. http://www.learnerstv.com/Free-Physics-Video-lectures-ltv057-Page1.htm
15. http://www.cosmolearning.com/video-lectures/fundamentals-of-engineering-mechanics-11354/
16. http://www.cosmolearning.com/video-lectures/fundamentals-of-engineering-mechanics-11354/

10. Laboratory work:

As per the EM (Engineering Mechanics Lab) Syllabus

11. Evaluation methodology to be followed:

The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.
b. Quizzes
c. Home-work and assignments
d. Projects
e. Sessional examinations
f. Final examination

12. Award classification

Assessment procedure will be as follows:

• Class attendance and participation in discussions will be based on:
  a. Substantial in-class contribution to class topics and discussion questions
  b. Response to other students' queries
  c. Contribution to discussion and chat sessions
• Quizzes
  a. Quizzes will be of multiple choice, fill-in-the-blanks or match the columns type.
  b. Quizzes will be held periodically
• Home work and assignments
  a. The assignments/home-work may be of multiple choice or comprehensive type.
  b. They will be available online but submission and be carried out in handwritten form.
  c. The grades and detailed solutions of assignments (of both types) will be accessible online after the submission deadline.
• Projects
  a. Will be assigned in the mid-part of the course and should be completed and submitted before the end of the course.
  b. The presentation and grading will be available online.
• Sessional and Final examinations
  a. There will be comprehensive examinations held on-campus (Sessionals) or off-campus (External) on dates fixed by Mahamaya Technical University.

ME101P//ME201P Engineering Mechanics Lab

Course Objective:

1. To learn various principles of Mechanics used in our day to day life
2. To analyze the laboratory results (data processing, variability and significance) and the validity of the results
3. To give students the background of experimental techniques and to reinforce instruction in Engineering Mechanics principles .

4. To provide students with exposure to the systematic methods for solving engineering problems.
5. To discuss the basic Mechanical principles underlying modern Engineering Mechanics and to create an understanding of assumptions that are inherent to the solution of Engineering problems
6. To build the necessary theoretical background for design and construction of foundation systems.

Course Prerequisites:

Basic knowledge of Physics and Mathematics

Course Contents:

Sl. No.	Experiment	Objective	Expected Outcome
1	Polygon law of Co-planer forces (concurrent)	To determine the magnitude and direction of resultant of concurrent force system.	The experiment will help students in understanding the effect of force on engineering elements like hangers, slotted weights, thread, circular table, pulley, etc.
2	Bell crank lever -Jib crane	To determine magnitude and nature of forces applied on both the arms of bell crank.	Understanding the functioning and designing of cranes.
3	Support reaction for beam	To find out reaction set up in different types of beams under different types of loading	Information serves as the input to design a beam
4	Collision of elastic bodies(Law of conservation of momentum	To study the principle of conservation of momentum in collisions using two bodies.	Exploring concept of collision and transfer of kinetic energy.
5	Moment of inertia of fly wheel.	The primary objective of this experiment is to find the relationship between the moment of inertia and the radius for discs of the same mass. The secondary objective is to develop a general equation relating the moment of inertia and radius for discs of any mass.	A detailed study of the mass moment of inertia and related concepts.
6	To study the slider-crank mechanism (2-stroke & 4-stroke I.C. Engine models)	To understand the working of 4-bar slider crank mechanism	Providing knowledge about concept of relative motion of various parts of an I.C. Engine and other such mechanism
7	Friction experiment(s) on inclined plane	To find the mechanical advantage, velocity ratio and efficiency of a simple screw jack.	Concept of pitch and lead, developing relation between: effort v/s load and efficiency v/s load.
8.	Simple & compound gear-train experiment	To compare simple and compound gear train.	Understanding the concept of power

		To calculate velocity ratio To calculate speed of any gear	transmission and change of speed
9.	Worm & worm-wheel experiment for load lifting	To find the mechanical advantage, velocity ratio, and efficiency of worm and worm wheel.	Understanding the concept , how the load can lifted at some distance from the point where effort is applied.
10.	Belt-Pulley experiment	To investigate the relationship belt tensions, angle of wrap and coefficient of friction for flat / V-belt.	Provides a reliable model for belt-driven power transmission, effect of angle of wrap to the power that can be transmitted, compare the power transmitting capability of flat / V-belt.
11	Experiment on Trusses	To calculate the force applied and its nature in the members under loaded condition.	Differentiating among perfect, deficient and redundant trusses, practical proof of Lami's theorem, parallelogram law and resolution of force.
12	Statics experiment on equilibrium	To determine that, for a body in Static equilibrium, the following are true: • The sum of the moment about any point is zero • The sum of forces is zero	Experimental proof of equilibrium condition used in solving problems like truss, beam, friction etc.
13	Simple/compound pendulum	To measure oscillation period. To compare between experimental and theoretical periods of oscillations	Helps in comparing practical and theoretical values of acceleration due to gravity.

Outcome of the course:

The students are expected to compare experimental results with theoretical concepts, speculate about reasons for discrepancies, and learn from deductive reasoning.

The purposes of experimentation as a subject in the curriculum are many, but perhaps the most important ones are to provide opportunities for the student to:

1. Verify certain theories
2. Become familiar with methods of measurements
3. Organise his/her own work and carry it through systematically and carefully
4. Organise the work of a team
5. Analyse data, assess its reliability and draw conclusions.

References:

1. "Applied Mechanics and Strength of Materials", U.C. Jindal, Galgotia Publications
2. "Engineering Mechanics For Uptu With Experiments", D.S. Kumar, S.K. Kataria publication
3. "Advanced Practical Physics for Students", Worsenop & Flint
4. www.physicsclassroom.com
5. www.schoolphysics.co.uk/.../experiments
6. www.physicsforums.com
7. http://web.mit.edu/emech

B. Tech. I/II Semester

(Common to all branches)

1. Title of the course: EE101/EE201 Electrical Engineering
2. Work load per week

a. Lecture (L): 3 hrs/week	Total Lecture Hours per Semester: 42
b. Tutorial (T): 1 hrs/week	Total Tutorial Hours per Semester: 14
c. Practicals (P): 2 hrs/week	Total Lab Hours per Semester: 28
c. Total Credits: L+T+P based	5

Objective & outcome of Learning:

This is a basic course for all Engineering students of 1st Year. The objective is to make them familiar with basic principles of Electrical Power Engineering, the major equipments used in the system and the corresponding measuring instruments. At the end of this course and engineering graduation will have adequate knowledge of Electrical Power Equipments and how to use them.

The Lab experiments associated with this course will make him well prepared to use such equipments in the field.

Unit-I

1. D C Circuit Analysis and Network Theorems:

   Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, source transformation, unilateral and bilateral elements,

   Kirchhoff's laws; loop and nodal methods of analysis; star-delta transformation; Network Theorems: Superposition Theorem, Thevenin's Theorem, Maximum Power Transfer Theorem (simple numerical problems with resistive element)

   7

Unit-II

2. Steady-State Analysis of Single Phase AC Circuits:

   AC Fundamentals: Sinusoidal, square and triangular waveforms-average and effective values, form and peak factors, concept of phasors, phasor representation of sinusoidally varying voltage and current, concept of impedance, analysis of series, parallel and series-parallel RLC Circuits: apparent, active & reactive powers, power factor, resonance in series and parallel circuits, bandwidth and quality factor (simple numerical problems).

   8

Unit-III

3. Three Phase AC Circuits:

   Three phase system-its necessity and advantages, meaning of phase sequence, star and delta connections, balanced supply and balanced load, line and phase voltage/current relations, three-phase power and its measurement (simple numerical problems).

   4

4. Measuring Instruments:

Types of instruments, construction and working principles of PMMC and moving iron type voltmeters & ammeters, single phase dynamometer wattmeter and induction type energy meter, block diagram of multi-meter & megger. 4

Unit-IV

5. Magnetic Circuit:

Magnetic circuit concepts, analogy between electric & magnetic circuits with DC excitations, magnetic circuit calculations. 2

6. Introduction to Power System:

General layout of electrical power system and functions of its elements, standard transmission and distribution voltages, concept of grid (elementary treatment only).

2

7. Single Phase Transformer:

Principle of operation, construction, e.m.f. equation, equivalent circuit, power losses, efficiency (simple numerical problems), introduction to auto transformer.

4

Unit-V

8. Electrical Machines:

DC machines: Construction, e.m.f. equation of generator and torque equation of motor. Types and DG machines, characteristics and applications of dc motors (simple numerical problems).

Three Phase Induction Motor: Constructions types, rotating magnetic field. Principle of operation, slip-torque characteristics, applications (numerical problems related to slip only).

Single Phase Induction motor: Principle of operation phase splitting methods of starting, applications.

Three Phase Synchronous Machines: Principle of operation of alternator and synchronous motor and their applications. 9

Text Books:

1. V. Del Toro, “Principles of Electrical Engineering” Prentice Hall International
2. I.J. Nagarath, :”Basic Electrical Engineering” Tata McGraw Hill
3. D.E. Fitzgerald & A. Grabel Higginbotham, “Basic Electrical Engineering" Mc-Graw Hill

Reference:

1. Edward Hughes, “Electrical Technology” Longman
2. T.K. Nagsarkar & M.S. Sukhija, “Basic Electrical Engineering” Oxford University Press.
3. H. Cotton, “Advanced Electrical Technology” Wheeler Publishing.
4. W.H. Hayt & J.E. Kennely, “Engineering Circuit Analysis” Mc Graw Hill.

NPTEL Course on Electrical Technologies

EE101P/201P ELECTRICAL ENGINEERING LABORATORY

List of Experiments

Note: A minimum of 10 experiments from the following should be performed

1. Verification of Kirchhoff's laws
2. Verification of (i) Superposition theorem (ii) Thevenin's Theorem (iii) maximum Power Transfer Theorem.
3. Measurement of power and power factor in a single phase ac series inductive circuit and study the improvement of power factor using capacitor.
4. Study the phenomenon of resonance in RLC series circuit and obtain resonant frequency.
5. Measurement of power in 3-phase circuit by two wattmeter method and determination of its power factor.
6. Starting and reversing of single phase Induction motor.
7. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase transformer.
8. To study speed control of dc shunt motor using (i) armature voltage control (ii) field flux control.
9. To study running and speed reversal of a three phase induction motor and record speed in both directions.
10. To measure energy by a single phase energy meter and determine the error.
11. To perform the O.C. & S.C. Test on 1-phase Transformer and establish equivalent circuit and full load efficiency.
12. Determination of Insulation resistance of transformer/motor/cable with the help of Megger.

B. Tech. I / II Semester

(Common to all branches)

1. Title of the course: EC101/201 Electronics Engineering

2. Work load per week

a. Lecture (L): 3 hrs/week	Total Lecture Hours per Semester: 42
b.Tutorials (T): 1 hrs/week	Total Tutorial Hours per Semester: 14
c. Practicals (P): 2 hrs/week	Total Lab Hours per Semester: 28
d. Total Credits: L+T+P based	5

e. One credit is defined as one lecture load per week and two hours of self-study to be connected with tutorial, practical work book and assignments.

3. Prerequisites of the course: As a prerequisite for this course on Basic Electronics, knowledge of general principles of electricity, magnetism and semiconductor physics is assumed.

4. Prerequisite for which next course: This course is prerequisite for

- EEC-301 Fundamental of Electronic Devices
- EEC-401 Electronic Circuits
- EEC-404 Electronic Measurements and Instrumentation

5. Why you need to study this course: We are living in an age of Information Technology. Electronics is at the very foundation of the Information and Computer Age. The giant strides that we have made in the areas of Communications and Computers are possible only because of the great successes that we have achieved in the field of Electronics.

It is sometimes unbelievable, how many electronics gadgets that we carry these days in our person – Digital Wrist-watch, Calculator, Cell-phone, Digital Diary or a PDA, Digital Camera or a Video camera, etc. The different type of Electronic equipments that has invaded our offices and homes these days is also mind boggling.

Electronics has made deep impact in several vital areas such as health care, medical diagnosis and treatment, Air and space travels, Automobiles, etc. In short, the technological developments of several countries of the globe are directly related to their strengths in electronics design, manufacture, products and services.

Course Objective:

Basic idea of the course will be to introduce the basic concepts required to understand the electronic devices, circuits and measuring instruments. The course has been built for first year undergraduate students and targeted as general course for all branches of engineering.

6. Learning outcomes expected from the course:

At the completion of this Course, student will have the basic skills required to:

a) Identify schematic symbols and understand the working principles of electronic devices e.g. Diode, Zener Diode, LED, BJT, JFET and MOSFET etc.

b) Understand the working principles of electronic circuits e.g. Rectifiers, Clipper, Clamper, Filters, Amplifiers and Operational Amplifiers etc. also understand methods to analyse and characterize these circuits

c) Understand the functioning and purposes of Power Supplies, Test and Measuring equipments such as Multimeters, CROs and Function generators etc.

d) Be able to rig up and test small electronics circuits.

