R18

B.Tech – M.E

Draft Course Structure (for I & II year)

Bachelor of Technology

Mechanical Engineering (ME)

I YEAR – I SEMESTER

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	18HS0830	Mathematics-I	3	0	0	3
2	18HS0850	Physics	3	1	0	4
3	18CE0101	Engineering Mechanics	2	1	0	3
4	18CS0502	Programming for problem solving	3	0	0	3
5	18HS0852	Physics Lab	0	0	3	1.5
6	18CS0503	Programming for problem solving Lab	0	0	3	1.5
7	18ME0301	Workshop Practice Lab	0	0	4	2
Induction Program (3 weeks)			0	0	0	0
Contact Periods / Week			**11**	**2**	**10**	**18**
			Total/Week 25			

I YEAR – II SEMESTER

S No.	COURSE CODE	NAME OF THE SUBJECT	L	T	P/ Drg	C
1	18HS0810	English	3	0	0	3
2	18HS0831	Mathematics-II	3	1	0	4
3	18HS0801	Chemistry	3	1	0	4
4	18ME0302	Engineering Graphics & Design	1	0	4	3
5	18ME0303	Materials Engineering	3	0	0	3
6	18HS0811	English Lab	0	0	3	1.5
7	18HS0802	Chemistry Lab	0	0	3	1.5
	Non-Credit Course					
8	18HS0816	Indian Constitution	3	0	0	0
Contact Periods / Week			**16**	**2**	**10**	**20**
			Total/Week 28			

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II YEAR – I SEMESTER

S No.	COURSE CODE	NAME OF THE SUBJECT	L	T	P/ Drg	C
1	18HS0835	Probability & Statistics	3	1	0	4
2	18HS0803	Biology for Engineers	3	0	0	3
3	18CE0151	Strength of Materials	3	0	0	3
4	18ME0304	Kinematics