7. Details of the syllabi:

Unit	Topic	Text Book / Topics	Lectures
I	Introduction to Electronics Diode Fundamentals • Semiconductor materials (Intrinsic and extrinsic) • The Unbiased Diode • Forward Bias and Reverse Bias, Breakdown, Energy Levels ,The Energy Hill ,Barrier Potential and Temperature • Reverse-Biased Diode • Basic Ideas • The Ideal Diode ,The Second and Third Approximation • Up-Down Circuit Analysis • Bulk Resistance ,DC Resistance of a Diode , Load Lines Diode Circuits • The Half-Wave, Full-Wave and Bridge Rectifiers • The Choke-Input Filter and the Capacitor-Input Filter • Peak Inverse Voltage and Surge Current • Clippers and Limiters • Clampers • Voltage Multipliers Special purpose diodes • The Zener Diode, The Loaded Zener Regulator, Second Approximation of a Zener Diode	Text Book 1 2.2, 2.4,2.6-2.7 2.8 2.9-2.14 2.15 3.1 3.2-3.4 3.6 3.8-3.10 Text Book 1 4.1,4.3, 4.4 4.5, 4.6 4.7 4.10 4.11 4.12 Text Book 1 5.1-5.3	10

	• Optoelectronic Devices • Schottky Diode • Varactor Diode	5.8 5.9 5.10	
II	Bipolar Junction Transistors (BJTs) Transistor Fundamentals • The Unbiased Transistor , the Biased Transistor • Transistor Currents • The CE Connection • Base Curve & Collector Curves • Transistor Approximations • Variations in current Gain • The Load Line • The Operating Point • Recognizing Saturation • The transistor Switch • Emitter Bias • Voltage-Divider bias, Accurate VDB Analysis , VDB Load Line and Q Point • Other types of Bias Transistor Circuits • Base-Biased Amplifier • Emitter-Biased Amplifier • Small-Signal Operation • AC Beta • Resistance of the Emitter Diode • Analyzing an Amplifier • Voltage Gain • The Loading Effect of Input Impedance • CC amplifier • Output impedance	Text Book 1 6.1, 6.2 6.3 6.4 6.5, 6.6 6.7 7.1 7.2 7.3 7.4 7.5 7.6 8.1-8.3 8.5 Text Book 1 9.1 9.2 9.3 9.4 9.5 9.7 10.1 10.2 11.1	8

	• Cascading CE and CC	11.2 11.3	
III	Field Effect Devices JFET • Basic Ideas • Drain Curves • The Transconductance Curve • Biasing in the Ohmic Region and Active Region • Transconductance • JFET Amplifiers • The JFET Analog Switch • Other JFET Applications MOSFET • The Depletion –Mode MOSFET • D-MOSFET Curves • Depletion-Mode MOSFET Amplifier • The Enhancement-Mode MOSFET • The Ohmic Region • CMOS	Text Book 1 13.1 13.2 13.3 13.4, 13.5 13.6 13.7 13.8 13.9 Text Book 1 14.1 14.2 14.3 14.4 14.5 14.7	8
IV	Operational Amplifiers Introduction to Op Amps • The 741Op Amp • Inverting Amplifier and noninverting Amplifier • Two Op-Amp Applications • Four Types of Negative Feedback Op-Amp Circuits Linear Op-Amp Circuits • Inverting-Amplifier Circuits • Noninverting-Amplifier Circuits • Summing amplifier circuits Nonlinear Op-Amp Circuits	Text Book 1 18.1, 18.2 18.3, 18.4 18.5 19.1 Text Book 1 20.1 20.2 20.6	8

	• Comparator with zero and nonzero reference • Integrator • Differentiator	22.1, 22.2 22.5 22.10	
V	Electronic Instrumentation and Measurements Digital Voltmeters • Digital Voltmeter Systems • Digital Multimeters Cathode-ray Oscilloscopes • Cathode-Ray tube • Deflection Amplifier • Waveform Display • Oscilloscope Time Base • Oscilloscope Controls • Measurement of Voltage, Frequency, and Phase Signal Generator • Function Generators Laboratory Power Supplies • Unregulated DC Power Supplies • Power Supply Performance and Specifications • DC Power Supply Use	Text Book 2 6.1 6.2 Text Book 2 9.1 9.2 9.3 9.4 9.5 9.6 Text Book 2 11.2 Text Book 2 16.1 16.4 16.5	8

8. Text books:

1. Albert Malvino / David J. Bates "Electronic Principles", The McGraw-Hill Companies, Seventh Edition.
   http://www.mhhe.com/malvino/ep7esie

2. David A. Bell "Electronic Instrumentation and Measurements", Second Edition, OXFORD University Press.

9. Reference Material:

1. Robert L. Boylestand / Louis Nashelsky "Electronic Devices and Circuit Theory", 10th Edition, Pearson Education.

2. Lecture Series on Basic Electronics by Prof. T.S.Natarajan, Department of physics, IIT Madras http://nptel.iitm.ac.in

3. Basic Electronics(Video content) by Prof. Chitralekha Mahanta, IIT Guwahati http://nptel.iitm.ac.in/courses/

4. Basic Electronics(Web Content) by Prof. Pramod Agarwal, IIT Roorkee http://nptel.iitm.ac.in/courses/

10. Laboratory work: As per the EC (Electronics Engineering Lab) Syllabus

11. Evaluation methodology to be followed:
The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.
b. Quizzes
c. Home-works and assignments
d. Projects
e. Sessional examinations
f. Final examination

12. Award classification

Assessment procedure will be as follows:

• Class attendance and participation in discussions will be based on:
a. Substantial in-class contribution about class topics and discussion questions
b. Response to other students' queries
c. Contribution in discussion and chat sessions

• Quizzes
a. Quizzes will be of type multiple choice, fill-in-the-blanks or match the columns.
b. Quizzes will be held periodically

• Home works and assignments
a. The assignments/home-works may be of multiple choice type or comprehensive type.
b. They will be available online but submission will be carried out in handwritten form.
c. The grades and detailed solutions of assignments (of both types) will be accessible online after the submission deadline.

• Projects
a. Will be assigned in the mid-part of the course and should be completed and submitted before the end of the course.
b. The presentation and grading will be available online.

• Sessional and Final examinations
a. These will be comprehensive examinations held on-campus (Sessionals) or off-campus (External) on dates fixed by the Mahamaya Technical University.

EC101P/201P ELECTRONICS ENGINEERING LAB

Course Objective:

1. To become familiar with various electronic devices.
2. To become familiar with usage of data sheet of various components
3. To become familiar with circuit testing
4. To learn to use common electronic measuring instruments.
5. To learn electronic design aids.

Course Pre requisites:

Basic knowledge of Electricity, Magnetism, Semiconductor Physics

Course Content:

Exp. No.	Experiment	Objective	Expected Outcome
1	Study of Digital Multimeters	1.Measurement of AC and DC voltages 2. Measurement of Current 3. Measurement of resistance 4. Measurement of parameters of diodes and transistors.	To be ready to carry out the necessary measurements with the Multimeter.
2	Study of Cathode Ray Oscilloscope	1. To study of controls of CRO 2. To measure amplitude, time period and frequency of time varying signals. 3. To study Lissajous figures to know about the phase difference between the two signals and the ratio of their frequencies.	To get familiarized with oscilloscope usage for different types of measurements.
3	Study of Function generator	1. Study of controls of Function generator 2. To configure the function generator to output a 10Vpp, 1 Khz sinusoidal wave	Should be able to learn operational controls of function generator so that it can be configured for the desired output.
4	Study of Passive Components • Resistors • Inductors • Capacitors	1. To study color codes for value, tolerance and wattage.	Should be able to • Identify the component • Calculate and measure the value of the component • Compare the calculated values with measured values.
5	Study of other useful components • Relay • Switches • Connectors • Cables • Transformers	1. To study various types of components used in electronics circuitry and systems	Should be able to read the • Datasheet of the components • Make selection of desired components for designing a circuit

6-9	Study of Semiconductor devices • Diodes • BJT • FET • OP Amp	1. To study the data sheet to understand specifications of – Diodes, BJT, FET, OPAMP 2. To build and test clipper and clamper using diode. 4. To build and test BJT as switch. 3. To build and test OPAMP Adder and Subtractor.	Should be able to • Identify devices and understand their behavior. • Should be able to use them on Breadboard to build small circuits like rectifiers, switches, amplifiers, power supplies etc.
10	Study of PSPICE	1. Simulation and analysis of common emitter amplifier using SPICE.	To learn about electronic design automation tools.
11	Study of soldering techniques and Soldering practice	1. To build and test Half and Full wave rectifier on general purpose PCB.	To learn to solder electronic components on PCB and test the circuit

Outcome of the course:

The students are expected to compare experimental results with theoretical concepts, speculate reasons for discrepancies, and learn from deductive reasoning.

References:

1. 'Thomas C. Hayes/Paul Horowitz "Student Manual for The Art of Electronics", Cambridge University Press
2. Virtual Lab Website "http://www.vlab.co.in/"

B Tech I / II Semester

(Common to all branches)

1. Title of the Course : AS103/AS203 Engineering Chemistry
2. Work load per week
    a. Lecture (L) 3 hrs / week Total Lectures hrs per Sem - 42
    b. Practical (P) 2hrs / week Total Lab hrs per Sem - 24
    c. Total Credits L + P 4
    d. One Credit is defined as one Lecture load per week and two hrs of Self study to be connected with tutorial, practical work, book & assignments.

3. Pre requisites of the Course:
    a. Basic concepts of chemistry at +2 level.
    b. Understanding of different states of matter, structure of atom, chemical bonding,
    c. General properties of elements and periodicity, Elementary knowledge of thermodynamics, chemical reactivity and chemical equilibrium
    d. Elementary knowledge of reaction rates, catalysis
    e. Simple Organic compounds, their structure and reactions
4. Pre requisites of which next course:

    Chemical Science courses for different engineering and Technology disciplines requiring knowledge of advanced chemical systems, procedures and protocols

5. Why you need to study this course

    Chemistry is a central science linking physics, mathematics and computers on one hand and mechanical, electrical, chemical engineering, biotechnology, biomedical engineering, neural networks and other fundamental and applied disciplines on the other hand. Rapid progress in the subject has to keep pace with teaching of chemistry to all students particularly to budding engineers who will have to deal with some chemical or the other or chemical processes or reactions during their later career. Chemistry is also involved in understanding human body, medicine and biological reactions in the living system. Courses in mechanical engineering, energy efficiency, power sector, biotechnology, biochemical and chemical engineering, biomedical engineering, tissue engineering would be requiring more chemistry content and therefore such students can take another

chemistry elective course. This will help them in becoming successful practicing engineers besides providing essential ground work to pursue advanced studies in their respective engineering fields.

Chemistry I course for undergraduate engineering students is designed to strengthen the fundamentals of chemistry so that they can build their own interface of applied chemical concepts with their industrial /engineering application in their chosen branch of engineering.

Course objective; The course is stipulated to be at a general level for all engineering disciplines with view to

- To understand fundamentals of applied chemistry(inorganic, organic and physical chemistry) required for engineering education and practice
- To equip future engineers with sufficient general chemistry information to be able to identify required chemical measures to be adopted during their professional career especially applications of traditional and novel engineering materials

6. Learning Outcome from this Course

- Understand matter and its constituents as transition from atoms to molecules to Engineering materials
- Understand methods of separation, analysis and purification of compounds and materials
- Understand the structure and stereostructure of molecules and their representation and chirality
- Understand essentials of modern tools for analysis of compounds by chemical, physical and spectroscopic techniques(elementary level).
- Understand Unit Processes for obtaining organic compounds at an industrial scale and learn the ways to adopt and modify reaction conditions.
- Able to treat and analyze waste water and potable water and understand the mechanism of corrosion on various material used in industry.

7. Contents of Chemistry Course:

Unit	Topic	Text Books	Lecturers
I	<u>Introduction of Engineering Chemistry</u> Atoms to molecules to materials for Engineers. Atoms combines to give molecules and how molecules aggregate o give materials Recapitulation of salient feature OF valence bond theory ,Hybridization, sigma and pi bonds shape of the simple inorganic compounds based upon concepts of hybridization and to illustrate planar, tetrahedral square planer, and octahedral geometries. Molecular orbital theory and its application to form homo (H2 N2 &O2) and hetero (HF,NO) diatomic molecules. Structure and stereo structure of molecules Representing three dimensional structure of organic molecules including Conformations, Newman, Sawhorse,Fischer, projections wedge and dash structural representation, equivalence of structural representations Chirality, optical activity and isomerism , compounds containing one and two chiral carbons , enantiomers, di stereo isomers, meso compounds, no. of chiral atoms and optical isomers, Dynamic stereochemistry , concepts of regiochemistry, stereo selectivity, Stereo specificity and enantiomeric excess R&S nomenclature. Geometrical isomerism in simple acyclic and cyclic molecules, E & Z nomenclature.	1	4 6
II	Materials and their Characterization	2	2

	Micro and macroscopic properties of molecules, Intermolecular forces, Molecular aggregation micelles, Examples of inorganic and organic functional materials, core concepts of nanotechnology. Purification; Physical (crystallization, fractional crystallization , distillation , fractional distillation, steam distillation) and chemical methods of purification. General chromatographic(Adsorption and partition) techniques(column thin layer and paper chromatography) and their application. Criteria of purity ; Melting and Boiling point, chromatography , particle size measurement and surface area Characterization; Surface tension, Viscosity ,Conductivity , and Absorption Spectroscopy (IR, UV – Visible , NMR)		4 6
III	Stability and Reactivity of Molecules : Unit processes in organic chemistry Reactivity of Molecules : Electron displacement effects – inductive, electromeric, resonance and hyper conjugation, Reactive sites in molecules - functional groups. Reactions Dynamics: Chemical kinetics, Order and molecularity, zero, first and second order reactions, pseudo first order reaction , temperature dependence of reaction rates, Catalysis and some industrially important catalytic reactions. Reaction Mechanism: Fission of a covalent Bond, types of reactions – nucleophilic (SN1 & SN2, SNi, SNAr) and electrophilic substitution reactions (Nitration, Sulphonation, Halogenation, and Friedel Crafts reaction) and their mechanism , regio and Stereochemistry of involved reactions	1,2	4 4
IV	Water and its treatment : Alkalinity of water, estimation of alkalinity, Hard and soft water, hardness- units, determination of hardness by complexometric Titration, Removal of hardness of water- Zeolite , ion exchange process, Boiler Feed water, descaling of	2	4

	boilers desalination of brackish water, Reverse osmosis, potable water,		
V	Some materials of Industrial importance: Polymers and Polymerization (ionic, anionic and free radical induced), Properties of polymers , Number average and Weight average molecular weighs, characterization of polymer samples , polymer blends, Stereo structures of polymers, Dendrimers, Some examples of common polymers used in Industry, Natural and Synthetic rubber, Silicones, Composites, Adhesives, Conducting polymers, Biodegradable polymers. Metallic corrosion and its prevention, electrolysis , Industrial electrolytic processes-(aluminium). Fuel cells and batteries. Control of friction – Oils, fats and lubricants , Soaps and detergents	5 2 1	8

References:

Recommended Reference Books:

Students are encouraged to use available library resources, electronic media and internet information for further understanding of the subject. The following books are suggested as reference works for teachers/students

1. Organic Chemistry, P.Y. Bruice , Ninth Impression, 2011, Pearson India

2. Chemistry [3] , A. Burrows, john Holman, A, Parsons, G. Pilling, G.Price, Oxford University Press, 2009

3. Engineering Chemistry, A Text book of Chemistry for Engineers published by John Wiley and Sons,India 2011

4. Unit processes in Organic Synthesis by Groggins, Tata McGraw Hill, 2001

5. Spectroscopic Methods in Organic Chemistry, D H Williams and I. Fleming, Tata McGraw Hill, 1991

CHEMISTRY LABORATORY AS103P/AS203P

The following representative experiments have been suggested for chemistry laboratory :

1. Introduction to safety and working in a chemical laboratory
2. Determination of hardness of water by titration with standard EDTA solution
3. Determination of iodide content in iodized salt through iodometric titration with sodium thiosulphate
4. Determination of Alkalinity in water sample.
5. Determination of rate constant for acid catalyzed hydrolysis of ethyl acetate through ` titration
6. Determination of glycine content in a sample of amino acid
7. Synthesis of benzimidazole and record of its UV spectrum
8. Comparison of viscosity and surface tension of two liquids and their variation on addition of surfactants and soap of known concentration
9. Determination of neutralization of a lubricant oil or iodine number of an unsaturated oil.
10. Detection of functional groups in an organic compound by wet tests
11. Identification of an organic compound
12. Synthesis of p-nitroacetanilide from acetanilide

References:

1. Vogel's quantitative Analysis A I Vogel, G Svelha Seventh Edition longman Group ltd.

2. Elementary Practical Organic Chemistry Fifth Edition Quantitave analysis, A I Vogel, Longman Group Ltd.

3. Practical Eng. Chemistry S. S. Dara , First edition S. Chand Company.

4. A Eng. Chemistry Sudha Rani and S.K. Bhasin First edition Dhanpat rai Publication.

5. Saltcomindia.gov.in./NIDCCP- EstimatContent.html

Syllabus B Tech I / II Semester

(Common to all branches)

1. Title of the course: ME102/ ME202 Manufacturing Practices

2. Work load per week

a. Lecture (L): 2 hrs/week — Total Lecture Hours per Semester: 28

b. Tutorial (T): 0 — Total Tutorial Hours per Semester 0

c. Practical's (P): 2 hrs/week — Total Lab Hours per Semester: 28

d. Total Credits: L+T+P based — 3

3. Prerequisites of the course if any:

The subject requires basic knowledge of mathematics and measuring equipments

4. Prerequisite for which next course:

Manufacturing Practices is the fundamental subject for Manufacturing Science, Production Technology, Advance Machining etc.

5. Why you need to study this course.

The course will help in understanding various operations of manufacturing processes

6. Course Objectives:

1. To become familiar with various manufacturing processes.
2. To become familiar with usage of various manufacturing instruments.
3. To become familiar with various operations.
4. To learn to use instruments with safety precautions.

7. Details of the syllabus: (Lectures)

Sr. No.	Topic	Text Book/ Topics	Lectures
1.	Carpentry Shop • Basic concepts • Types of woods and their properties • Seasoning of wood • Carpentry tools • Carpentry Processes • Carpentry joints	Text Book 1 10.1 10.2, 10.3, 10.4, 10.5 10.4 10.8 10.17-10.25 10.26	3
2	Fitting Bench Working Shop • Introduction • voices • Fitting tools • Fitting Processes	Text Book 1 14.1 14.2 14.3,14.4,14.5,14.6,14.7,14.8 ,14.11, 14.12, 14.13, 14.14,14.15, 14.18 14.20, 14.21	3
3.	Black Smithy Shop • Introduction • Forging Material • Heating devices	Text Book 1 8.1 8.2 8.3	3

	• Hand tools and appliances • Smith Forging operations • Forging Processes • Defects in Forging	8.5 8.6 8.8, 8.9, 8.10 8.20	
4.	Welding Shop • Introduction to welding • Weldability • Types of welding • Metallurgy of Weld • Arc Welding • Resistance Welding	Text Book 1 9.1 9.2 9.3 9.4 9,9, 9.10 9.11	3
5.	Sheet Metal Shop • Introduction to sheet metal shop • Metals used in sheet metal works • Hand tools and accessories e.g. different types of hammers, hard and soft mallet • Sheet Metal operation • Sheet Metal Joints Hems and Seams • Sheet metal allowance • Sheet Metal working machines	Text Book 1 18.1 18.2 18.3 18.4 18.5 18.6 18.7	3
6.	Machine Shop • Introduction to machine tools and machining processes; • Types of cutting tools • Selection of cutting speeds and feed • Simple machining operations on Lathe, shaping, Milling	Text Book 2 2.1, 2.2 3.10, 3.46-3.48 3.5-3.9, 3.13-3.21,3.35	4
7.	Foundry Shop • Introduction • Pattern Materials • Pattern making tools • Types of Pattern • Pattern Making allowances • Method of Constructing a pattern • Moulding sand, • Moulding sand types • Moulding sand size and shape • Sand additives • Moulding Processes	Text Book 1 11.1 11.2 11.3 11.4 11.5 11.6 11.12 11.13 11.14 11.17 11.19	3

8. Details of the syllabus: ME102P/ME202P (LAB)

Ex. No.	Experiment	Objective	Expected Outcome
1	Carpentry Shop	1. To understand different types of woods and their properties. 2. Study various tools & equipments used in carpentry. 3. To prepare half-lap corner joint, Mortise & tenon joints. 4. Simple exercise on wood working lathe.	To perform different types of operations on woods (such as sawing, joint making etc).
2	Fitting Bench Working Shop	1. Introduction to fitting tools, Study of tools & operations. 2. Simple exercises involving fitting work.	To get familiarized with various Fitting operations

		3. To Make perfect male-female joint. 4. Simple exercises involving drilling/tapping.	
3	Black Smithy Shop	1. Introduction and demonstration of various black smithy operations. 2. To learn upsetting, drawing down, punching, bending. 3. To perform operation for making L-Shaped nail	To be able to learn Forming operations (such as bending, upsetting and drawing).
4	Welding Shop	1. Introduction to welding and welding equipments. 2. To learn operations of Gas welding & Arc welding. 3. To learn Simple butt and Lap welded joints. 4. To learn Oxy-acetylene flame welding and cutting.	To get familiarized with Electric arc welding and Oxy-acetylene gas welding.
5	Sheet Metal Shop	1. Introduction to tools and operations in sheet metal shop. 2. Fabrication of tool-box, tray, electric panel box etc. . 3. Making Funnel complete with 'soldering' .	To be able to learn various sheet metal operations.
6	Machine Shop	1. Introduction to Lathe machine and its various operations. 2. To perform Plane turning, Step turning, Taper turning & Threading. 3. Introduction of Single point cutting tool grinding.	To get familiarized with Lathe machine and various machining operations.
7	Foundry Shop	1. Introduction to foundry tools . 2. To study different types of molding sands. 3. Mould making with the use of a core and Casting.	To get familiarized with various Foundry techniques.

9. Text books to be used:

1. Hajra Chaudhary, "Elements of Workshop Technology", Vol 1, Media Promoters and Publications Pvt. Ltd., 11th Edition
2. Hajra Chaudhary, "Workshop Technology", Vol 2, Media Promoters and Publications Pvt. Ltd.11th Edition

10. References:

1. B. S. Raghuwanshi , "Workshop Technology" , Vol-1, Dhanpat Rai & Co, Ninth Edition.
2. R. S. Khurma "A Textbook of Workshop Technology: Manufacturing Processes", S. Chand Publisher , 16th edition
3. W. Chapman, "Workshop technology ",
4. http://freevideolectures.com/Course/2369/Manufacturing-Processes-II
5. http://freevideolectures.com/Course/2368/Manufacturing-Processes-I
6. http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv234-Page1.htm
7. http://nptel.iitm.ac.in/video.php?subjectId=112105126
8. http://web.mit.edu/2.810/www/lectures.html

11. Evaluation methodology to be followed:

The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.
b. Quizzes
c. Projects
d. Sessional examinations
f. Final examination

12. Award classification

Assessment procedure will be as follows:

- Class attendance and participation in discussions will be based on:
  a. Substantial in-class contribution to class topics and discussion questions
  b. Response to other students' queries
  c. Contribution to discussion and chat sessions
- Quizzes
  a. Quizzes will be of multiple choice, fill-in-the-blanks or match the columns type.
  b. Quizzes will be held periodically
- Projects
  a. Will be assigned in the mid-part of the course and should be completed and submitted before the end of the course.
  b. The presentation and grading will be available online.
- Sessional and Final examinations
  a. There will be comprehensive practical examinations held on-campus (Sessionals) on dates fixed by Mahamaya Technical University.

B. Tech. I / II Semester

(For CS, EC, EE, IC, EI , IT and BT branches)

1. Title of the course: AS104/AS204 Introduction to Bio Science

2. Work load per week

a. Lecture (L): 3 hrs/week	Total Lecture Hours per Semester: 42
b.Tutorials (T):0	Total Tutorial Hours per Semester: 0
c. Practicals (P): 0	Total Lab Hours per Semester: 0
d. Total Credits:	L+T+P based 3

e. One credit is defined as one lecture load per week and two hours of self-study to be connected with tutorial, practical work book and assignments.

3. Prerequisites of the course: As a prerequisite for this course on Living System, Cellular Structure, knowledge of general principles of Metabolism and Genetic Engineering is assumed.

4. Prerequisite for which next course: This course is prerequisite for

- BT-302 Microbiology & Cell Biology.
- BT-303 Molecular Dynamics & Bioenergetics.
- BT-501 Genetic Engineering.

5. Why you need to study this course: We are living in an age of Science & Technology. Present Scenario witnesses the interdisciplinary approach in every walk of life. Even subject like psychology, Public administration claim themselves to be science on the ground that it avail the services of scientific methods and experimental research to attain conclusion. Similar is the case of Biological Sciences. Its subject matter is quite vast as it encompasses fields like genomics, proteomics, metabolomics, physics to understand the orientation of macromolecules and even economics to establish the strong roots of Biotechnology as industry, because biotechnology cuts across international boundaries and affects public and private interest and influences on international relations , focussing on agriculture , environmental issues, low commerce and biological warfare and in order to aid scientific community . It becomes necessary to demarcate the boundary of this discipline. In every aspects of Life, The role of Biosciences is quire inevitable. In the modern era, Biotechnology has become a boon to the mankind by way of changing the lives. Some of the considerable results are : Genetically modified food , High yield varieties, Pest and disease protection , Less erosion , Human Application , Transgenic animals / Plants , Xenobiotics, Health care & diagnosis etc.

Course Objective:

Basic idea of the course will be to introduce the basic concepts required to understand the Living Systems, Cellular Structure & Metabolism and Concept of Genetic Engineering. The course has been built for first year undergraduate students and targeted as general course for all branches of engineering.

6. Learning outcomes expected from the course:

At the completion of this Course, student will have the basic skills required to:

a) Understand the potential of engineering Living systems.

b) Understand key common features of living system, cellular structure & function

c) Have a basic understanding of cellular metabolism, Physiological processes and Metabolic engineering

d) Understand the basics of Cell division, Gene control and expression emphasizing on systems more commonly used in biotechnology.

e) Have a basic knowledge of what is feasible with genetic engineering, key underlying technology.

Aims:

This course will provide a basic grounding in key aspects of molecular bioscience with an emphasis on bioscience engineering:

- Common features of living systems
- Cellular structure, Cell division & metabolism.
- Metabolic engineering.
- Basics of genetic engineering.
- Genome sequencing, genomics and key computational methods.
- Human Reproduction, Sex and Sexuality.

7. Details of the syllabi:

Unit	Topic	Text Book/ Topics	Lectures
I	Introduction to Bioscience Cell Structure & Function • The development of cell theory • Cell Size • The structure of Cellular Membranes • Organelles composed of membranes • Plasma Membrane • Endoplasmic Reticulum • Golgi Apparatus • Lysosomes • Perosisomes • Vacuoles & Vesicles • Nuclear Membrane Metabolic Engineering • Biochemical Pathways-Cellular Respiration • An overview of Aerobic cellular Respiration • Glycolysis • The Crebs Cycle • The Electron Transport System (ETS)	Text Book 1 4.1, 4.2 4.3 4.4 4.4a 4,4b 4.4c 4.4d 4.4e 4.4f 4.4g Text Book 1 6.0 6.2 6.2a 6.2b 6.2c	10
II	Molecular Biology , Genomics & Proteomics DNA and RNA : The Molecular Basis • DNA and the Importance of Proteins • DNA Structure and Function • DNA Structure • Base pairing in DNA Replication • The repair of genetic information • The DNA code	Text Book 1 8.0 8.1 8.2 8.2a 8.2b 8.2c 8.2d	8

	• RNA Structure and Function Synthetic Biology Protein Synthesis : Central dogma • Step-1 : Transcription --- Making RNA • Step -2 : Translation----Making Protein The Control of Protein Synthesis • Controlling Protein Quantity • Controlling Protein Quality	Text Book 1, 8.3 8.4 8.4a 8.4b 8.5 8.5a 8.5b	
III	Cell Division - Proliferation Cell Division – an overview • Asexual Reproduction • Sexual Reproduction The Cell Cycle and Mitosis • The G1 stage of Interphase • The S stage of Interphase • The G2 stage of Interphase Mitosis : Cell Replication • Prophase • Metaphase • Anaphase • Telophase • Cytokinesis Controlling Mitosis	Text Book 1 9.1 9.1a 9.1b 9.2 9.2a 9.2b 9.2c Text Book 1,9.3 9.3a 9.3b 9.3c 9.3d 9.3e 9.4	8
IV	Genetic Engineering Introduction to Genetic Engineering	Text Book 1 11.1	8

	• DNA Fingerprinting • DNA Fingerprinting Technique • DNA Fingerprinting Application • Polymerase Chain Reaction • Electrophoresis Gene Sequencing • Gene Sequencing and Human Genome Project • Human Genome Project Techniques • Human Genome Project Application • Cloning Genes • Genetically modified Food • Gene Therapy Stem Cells • Embryonic and Adult Stem Cells • Personalized Stem Cell Lines	18.1, 18.2 18.3, 18.4 18.5 19.1 Text Book 1 20.1 20.2 20.6 22.1, 22.2 22.5 22.10	
V	Human Reproduction and Reproductive Health Human Reproduction , Sex and Sexuality • The Male Reproductive System • The Female Reproductive System • Gametogenesis • Menstrual Cycle • Fertilization and Implantation • Pregnancy and Embryonic Development • Parturition and Lactation Reproductive Health • Reproductive Health : Problems and Strategies • Birth Control • Medical Termination of Pregnency	Text Book-1,27 Text Book 2, 3.0 3.1 3.2 3.3 3.4 3.5 3.6 3.7 6.2 Text Book 1,27.8 Text Book 2,4.0 9.1 9.2 9.3 9.4	8

	Contraception • Barrier Methods • Chemical Methods • Hormonal Control Methods • The Timing Methods • Intra-uterine Devices • Surgical Methods	Text Book-1, 27.10 27.10a 27.10b 27.10c 27.10d 27.10e 27.10e	

8. Text books:

1- "Concepts in Biology" by Elden D Enger, Frederick C Ross and David B Bailey: Tata Mc Graw Hill Education Private Limited, New Delhi

2-"Biology" Text Book for Class XII by National Council of Educational Research and Training, New Delhi

9. Reference Material:

http://www.mhhe.com/enger14e
http:// www.biotech.ca/EN/history.html
http://statwww.berkely.eu/users/terry/classes/s2601998/week8b/week8b/no d9.html
Amgen 2004 About Biotechnology. http://amgen.com/rnd/biotechnology.html

Molecular Biology of the cell by Brice Alberts, Lexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter Walter , published by Garland science , Taylor & Francis group, UK.

10. Laboratory work: N.A.

11. Evaluation methodology to be followed:

The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.
b. Quizzes
c. Home-works and assignments
d. Projects
e. Sessional examinations
f. Final examination

12. Award classification

Assessment procedure will be as follows:

• Class attendance and participation in discussions will be based on:
  a. Substantial in-class contribution about class topics and discussion questions
  b. Response to other students' queries
  c. Contribution in discussion and chat sessions

• Quizzes
  a. Quizzes will be of type multiple choice, fill-in-the-blanks or match the columns.
  b. Quizzes will be held periodically

- Home works and assignments
    a. The assignments/home-works may be of multiple choice type or comprehensive type.
    b. They will be available online but submission will be carried out in handwritten form.
    c. The grades and detailed solutions of assignments (of both types) will be accessible online after the submission deadline.

- Projects
    a. Will be assigned in the mid-part of the course and should be completed and submitted before the end of the course.
    b. The presentation and grading will be available online.

- Sessional and Final examinations
    a. These will be comprehensive examinations held on-campus (Sessionals) or off-campus (External) on dates fixed by the Mahamaya Technical University.

B. Tech. I / II Semester

(For ME/MT and Chemical Engineering branches)

1. Title of the course: ME103/ME203 Manufacturing Science
2. Work load per week in terms of
    a. Lecture (L): 3hrs/wk Total Lecture Hours per Semester: 42
    b. Tutorials (T): 0 hrs/wk Total Tutorial Hours per Semester: 0
    c. Practicals (P): 0 hrs/wk Total Lab Hours per Semester: 0
    d. Total Credits L+T+P based 3
    e. One credit is defined as one lecture load per week and two hours of self study to be connected with tutorial, practical work book and assignments.

3. Prerequisites of the course if any:
    Prerequisite for this course on Manufacturing Science is the knowledge of basic Chemistry and Physics.

4. Prerequisite for which next course:
    - Manufacturing Science-I,
    - Manufacturing Science-II,
    - Material Science in Engineering,
    - Production Planning & Control.

5. Why you need to study this course:

Manufacturing science lies at the very center of engineering and it has an important role to play in society, especially in a developing country like India, which bases its economy on technology. A wide ranging variety of fields of learning touch on manufacturing science and it must work organically with the other areas of engineering in order to stimulate innovation and retain flexibility in the face of rapid progress in science and technology.

Manufacturing, in its broadest sense, is the process of converting raw materials into useful products. It encompasses the design and manufacturing of goods, using various production methods and techniques. Manufacturing is the backbone of any industrialized nation and its level of manufacturing activity is directly related to the economic health. Advanced Manufacturing Technology with planned and controlled processes is the present day need of the manufacturing industries.

Course Objective:
Basic idea of the course will be to introduce the basic knowledge of material and their mechanical properties, testing of metals, basic manufacturing techniques, different machines and an introduction to production management. The course has been built for first year undergraduate students and is targeted as a general course for all branches of engineering

6. Learning outcomes expected from the course:

At the completion of this course, students will have the basic skills required for :

a) Selection of material for particular application on the basis of their properties and mode of failure.
b) Understanding the working principles of machines like; lathe, shaper, planer, milling, drilling and grinding machines
c) Basic ideas of welding, casting and machining with their applications.

d) Understanding of site selection and production planning.

7. Details of the syllabus:

Unit	Topic	Text Book/ Topics	Lectures
I	Properties, Inspection and Testing of materials a. Introduction to stress & strain b. Mechanical Properties: Strength, Elasticity, Stiffness, Malleability, Ductility, Brittleness, Resilience, Toughness and Hardness. c. Elementary ideas of Creep, Fatigue & Fracture d. Testing of metals : Destructive testing, Tensile testing, Compression test, Hardness tests, Impact test	Text Book 1 5.1, 5.2 5.5-5.14 5.15, 5.16, 5.17, 5.29 5.19-5.22, 5.28	7
II	Basic Metals & Alloys : Properties and Applications 2a. Ferrous Materials: • Carbon steel and its classification based on percentage of carbon as low, mild, medium & high carbon steel, its properties & applications • Wrought iron, Cast iron, Alloy steels: stainless steel, tool steel • Elementary introduction to Heat- treatment of carbon steels: Annealing, Normalizing, Quenching, Tempering & Case-hardening. Non-Ferrous metals & alloys: • Common uses of various non-ferrous metals & alloys and their composition such as Cu-alloys: Brass, Bronze, Al-alloys such as Duralumin.	Text Book 1 6.2, 6.3 6.7-6.15, 6.26. 6.27, 6.28 8.2, 8.3, 8.4, 8.7-8.14, 8.20, 8.23 7.1-7.3, 7.10, 7.11, 7.12	8

III	Introduction to Metal Forming & Casting Process and their applications Metal Forming: Basic metal forming operations and uses of : • Forging , Rolling , Wire & Tube-drawing/making and Extrusion, and their products/applications. • Press-work, & die & punch assembly, cutting and forming and their applications. • Hot-working versus cold-working. Casting: • Pattern & allowances. • Molding sands and their desirable properties. • Mould making with the use of a core. • Gating system. • Casting defects & remedies. • Cupola Furnace. • Die-casting and its uses.	Text Book 1 20.1, 20.20-20.26, 19.3-19.5, 19.7, 19.11, 19.12, 19.16, 19.17, 26.4, 26.12-26.20, 19.2, 19.15 12.3, 12.7, 12.10, 14.1-14.9, 15.12, 15.15, 18.1-18.20, 16.4, 17.10, 17.11	8
IV	Introduction to Machining & Welding and its applications Machining: • Basic principles of Lathe-machine and operations performed on it. • Basic description of machines and operations of Shaper, Planer, Drilling, Milling & Grinding. Welding: • Importance & basic concepts of welding, • Classification of welding processes. • Gas-welding, types of flames. • Electric-Arc welding. • Resistance welding. • Soldering & Brazing and its uses.	Text Book 2 3.2, 3.4-3.9, 3.13-3.33 7.2, 7.3, 7.5, 8.4, 8.5, 5.2-5.6, 11.2, 11.18, 10.2, 10.3, 10.8-10.10 Text Book 1 24.1, 24.2, 24.16-24.17, 22.19 24.32-24.34 24.5, 24.6, 24.7, 24.10, 24.13 24.65, 24.66	7
V	Miscellaneous Topics Manufacturing: • Importance of Materials & Manufacturing in Technological & Socio- Economic developments, • Plant location, • Plant layout – its types, • Types of Production. • Production versus Productivity Miscellaneous Processes:	Text Book 1 1.1, 1.2, 2.2, 2.3,2.4 3.1, 3.2, 3.3 21. 21.2,	5

	• Powder-metallurgy process & its applications • Plastic-products manufacturing • Galvanizing and Electroplating.	21.4, 21.6-21.9, 21.12, 21.15 22.2, 22.8, 22.16 27.31, 27.29	

8. Text books to be used

1. B. S. Raghuwanshi , "Workshop Technology" , vol-1, Dhanpat Rai & Co, Ninth Edition
2. Hajra Chaudhary, "Workshop Technology" , vol-2, MP Publications , Seventh edition

9. Reference materials including web sources

1. DeGarmo, "Materials and Processes in Manufacturing"
2. http://nptel.iitm.ac.in/courses.php
3. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-ROORKEE/MANUFACTURING-PROCESSES/index.htm
4. http://nptel.iitm.ac.in/video.php?subjectId=112107145
5. http://freevideolectures.com/Course/2369/Manufacturing-Processes-II
6. http://freevideolectures.com/Course/2368/Manufacturing-Processes-I
7. http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv234-Page1.htm
8. http://nptel.iitm.ac.in/video.php?subjectId=112105126
9. http://web.mit.edu/2.810/www/lectures.html

11. Evaluation methodology to be followed

The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.
b. Quizzes
c. Home-works and assignments
d. Projects
e. Sessional examinations
f. Final examination

12. Award classification

Assessment procedure will be as follows:

• Class attendance and participation in discussions will be based on:

a. Substantial in-class contribution to class topics and discussion questions

b. Response to other students' queries

c. Contribution to discussion and chat sessions

• Quizzes

a. Quizzes will be of multiple choice, fill-in-the-blanks or match the columns type.

b. Quizzes will be held periodically

- Home work and assignments

  a. The assignments/home-work may be of multiple choice type or comprehensive type.

  b. They will be available online but submission will be carried out in handwritten form.

  c. The grades and detailed solutions of assignments (of both types) will be accessible online after the submission deadline.

- Projects

  a. Will be assigned in the mid-part of the course and should be completed and submitted before the end of the course.

  b. The presentation and grading will be available online.

- Sessional and Final examinations

  a. There will be comprehensive examinations held on-campus (Sessionals) or off-campus (External) on dates fixed by Mahamaya Technical University.

B. Tech. I / II Semester

(For Civil Engineering)

1. Title of the course: CE103/CE203 GEOLOGICAL SCIENCES

2. Work load per week

a. Lecture (L): 3 hrs/week Total Lecture Hours per Semester: 42

b. Tutorials (T):0 Total Tutorial Hours per Semester: 0

c. Practicals (P): 0 Total Lab Hours per Semester: 0

d. Total Credits: L+T+P based 3

e. One credit is defined as one lecture load per week and two hours of self-study to be connected with tutorial, practical work book and assignments.

3. Prerequisites of the course: Basic Knowledge of general physics, chemistry & geography.
4. Prerequisite for which next course: This course is prerequisite for :

- Geolotechnical Engg.
- Bridge Engg.
- Tunnel Engg.
- Water Resource Engg.
- Earthquake Resistant Design of Structures.
- Building material and construction.

5. Why you need to study this course:

Geology is the science of the earth‘s crust, including rocks, its origin, stratification, faults & folds, physical properties, strength, its engineering behavior etc. Since most of the structures specially heavy structures like high rise buildings, dams , bridges etc are founded on rocks. Besides, the tunnels & underground cavities are also constructed for various purposes. It is therefore essential for a Civil Engineer to be aware of geological features & their behavior for planning & development of structures. Further this will also help in selecting suitable construction materials.

Course Objective:

Although this course is not intended to make a trained geologist but this will help assist a Civil Engineer in carrying out the following functions-

- Understand the interrelation of site selection & geological knowledge for all big construction projects.
- Properties of rocks & minerals used as building material & as well as base of foundations.
- Know about the geological features, there causes & effects on construction projects.

- Lastly, to gain basic knowledge of geological investigations required for big projects like bridge, tunnel, reservoirs , dams etc.

6. Learning outcomes expected from the course:

At the completion of this Course, student will have the basic skills required to:

a) Understand the properties & structures of rocks & minerals, and there effects on the characteristics of rocks.

b) Geological features, their causes & effects on construction & design of projects.

c) Basic knowledge about the geological investigation to be made for site selection of big construction projects & general methods for performing these investigations.

Aims:

This course will provide a fair knowledge to the students about the geological aspects of all the investigations done for important engineering projects. The emphasis is on-

- Common properties of rocks & minerals.
- Rock deformations, there causes, effects & preventive measures.
- Principles of geological exploration for sub-surface structures & underground water features.

- Understanding of site selection for bridge, tunnel, reservoirs , dams etc. on basis of geological studies.

7. Details of the syllabi:

Unit	Topic	Text Book1 Page. No.	Lectures
I	Rocks: • Introduction & importance of Geological knowledge • Rocks, their origin • Structure & Texture. • Classification of igneous sedimentary and metamorphic rocks and their suitability as engineering materials. • Stratification & Lamination bedding, • Outcrop-its relation to topography. • Dip and Strike of bed • Overlap, outlier and Inlier.	Chapter-3 Chapter-5 Chapter-6	12

	• Building stones. • Engineering properties of rocks.	Chapter-22	
II	Minerals: • Their physical properties and detailed study of certain rock forming minerals. • Alkali aggregate reaction, • Grouting, • Pozzolonic materials. • Mineral constituents of sedimentary, igneous, and metamorphic rocks.	Chapter-4	10
III	Rock deformation: • Folds. • Faults. • Joints unconformity. • Their classification, causes and relation to engineering behavior of rock masses. • Landslides, its causes & preventive measures.	Chapter-6 Chapter-22 Chapter-19	8
IV	• Principles of geological exploration • Methods for sub-surface structure. • Underground water & its origin • Aquifer & Aquiclude • Artesian wells. • Underground provinces and its role as geological hazard. • Site selection for dam. • Reservoir, bridge and tunnel.	Chapter-11 Chapter-17 Chapter-18,21	10

8. Text books:

1- "D Venkat Reddy: Engg. Geology, Vikas Publication

2. Tony Waltham: Foundations of Engg. Geology, Spon Press

9. Reference Material:

1. Tony Waltham: Foundations of Engineering Geology, SPON Press.
2. D Venkat Reddy: Engineering Geology, Vikas Publishing House Pvt. Ltd.
3. J M Treteth: Geology of Engineers, Princeton, Von. Nostrand.
4. K V G K Gokhale: Text book of Engineering Geology, B S Publication.
5. Prabin Singh: Engg. and General Geology, Katson Publishing House.
6. D S Arora: Geology for Engineers, Mohindra Capital Publishers, Chandigarh.
7. F G Bell: Fundamental of Engineering Geology, B S Publication.
8. Leggot R F: Geology and Engineering, McGraw Hill, New York.
9. P K Mukerjee: A Text book of Geology, Calcuta Word Publishers.
10. B S Sathya Narayanswami: Engineering Geology, Dhanpat Rai & Co.
11. Prakash Rao : Engineering Geology, Nirali Prakashan, Pune.

10. Laboratory work: N.A.

11. Evaluation methodology to be followed:
The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.
b. Quizzes
c. Home-works and assignments
d. Projects
e. Sessional examinations
f. Final examination

12. Award classification

Assessment procedure will be as follows:

• Class attendance and participation in discussions will be based on:
  a. Substantial in-class contribution about class topics and discussion questions
  b. Response to other students' queries
  c. Contribution in discussion and chat sessions

• Quizzes
  a. Quizzes will be of type multiple choice, fill-in-the-blanks or match the columns.
  b. Quizzes will be held periodically

• Home works and assignments
  a. The assignments/home-works may be of multiple choice type or comprehensive type.
  b. They will be available online but submission will be carried out in handwritten form.
  c. The grades and detailed solutions of assignments (of both types) will be accessible online after the submission deadline.

• Projects

a. Will be assigned in the mid-part of the course and should be completed and submitted before the end of the course.
b. The presentation and grading will be available online.

- Sessional and Final examinations
  a. These will be comprehensive examinations held on-campus (Sessionals) or off-campus (External) on dates fixed by the Mahamaya Technical University.

B. Tech. I / II Semester

(Branch Elective for Agricultural Engineering)

1. Title of the course: AG102/AG202 Material Science

2. Work load per week

a. Lecture (L): 3 hrs/week	Total Lecture Hours per Semester: 42
b.Tutorials (T):0	Total Tutorial Hours per Semester: 0
c. Practicals (P): 0	Total Lab Hours per Semester: 0
d. Total Credits: L+T+P based	3

e. One credit is defined as one lecture load per week and two hours of self-study to be connected with tutorial, practical work book and assignments.

3. Prerequisites of the course: As a prerequisite for this course on Material Science , Basic knowledge of atomic concepts in Physics and Chemistry is assumed.

4. Prerequisite for which next course: This course is prerequisite for

- Machine Design.
- Farm Machinery Design.

5. Why you need to study this course: Materials science is one of the most important subjects as it impacts nearly all the traditional fields of engineering. The subject is concerned with the structure and properties of materials used in modern technology. This means that materials science is at the forefront of high technology for the simple reason that advancements in technology are the direct result of advances in materials. The importance of materials science is not recent. We only have to look at the names of eras to realize that materials have been instrumental in the advance of civilization: the Stone Age, the Bronze Age, the Iron Age. To many, we are now living in the Materials Age. The field of materials science is directed towards understanding why materials behave the way they do, how materials are made, and how new materials with unique properties can be created. The study of materials science encompasses specific materials such as metals, ceramics, polymers, and semiconductors, and understanding how their structure, from the atomic level to that of common objects, influences mechanical, electrical, optical, chemical, biological and magnetic properties. What this means is that materials science impacts a wide range of modern technologies; from producing high-strength, lightweight aluminum alloys for new generations of aircraft to the addition of a layer of atoms on the surface of materials used in optical communications.

Course Objective:

Basic idea of the course will be to introduce the basic concepts required to understand the different properties of the materials. The course has been built for first year undergraduate students of Agricultural Engg.

6. Learning outcomes expected from the course:

At the completion of this Course, student will have the basic skills required to:

a) Understand the potential of different materials.

b) Understand the different properties of materials

c) Have a basic understanding of mechanical properties of materials.

d) Understand the basics of ferrous and non ferrous materials.

e) Have a basic knowledge of magnetic and electrical properties of materials.

Aims:

This course will provide a basic grounding in key aspects of Material Science with an emphasis on properties of materials

7. Details of the syllabi:

Unit	Topic	Text Book/ Topics	Lectures
I	Introduction to Material science • Historical perspective • importance of materials • Brief review of modern & atomic concepts in Physics and Chemistry • Atomic models and Chemical bonding Crystallography and imperfections • Concept of unit cell • space lattice • Bravais lattices • common crystal structures • Atomic packing factor and density • Miller indices • X-ray crystallography techniques • Imperfections, Defects & Dislocations in solids	Text Book 1 1.1,1.2 1.3 Text Book 2 4.1-4.9 Text Book 1 3.4 3.3 3.5 3.8-3.11 3.14 3.15,3.16 6.9-6.20 5.1-5.4	10
II	Mechanical Properties and Testing • Stress strain diagram • Ductile and brittle materials • stress Vs strength • toughness, hardness, fracture, fatigue and creep	Text Book 1 15.1 to 15.8	10

	Phase Diagram and Equilibrium Diagram • Uniary and Binary diagrams , Phase rules • Types of equilibrium diagrams • solid solution type, eutectic type and combination type, Iron-carbon equilibrium diagram.	Text Book 2 7.1-7.8 Text Book 1 9.1-9.15	
III	Ferrous materials • Iron and steel manufacture • furnaces • various types of carbon steels • alloy steels and cast irons, its properties and uses Heat Treatment • various types of heat treatment, such as Annealing, Normalizing, Quenching, Tempering and Case hardening. • Time Temperature Transformation (TTT) diagrams Non-Ferrous metals and alloys • Non-ferrous metals, such as Cu, Al, Zn, Cr, Ni etc. and its applications • Various types of Brass, Bronze bearing materials their properties and uses • Aluminum alloys, such as Duralumin, Other advanced materials/alloys.	Text Book 3 11.2 Text Book 1 11.1-11.8 10.12 Text Book 3 11.3	10

IV	Magnetic properties • Concept of magnetism- Dia, para, ferro magnetic materials • Hysteresis • Soft and hard magnetic materials • Magnetic Storages Electrical Properties • Energy band • concept of conductor, insulator and semi conductor • Intrinsic and extrinsic semi-conductor • p-n junction and transistors • Meissner effect	Text Book 1 13.1 to 13.18 - do -	10

8. Text / Reference Books:

1. Narula, "Material Science", Tata Mc.Graw Hill
2. V. Raghvan, "Material Science", Prentice Hall of India
3. W.D. Callisster Jr. 'Material Science & Engineering Addition'- Wesley Publishing Co.

9. Reference Material:

http:// http://www.msm.cam.ac.uk/phase-trans/2012/Manna/Part2.pdf
http://web.mit.edu/8.13/www/JLExperiments/JLExp39.pdf
http://www.nano-tech.gatech.edu/Chapter7_g_2nd_lecture.pdf

Reference Books:

1. Van Vlash, "Elements of Material Science & Engineering", John Wiley & Sons

10. Laboratory work: N.A.

11. Evaluation methodology to be followed:

The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.
b. Quizzes
c. Home-works and assignments
d. Projects
e. Sessional examinations
f. Final examination

12. Award classification

Assessment procedure will be as follows:

• Class attendance and participation in discussions will be based on:
a. Substantial in-class contribution about class topics and discussion questions

b. Response to other students' queries
c. Contribution in discussion and chat sessions

- Quizzes
  a. Quizzes will be of type multiple choice, fill-in-the-blanks or match the columns.
  b. Quizzes will be held periodically

- Home works and assignments
  a. The assignments/home-works may be of multiple choice type or comprehensive type.
  b. They will be available online but submission will be carried out in handwritten form.
  c. The grades and detailed solutions of assignments (of both types) will be accessible online after the submission deadline.

- Projects
  a. Will be assigned in the mid-part of the course and should be completed and submitted before the end of the course.
  b. The presentation and grading will be available online.

- Sessional and Final examinations
  a. These will be comprehensive examinations held on-campus (Sessionals) or off-campus (External) on dates fixed by the Mahamaya Technical University.

B Tech I / II Semester

(Common for all branches)

1. Title of the course: CE101/CE201 ENERGY, ENVIRONMENT AND ECOLOGY

2. Work load per week

a. Lecture (L): 3 hrs/week Total Lecture Hours per Semester: 42

b. Tutorials (T): 0 Total Tutorial Hours per Semester: 0

c. Practicals (P): 0 Total Lab Hours per Semester: 0

d. Total Credits: L+T+P based 03

e. One credit is defined as one lecture load per week and two hours of self-study to be connected with tutorial, practical work book and assignments.

3. Prerequisites of the course
(a) Relation between human and nature
(b) Effect of human activities on environment
(c) Calculate the intensity of pollutants
(d) Interaction between nature and human being
(e) Chemistry of soil, air and water
(f) Government legislation to control environmental pollution problem

4. Prerequisites of which next course: This course is prerequisite for :
- Environment Engineering-I & II.
- Environmental Management for Industries.
- Environmental Geo-technology.
- Industrial pollution control & Environmental Audit

5. Objectives of the course

(a) Develop ability to understand interrelationship between human beings and nature.
(b) Recognizing basic component of environment i.e. air, water and soil and ecology i.e. energy, producers and decomposers.
(c) Identify problem of pollution along its solution
(d) Evaluate quantity and quality of natured resources and how natural resource can be available for a long time.
(e) Teach students how their activities support environment instead of degradation of environment by anthropogenic activities.

(f) Introduce students to upcoming environmental pollution control techniques.

6. Learning outcomes from this course

(a) To be able to plan and prepare suitable methods for the conservation of environmental segments.
(b) To be able to plan importance of sustainable developments i.e. appropriate use of natural resources.
(c) To be able to plan and prepare new techniques of development by reducing low rate consumption of natural resources through Environment Impact Assessment (EIA) process.
(d) To be able to understand role of individual NGO and Government for environment protection activities.

7. Details of the syllabi:

Unit	Topic	Text Book1 Page. No.	Lectures
I	Introduction: • Definition of environment. • Need of public awareness. • Segments of environment. • Importance of Environment. • Ecosystem- definition, classification and components. • Function of ecosystem. • Nitrogen and sulphur cycle.	(Text book-1 Chapter-1) (Text book-2, 1.3) (Text book-1,Chapter-2) (Text book-2, 1.4.4,1.4.5)	6
II	Sustainable Development: • Definition, principle, parameter and its challenges. • Biodiversity: classification, measurement and conservation. • Natural resources: availability & problems. • Minerals & Energy Resources • Seed suicide and sustainable agriculture.	Text book-1,chapter-5 (T.Book-2, Chapter-9) (T.Book-1,Chapter-7) (Text book-1,Chapter-8)	6

III	Energy: • Classification of energy resources. • Fossil fuels, nuclear and hydroelectric energy. • Solar, wind, biomass, biogas and hydrogen fuel energy.	Text book-1,chapter-8	4
IV	Pollution: • Environment pollution. • Water pollution, • Solid waste management & hazards waste management. • Current environmental issues • Problem with urbanization and automobile pollution and their control. • Adverse effects of Pollution: Climate change; Green house effect, Global warming, Acid rain and ozone layer depletion.	T.Book-1,Chapter-11 (T.Book-1,Chapter-12),T.Book-2,Ch.-7 T.book-1,Ch.-13 T.book-1,Ch.-18 T.BOOK-2,ch.-2	8
V	Environmental protection & Control Measures: • Government initiatives i.e. air, water and environmental protection act. • Role of NGOs. • Environment Impact Assessment (EIA): definition, methodology and process. • Environmental education: its principle and objectives. • Case Studies – Bhopal Gas Tragedy, London Smog. • Water Borne and water induce disease, arsenic problem in drinking water	T.book-1,Ch.-20	6

Text Books

1. Environment Studies - R Rajagopalan, Oxford Publications.
2. Environmental Chemistry – A K De, New Age Publications.

Reference Books

1. Environment and Ecology – Smriti Srivastava, S K Kataria & Sons.
2. Environmental Science – G T Miller, Publisher – Thomson Asia, Singapore.
3. Environmental Change and Globalization: Double Exposures – Robin Leichenko and Karen O'Brien, Oxford University Press.
4. Essential Environmental Studies – S P Mishra & S N Pandey, Ane Book Publications.
5. Principles of Environmental Science and Engineering by P Venugoplan Rao, Prentice Hall of India.
6. Environmental Science and Engineering by Meenakshi, Prentice Hall of India.
7. Introduction to Environmental Science – Y Anjaneyulu, B S Publication.
8. Environmental Science – D B Botkin, E A Keller, Wiley, India.
9. Fundamentals of Ecology – E P Odum, Publisher – Thomson Asia, Singapore.
10. Basics of Environment & Ecology – Anubhava Kushik, New Age International Publications.
11. Environmental Studies – Benny Joseph – Tata Mcgraw Hill.
12. Text book of Environment Science & Technology - M Anji Reddy, B S Publication.
13. Environmental Studies – S N Chary, Macmillan Publishers, India, Ltd.
14. Environmental Studies – B S Chauhan, University Science Press.

Internet Link:- (i) www.epa.gov
(ii) www.unfcce.int
(iii) www.unep.org
(iv) www.cpcb.nic.in
(v) www.environmental.ksc.nasa.gov

B. Tech. I / II Semester

(Common to all branches)

1. Title of the course: AS105/AS205 Professional Communication

2. Work load per week

a. Tutorial(T): 1 hrs/week	Total Tutorial Hours per Semester: 14
b. Practicals (P): 2 hrs/week	Total Lab Hours per Semester: 28
c. Total Credits: T+P	2

Objectives of the course: To impart basic Communication skills to the first year UG students in the English language through rigorous practice and use of various categories of common words and their application in sentences; to enable them to achieve effective language proficiency for their social, professional & inter personal communication both in speaking & writing.

Desired Outcome of the Course: The student must be able to:

i) Understand and use about 1200 to 1500 General Purpose words of English language,

ii) Express his /her ideas and thoughts in speech or writing,

iii) Be able to comprehend, converse, interact and participate in any day-to-day events and situation

iv) Write grammatically correct sentences for various forms of written communication to express oneself.

Key Concepts:

1. **Language/Communication in context**: communication as a means of sharing information, speakers-listener and reader-writer relationship, process, importance, purpose, features of communication (accuracy, brevity, clarity and appropriateness in communication), barriers to communication, personal and interpersonal communication.
2. **Writing Skills:** Learning words for general purpose, use through situations, sentence formation and use of given set of words in different contexts, usages of words in different tenses, aspect and moods, narrative in first, second and third person, meaning and usages of connectives, modifiers and models, phrasal verbs, connotations, various types of sentences and paragraphs, features of paragraph (cohesion and coherence).
3. **Speaking Skills:** Speech and verbal communication, articulation (pronunciation of different sounds and words i.e. vowels, consonants, diphthongs, (IPA Chart) and words), paralinguistic features, formal informal speaking, extempore, discussion and presentation.
4. **Reading Comprehension:** kinds and types of reading texts, basic steps to effective reading, abstracting, précis writing and summarizing taking example from different texts.

5. **Listening Comprehension:** Process and types of listening, steps of listening, barriers to listening, Fluency & speed, impact of pronunciation on comprehension through various texts, intelligent listening.

Details of Lab Sessions:

Details of Lab Sessions: Session	**Topics to be covered in the lab**
Lab 1-8	1. Vocabulary exercises on the newly learnt words with evaluation 2. Simple conversation exercises using the newly learnt words 3. Practicing the pronunciation of the newly learnt words 4. Practice of sounds (Vowels & Consonants) 5. Transcription of words
Lab 9-18	1. Reading & Comprehension of simple passages with exercises for evaluation 2. Listening & Comprehension of simple passages with exercises for evaluation 3. Discussion & simple conversation exercises based on the passages
Lab 19-21	1. Understanding of tenses & practice exercises with evaluation 2. Practice exercises on enhancing conversational skills with evaluation
Lab 22-28	1. Understanding the conceptual inputs on presentation skills 2. Watching examples of good/bad presentation skills & evaluating with the group 3. Conducting presentations in front of the group along with peer and teacher evaluation

Text Books & references:

1. Sanjay Kumar and Pushp Lata. *Communication Skills*. Oxford University Press. 2012.
2. M.Ashraf Rizvi. *Effective Technical Communication.* Tata McGraw Hill. 2005.
3. Aruna Koneru. *Professional Communication*. Tata McGraw Hill. 2010.
4. Rani, N.K. Mohanraj, J & Babbellapati.. *Speak Well*. Orient Longaman 2012.
5. Laws.A, *Presentations*, Orient Longman. 2011.

Suggested readings

1. Bhaskar W. W. S. and Prabhu, N. S. “English Through Reading”. Vol I & II MacMillan, 1978.
2. D’Souza Eunice and Shaham, G. “Communication Skills in English”. Noble Publishing House 1977.
3. Fiske , John “ Introduction to Communication Studies” Routledge, London, 1990.

Suggested web-links:

http://www.ego4u.com/

http://www.english4today.com/

http://www.learnamericanenglishonline.com/

http://learnenglish.britishcouncil.org/en/

http://www.englisch-hilfen.de/en/

http://www.englishclub.com/

http://www.englishlearning.com/

http://learningenglish.voanews.com/

http://www.usingenglish.com/dictionary.html

http://www.mindtools.com/pages/article/newCS_99.ht

Performance Evaluation & Examination:

The student will have to perform on per lecture basis and the peer to peer learning and evaluation method is to be used. However, since the students will be given class tests and assignments hence these will have to be corrected and marked by the teachers and the marks made public with formative feedback to the student explaining where the mistake is and what the correct ways to answer the questions are.

Assignments are to be given to reinforce the concepts and extend the practice of words and their usage by the student in different situations, tenses and accounts in first, second or third person.

The Course examination will be practical based and the student will have to be proficient to demonstrate the language capability as will be tested on the basis of question paper sent from the university.

B. Tech. I / II Semester

(Common to all branches)

1. Title of the course: CE102/CE202 Computer Aided Engineering Graphics

2. Work load per week

a. Lecture (L):0	Total Lecture Hours per Semester: 0
b. Tutorials (T):1	Total Tutorial Hours per Semester: 14
c. Practicals (P): 3 hrs/week	Total Lab Hours per Semester: 42
d. Total Credits: T+P	2

e. One credit is defined as one lecture load per week and two hours of self-study to be connected with tutorial, practical work book and assignments.

3. Prerequisites of the course: Basic knowledge of Computer operations and geometry.

4. Prerequisite for which next course: This course is prerequisite for-

- Cad lab.
- Building Construction
- Design of steel structure
- Design of concrete structure
- Town planning and Architecture
- Structural detailing
- Building planning and drawing

5. Why you need to study this course: To develop the ability and understanding of the following-

- Drawing Instrument and their uses
- Dimensioning , scales and units, lettering
- Computer based 2D/3D Environment.
- Projections- Orthographic, isometric etc.
- Sections –plan and elevations

6. Learning outcomes expected from this course

- Understanding and preparing 2D/3D drawing on computer.
- A fair knowledge of units, scales and drawing instruments and their application.
- To be able to understand and prepare drawing : plan, elevation and cross sections.
- This will form basic inputs for developing drawings for various structures from designs.

7. Details of the syllabi:

Unit	Topic	Text Book 1/ Topics	Weeks
I	Introduction to computer aided sketching: • Drawing instruments and their uses • Lettering ,dimensioning and free hand practicing • Computer screen: layout of menus/tool bars • Creations of 2D/3D Environment. • Drawing scale, units etc. • Creation of shapes: square ,rectangle, circle, curves etc.	chapter-1 chapter-2	2
II	Orthographic projections: • Definitions • Projections of points, lines • True and apparent lengths, inclinations • Orthographic projections of plane surfaces • Projections of solids: tetrahedron ,hexahedron • Prisms and pyramids • cylinders and cones	Chapter-7 Chapter-8,9 Chapter-10,11 Chapter-12	8
III & IV	Sections and Development of lateral surfaces of solids • Sectional views • Apparent shapes and true shapes	CHAPTER-14	3

V	of sections of prism, pyramids, cylinder, cones Lateral surface of above solids Their fustums and trunctions Isometric projections: • Isometric scales • Isometric projections of simple figures: *tetrahedron *hexahedron *right regular prisms *pyramids *cylinder and cones *Spheres *cut spheres and combination of solids Note: Atleast 2 sheets to be prepared through Cad software.	Chapter-15 Chapter-17	2

8. Text books:

1. Engineering Drawing – N D Bhatt & V M Panchal, 48th edition, 2005 Charotar Publishing House, Gujarat.
2. A Primer on Computer Aided Engineering Drawing – 2006, Published by VTU, Belgaum.
3. A Textbook of Engineering Graphics, K. Venugopal and V. Prabhu Raja, New Age International Publishers.
4. Engineering Drawing and Graphics using Auto Cad, T. Jeyapoovan, Vikas Publishing House Pvt. Ltd.

Reference Books:

1. Computer Aided Engineering Drawing – S. Trymabaka Murthy, I K International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition – 2006.
2. Engineering Graphics – K R Gopalakrishna, 32nd edition, 2005 – Subhash Publishers, Bangalore.
3. Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production – Luzadder Warren J., duff John M., Eastern Economy Edition, 2005 - Prentice – Hall of India Pvt. Ltd., New Delhi.

B. Tech. I Semester

(Bio-Technology)

1. Title of the course: BT101 Engineering Mathematics - I

2. Work load per week in terms of

a. Lectures (L) : 3 hrs/wk Total Lecture Hours per Semester: 42

b. Tutorials : 1 hrs/wk Total Tutorial Hours per Semester: 14

c. Practicals : 0 hrs/ week

d. Total credit L+T+P based : 4

3. Prerequisite of the course

A Prerequisite for this course is knowledge of basic mathematics and geometry.

4. Prerequisite for which next course: This course is prerequisite for

- Mathematics II.
- Statistical Techniques.

5. Why you need to study this course

Mathematical biology aims at the mathematical representation, treatment and modeling of biological processes, using a variety of applied mathematical techniques and tools. It has both theoretical and practical applications in biological, biomedical and biotechnology research. By describing the systems in a quantitative manner, their behavior can be better simulated, and hence properties can be predicted that might not be evident to the experimenter.

Such mathematical areas are calculus, probability theory, statistics, linear algebra, abstract algebra, graph theory, combinatory, algebraic geometry, topology, dynamical systems, differential equations are now being applied in biology.

Course Objective

Basic idea of the course shall be to introduce the basic knowledge of mathematics and its application to biological experiments. Our target is to aware the students with basic mathematics who have non mathematical background so that they can use these mathematical tools in biotechnology and higher research.

6. Learning outcomes expected from this course

At the completion of this course, students shall have basic skills required for:

1. Selection of data on the basis of their properties and use them in different biological experiments.
2. Understanding of mathematical terms like vectors, probability, statistics, differentiation etc.
3. To make the students think logically.

7. Details of Syllabus

Unit	Topic	Text Book / Topics	Lectures
I.	Sets • Sets and their representations, empty set, number line, intervals • Subsets, power set, universal set, Venn diagram Relation and function • Cartesian product of sets • Relation • Function	Text Book 1 1.1-1.5 1.6-1.9 2.1-2.4	7
II.	COORDINATE GEOMETRY Straight Lines: • Brief recall of 2D from earlier classes. Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axes, point-slope form, slope-intercept form, two point form, intercepts form and normal form. General equation of a line. Distance of a point from a line. Conic Sections: • Sections of a cone: circle, ellipse, parabola, hyperbola, a point, a straight line and pair of intersecting lines as a degenerated case of a conic section. Standard equations and simple properties of parabola, ellipse and hyperbola. Standard equation of a circle.(without Application)	Text Book 1 10.1-10.5 11.1-11.6	9
III.	Limits and Derivatives • Introduction of limits, limits of Trigonometric Functions • Derivative introduced as rate of change both as that of distance function and geometrically, intuitive idea of limit. • Definition of derivative, relate it to slope of tangent of the curve, derivative of sum, difference, product and quotient of functions. • Derivatives of polynomial and trigonometric	Text Book 1 13.1,13.3.1, 13.4 13.2,13.3 13.5.1 13.5.2	8

	functions.		
IV.	Continuity and Differentiability • Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit function. • Concept of exponential and logarithmic functions and their derivative. • Logarithmic differentiation. • Derivative of functions expressed in parametric forms. • Second order derivatives. • Rolle's and Lagrange's Mean Value Theorems (without proof) and their geometric interpretations.	Text Book 2 5.2,5.3 5.4 5.5 5.6 5.7 5.8	8
V.	Permutations & Combinations • Fundamental principle of counting. • Factorial n. • (n!)Permutations and combinations, derivation of formulae and their connections, simple applications.	Text Book 1 7.2 7.3.2 7.3 7.4	8

8. Text books to be used

1) Mathematics - Textbook for Class XI, NCERT Publication

2) Mathematics Part I - Textbook for Class XII, NCERT Publication

3) Mathematics Part II - Textbook for Class XII, NCERT Publication

9. Reference books & web sources

1) Higher engineering mathematics by B.V.Ramana (Tata Macgraw Hill)

2) Advanced modern engineering mathemtics by Glyn james (pearson education)

3) Geogebra (freely downloadable) www.geogebra.org

10. Evaluation methodology to be followed

The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.

b. Quizzes

c. Home-work and assignments
d. Projects
e. Sessional examinations
f. Final examination

11. Award classification

Assessment procedure shall be as follows:

- Class attendance and participation in discussions shall be based on:
  a. Substantial in-class contribution to class topics and discussion questions.
  b. Response to other students' queries.
  c. Contribution to discussion and chat sessions.
- Quizzes
  a. Quizzes shall be of multiple choice, fill-in-the-blanks or match the columns type.
  b. Quizzes shall be held periodically.
- Home work and assignments
  a. The assignments/home-work may be of multiple choice or comprehensive type.
  b. They shall be available online but submission and be carried out in handwritten form.
  c. The grades and detailed solutions of assignments (of both types) shall be accessible online after the submission deadline.
- Sessional and Final examinations
  a. There shall be comprehensive examinations held on-campus (Sessionals) or off-campus (External) on dates fixed by Mahamaya Technical University.

B. Tech. I Semester

(Only for Bio-Technology students with PCM at 10+2 level)

1. Title of the course: **BT102 Biology - I**

2. Work load per week in terms of

a. Lectures (L) : 3 hrs/wk **Total Lecture Hours per Semester**: 42

b. Tutorials : 1 hrs/wk **Total Tutorial Hours per Semester**: 14

c. Practicals : 0 hrs/ week

d. Total credit L+T+P based : 4

e. one credit is defined as one lecture load per weekend two hours of self study to be connected with tutorial, practical work book and assignments**.**

3. Prerequisites of the course if any

A Prerequisite for this course is knowledge of basic Biology of organisms.

4. Prerequisite for which next course if any: This course is prerequisite for

- Biology II
- Introduction to biotechnology
- Microbiology & Cell Biology.

5. Why you need to study this course:

Biotechnology is the application of advances made in the biological sciences. There is need to know the basics of biology to students with mathematics background to develop a better understanding of how plant and animal system works. It would provide a platform for advanced courses of biotechnology like genomics, proteomics, metabolomics. The basic knowledge of Biology is a must to study the various aspects of biotechnology.

Course Objective

Basic idea of the course will be to introduce the basic knowledge of biology and its application to biological experiments. Our target is to aware the students with basic knowledge of biology who have mathematical background so that they can use these information in biotechnology and higher research.

6. Learning outcomes expected from this course

At the completion of this Course, student will have the basic skills required to:

a) Understand the basics of Living systems.

b) Understand key common features of living organisms & function

7. Details of syllabi:

Unit	Topic	Text Book / Topics	Lectures
I.	**Diversity in Living World** What is 'Living Diversity in the Living World Taxonomic Categories Species Genus Family Order Class Phylum Kingdom Taxonomical Aids Herbarium Botanical Gardens Museum Zoological Parks Key	Text Book 1 1.1 1.2 1.3 1.3.1 1.3.2 1.3.3 1.3.4 1.3.5 1.3.6 1.3.7 1.4 1.4.1 1.4.2 1.4.3 1.4.4 1.4.5	8
II.	**Biological Classification** Kingdom Monera Kingdom Protista Kingdom Fungi Kingdom Plantae *Algae* *Bryophytes* *Pteridophytes* *Gymnosperms* *Angiosperms* *Plant Life Cycles and Alternation of Generations* Kingdom Animalia *Basis of Classification*	Text Book 1 2.1 2.2 2.3 2.4 3.1 3.2 3.3 3.4 3.5 3.6 2.5 4.1	8

	Classification of Animals Viruses, Viroids and Lichens	4.2 2.6	
III.	**Structural Organization In Plants** The Root Regions of the Root Modifications of Root The Stem Modifications of Stem The Leaf Venation Types of Leaves The Inflorescence The Flower Parts of a Flower The Fruit The Seed Structure of a Dicotyledonous Seed Semi-technical Description of a Typical Flowering Plant The Tissue System Anatomy of Dicotyledonous and Monocotyledonous Plants Secondary Growth	Text Book 1 5.1 5.1.1 5.1.2 5.2 5.2.1 5.3 5.3.1 5.3.2 5.4 5.5 5.5.1 5.6 5.7 5.7.1 5.8 6.1 6.2 6.3 6.4	8
IV.	**Structural Organization In Animals** Animal Tissues Epithelial Tissue Connective Tissue Muscle Tissue Neural Tissue Organ and Organ System COCKROACH Morphology Anatomy FROGS Morphology Anatomy	Text Book 1 7.1 7.1.1 7.1.2 7.1.3 7.1.4 7.2 7.4 7.4.1 7.4.2 7.5 7.5.1	8
V	**Plant Physiology**	Text Book 1	

	Means of Transport Plant-Water Relations Long Distance Transport of Water Transpiration Uptake and Transport of Mineral Nutrients Phloem Transport: Flow from Source to Sink Methods to Study the Mineral Requirements of Plants Essential Mineral Elements Mechanism of Absorption of Elements Translocation of Solutes Soil as Reservoir of Essential Elements Metabolism of Nitrogen **Photosynthesis In Higher Plants** What do we Know? Early Experiments Where does Photosynthesis take place? How many Pigments are involved in Photosynthesis? What is Light Reaction? The Electron Transport Where are the ATP and NADPH Used? The C4 Pathway Photorespiration Factors affecting Photosynthesis **Plant Growth And Development** Growth Differentiation, Dedifferentiation and Redifferentiation Development Plant Growth Regulators Photoperiodism Vernalisation	11.1 11.2 11.3 11.4 11.5 11.6 12.1 12.2 12.3 12.4 12.5 12.6 13.1 13.2 13.3 13.4 13.5 13.6 13.7 13.8 13.9 13.10 15.1 15.2 15.3 15.4 15.5 15.6	10

8. Text books to be used

1) Biology - Textbook for Class XI, NCERT Publication

9. Reference books & web sources:

Biology by Peter H Raven, George B Johnson, Kenneth A. Mason, Jonathan Losos, Susan Singer (Macgraw Hill)

10. Evaluation methodology to be followed:

The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.
b. Quizzes
c. Home-work and assignments
d. Projects
e. Sessional examinations
f. Final examination

11. Award classification

Assessment procedure will be as follows:

• Class attendance and participation in discussions will be based on:
a. Substantial in-class contribution to class topics and discussion questions
b. Response to other students' queries
c. Contribution to discussion and chat sessions

• **Quizzes**
a. Quizzes will be of multiple choice, fill-in-the-blanks or match the columns type.
b. Quizzes will be held periodically

• **Home work and assignments**
a. The assignments/home-work may be of multiple choice or comprehensive type.
b. They will be available online but submission and be carried out in handwritten form.
c. The grades and detailed solutions of assignments (of both types) will be accessible online after the submission deadline.

• **Sessional and Final examinations**

a. There will be comprehensive examinations held on-campus (Sessionals) or off-campus (External) on dates fixed by Mahamaya Technical University.

B. Tech. I/II Semester

(For Bio Technology)

1. Title of the course: BT103/BT203 Engineering Mechanics

2. Work load per week

a. Lecture (L): 3 hrs/week	Total Lecture Hours per Semester: 42
b. Tutorials (T): 1 hr/week	Total Tutorial Hours per Semester: 14
c. Practical's (P): 2 hrs/week	Total Lab Hours per Semester: 22
d. Total Credits: L+T+P based	5

3. Prerequisite of the course

The subject requires basic knowledge of mathematics and elementary concept of vector calculus. Prior knowledge of physics is useful but not indispensable.

4. Prerequisite for next course

Engineering Mechanics is the fundamental subject for many engineering disciplines like Mechanical, Civil, Electrical, Chemical, Aeronautical and Naval Engineering etc. A thorough knowledge of this subject is a prerequisite for pursuing these disciplines as well as for other disciplines in their 1st year course as followed by most of the Indian universities. It lays the foundation for the subjects like Strength of Materials, Machine Design, Theory of Machine, Dynamics of Machines, Structure Mechanics etc.

5. Why you need to study this course

Engineering Mechanics is both a foundation and provides a framework for most of the branches of engineering. Most of the subjects in areas such as Mechanical, Civil and Aerospace are based upon the subjects of Statics and Dynamics. Even in disciplines such as Electrical Engineering and Mechatronics the course is useful in understanding the working of Electrical/ Robotics devices. An added benefit of studying Engineering Mechanics is that it strengthens problem solving abilities of students.

6. Learning outcomes expected from the course

a) The ability to understand basic concepts of force systems, motion, work and energy.
b) The ability to visualize, formulates, analyze and solve engineering problems.
c) The ability to understand scientific principles and apply them to the practice of engineering problems.
d) The ability to predict the applications of force and motion while carrying out the design of engineering problems.
e) The ability to design and conduct experiments, as well as to analyze and interpret data.

7. Details of the syllabus

Unit	Topic	Text Book/ Topics	Lectures
I.	Two Dimensional Concurrent Force Systems: • Basic concepts • Units • Force System • Law of motion • Moment and couple • Vectors - Vectorial representation of forces and moments • Vector operations • Principle of Transmissibility of forces • Resultant of a force system • Equilibrium and Equations of Equilibrium • Equilibrium conditions • Free body diagrams • Determination of reaction • Resultant of Two dimensional concurrent forces, Applications of concurrent forces	Text Book 1 1.1 to 1.4 1.5 3.4 1.7 4.2, 4.4 2.2, 4.2 2.4 3.3 3.5 5.1 5.3, 5.3.1, 5.3.3 5.2 5.3.3 3.6, 5.3.1	8
II.	Friction: • Introduction • Laws of Coulomb Friction • Equilibrium of Bodies involving Dry-friction • Ladder friction • Belt friction Belt Drive: • Introduction • Types of belt drives • Velocity ratio • Effect of slip on Velocity ratio • Length of belt • Ratio of tensions and power transmission by flat belt drives Structure: • Plane truss • Perfect and imperfect truss • Assumption in the truss analysis • Analysis of perfect plane trusses by the method of joints • Method of section	Text Book 1 6.1 to 6.7 6.3 6.8, 6.9 6.10 7.4, 7.4.1 7.4.2 7.4.2 7.4.3 7.4.3 7.4.4 7.4.6 Text Book 2 4.1 4.2 4.3 4.6 4.7	10
III.	Centroid and Moment of Inertia: • Centroid of plane, curve, area and composite bodies • Moment of inertia of plane area • Parallel Axes Theorem • Perpendicular axes theorems Lifting Machines: • Mechanical advantage • Velocity Ratio • Efficiency of machine • Ideal machine • Ideal effort and ideal load • Law of machine • Reversibility of machine • Lifting machines; System of Pulleys • Simple wheel and axle	Text Book 1 8.4, 8.5.1 to 8, 8..7 9.6.1 to 4 9.4 9.5 Text Book 2 6.1 6.1 6.1 6.1 6.1 6.3 6.6 6.7 6.8	8

IV.	Kinematics of Rigid Body: • Introduction • Kinematics of a particle • Plane rectilinear motion of rigid body • Plane curvilinear Motion of Rigid Body • Velocity and Acceleration under Translation and Rotational Motion	Text Book 1 12.1 12.2 12.4 13.1 12.5, 12.5.1, 12.6, 13.5, 13.6	8
V.	Kinetics of rigid body: • Introduction, Kinetics of a particle • Force, Mass and Acceleration • Work and Energy • Impulse and Momentum • D'Alembert's Principles and Dynamic Equilibrium • Friction in moving bodies	Text Book 1 14.1 14.2,14.3,14.4 15.1 to 15.8 16.1, 16.2, 16.3 14.5 14.4	8

8. Text books to be used

a) A. Nelson "Engineering Mechanics : Statics and Dynamics", The McGraw-Hill Companies., 4th Reprint , 2012.
b) S. S. Bhavikatti "Engineering Mechanics", New Age International Publishers, Second Edition, July 1998.

9. Reference materials including web sources

a) "Engineering Mechanics Statics", J.L Meriam, Seventh Edition, Wiley.
b) "Engineering Mechanics Dynamics", J.L Meriam, Seventh Edition Wiley.
c) " Engineering Mechanics", V. Jayakumar, Prentice Hall of India Private Limited.
d) " Engineering Mechanics", D. S. Kumar, S. K. Kataria and Sons Publications
e) "Engineering Mechanics" Irving H. Shames, Prentice Hall of India
f) "Engineering Mechanics : Statics and Dynamics", R. C. Hibbler, Twelfth Edition , Prentice Hall
g) "Mechanics of Solids", Abdul Mubeen, Pearson Education Asia.
h) "Mechanics of Materials", E.P.Popov, Prentice Hall of India Private Limited.
i) http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/engg_mechanics/index.htm
j) http://nptel.iitm.ac.in/video.php subjectId=112103108
k) http://www.youtube.com/watch?v=LG0YzGeAFxk
l) http://www.youtube.com/watch?v=eQfjGnCHBzc
m) http://www.nptelvideos.com/engineering_mechanics/
n) http://www.learnerstv.com/Free-Physics-Video-lectures-ltv057-Page1.htm
o) http://www.cosmolearning.com/video-lectures/fundamentals-of-engineering-mechanics-11354/
p) http://www.cosmolearning.com/video-lectures/fundamentals-of-engineering-mechanics-11354/

10. Laboratory work

As per the ME101P/ME201P (Engineering Mechanics Lab) Syllabus

11. Evaluation methodology to be followed

The evaluation and assessment plan consists of the following components:

a) Class attendance and participation in class discussions etc.
b) Quizzes.
c) Home-work and assignments.
d) Projects.
e) Sessional examinations.
f) Final examination.

12. Award classification

Assessment procedure shall be as follows:

• Class attendance and participation in discussions shall be based on:

a) Substantial in-class contribution to class topics and discussion questions.
b) Response to other students' queries.
c) Contribution to discussion and chat sessions.

• Quizzes

a) Quizzes shall be of multiple choice, fill-in-the-blanks or match the columns type.
b) Quizzes shall be held periodically.

• Home work and assignments

a) The assignments/home-work may be of multiple choice or comprehensive type.
b) They shall be available online but submission and be carried out in handwritten form.
c) The grades and detailed solutions of assignments (of both types) shall be accessible online after the submission deadline.

• Projects

a) Shall be assigned in the mid-part of the course and should be completed and submitted before the end of the course.
b) The presentation and grading shall be available online.

• Sessional and Final examinations

a) There shall be comprehensive examinations held on-campus (Sessionals) or off-campus (External) on dates fixed by Mahamaya Technical University.

B. Tech. I Semester (Agricultural Engineering)

1. Title of the course: **AG101 Engineering Mathematics- I**

2. Work load per week:

a. Lecture (L): 03 hrs/week **Total Lecture Hours per Semester**: 42

b.Tutorials (T): 01 **Total Tutorial Hours per Semester**: 14

c. Practicals (P): 0 **Total Lab Hours per Semester**: 0

d. Total Credits: L+T+P based: 4

e. One credit is defined as one lecture load per week and two hours of self-study to be connected with tutorial, practical work book and assignments.

3. Prerequisites of the course: As a prerequisite for this course on engineering mathematics-I basic knowledge of algebra, trigonometry, coordinate geometry, matrices of 10+2 level is assumed.

4. Prerequisite for which next course: This course is prerequisite for

- Engineering mathematics-II

5. Why you need to study this course:

Mathematics is a subject which is at the heart of all engineering activities. It is the language of technology and in itself it is a technical subject. The present course consists of topics such as differentiation, integration, series expansion of functions, partial differentiation, multiple integration, differential equations and matrices. The course aims to provide the basic knowledge of these topics and their applications which are frequently used in engineering and technology. Learning the craft of applying mathematics to real world problems will not only equip the students with technical skills, but will also enhance their ability to make sound judgement on the increasingly important role played by science and technology in modern world.

Course Objective:

Basic idea of the course will be to introduce the basic concepts required to understand the differential calculus, integral calculus, differential equations, matrices and their applications in the field of engineering and technology.

6. Learning outcomes expected from the course:

At the completion of this Course, student will have the basic skills required to:

a) Understand the use of derivatives in solving the problems related to motion in a straight line, motion under gravity, rate of change of quantities etc.

b) Have a basic knowledge of functions of more than two independent variables which are used in partial differentiation, Jacobians, maxima and minima.

c) Have a basic knowledge of integrals (including multiple integral) which are extremely useful in deriving equations used in physics, which is then used in different fields of engineering.

d) Understand the use of differential equations to solve various physical problems related to electrical circuit, rectilinear & vertical motion, bending of being etc.

e) Understand the use of matrices in solving simultaneous equations, linear transformation, mechanics, theory of electric circuits etc.

7. Details of the syllabi:

Unit	Topic	Text Book/ Topics	Lectures
I	**Differentiation:** • Definition • Limit and continuity • Derivatives of some standard functions • Derivatives of sum and difference • Derivatives of product and quotient of functions • Derivatives of composite functions and chain rule • Logarithmic differentiation • Parametric differentiation **Integration:** • Integration as inverse process of differentiation • Integration of some standard functions • Integration by substitution • Integration by parts • Integration by partial fraction	Text Book 1 Part-I Text Book 1 Part-II	10
II	• Taylor's and Maclaurin's series for one variable (without proof) • Indeterminate forms • Curvature: Cartesian formula for radius of curvature • Asymptotes for Cartesian coordinates only **Functions of two or more independent variables:** • Partial differentiation • Homogeneous functions and Euler's theorem • Total differentiation and change of variables • Jacobians • Maxima and minima (simple problems only)	Text Book 2 1.16 1.17 1.19 Text Book 3 4.3 2.1, 2.7, 2.8 2.10, 2.11 3.5 to 3.9 6.1 to 6.3 8.1 to 8.4	8

III	**Multiple Integration:** • Double integrals (Cartesian form) • Change of order of integration • Application of double integrals to find the area (Cartesian form) • Triple integrals • Application of triple integrals to find the volume (Cartesian form) • Gamma functions • Beta functions	Text Book 3 13.1, 13.2, 13.4 14.1 15.1 16.1 to 16.3 16.4 17.1 to 17.3 17.4 to 17.10, 17.13	8
IV	**Ordinary differential equations of first order and first degree:** • Exact differential equations • Equations reducible to exact form by integrating factors • Linear differential equations • Bernoulli's differential equations **Linear differential equations of higher orders with constant coefficients:** • Complementary functions • Particular integrals • Method of variation of parameters **Simultaneous linear differential equations with constant coefficients:**	Text Book 2 6.8 6.9 6.10 6.11 6.26, 6.27 6.28 6.30 6.32	8
V	**Matrices:** • Definition and types matrices • Elementary transformations • Rank of a matrix • Reduction to normal form and triangular form • Inverse of a matrix • Consistency and solution of linear equations • Cayley-Hamilton theorem (without proof) • Eigen values, Eigen vectors • Diagonalisation of matrices	Text Book-3 9.1 to 9.11 9.16 10.1 10.2, 10.3 9.19, 9.20 11.1, 11.3, 11.4 12.1, 12.2 12.3 12.5 to 12.13 12.18 to 12.20	8

8. Text books:

1. Mathematics part-I & II, Text Book for class XII, NCERT publications 2012.
2 B.V. Ramana, Higher Engineering Mathematics. Tata McGraw-Hill Publishing Company Ltd. 2009
3. H.K. Dass and Rama Verma, Introduction to Engineering Mathematics-I. S Chand Publications. 2012.

9. Reference Material:

Reference books:

1. E. Kreyszig, Advance Engineering Mathematics. John Wiley & Sons. 2005.
2. B.S. Grewal, Higher Engineering Mathematics. Khanna Publisher. 2005.
3. Peter V. O'Neil, Advance Engineering Mathematics. Thomson (Cengage) Learning, 2007.

Web Sources:

1. http://www.tutorcircle.com / differential-calculus-iInp.htm#
2. http://www.math.edu/calculus /tutorials / partial differentiation/
3. http://stattrek.com/ tutorials / matrix-algebra-tutorial.aspx.
4. http://kr.cs.ait.ac.th/~radok/math/mat6/startdiall.htm.

10. Laboratory work: N.A.

11. Evaluation methodology to be followed:

The evaluation and assessment plan consists of the following components:

a. Class attendance and participation in class discussions etc.
b. Home-works and assignments
c. Sessional examinations
d. Final examination

12. Award classification:

Assessment procedure will be as follows:

• Class attendance and participation in discussions will be based on:

a. Substantial in-class contribution about class topics and discussion questions
b. Response to other students' queries
c. Contribution in discussion

• Home works and assignments:

a. The assignments/home-works should be of comprehensive type.
b. The assignments/home-works should be submitted in handwritten form.
c. The grades and detailed solutions of assignments should be made available after the submission deadline.

• Sessional and Final examinations:

a. These will be comprehensive examinations held on-campus (Sessionals) or off-campus (External) on dates fixed by the Mahamaya Technical University.
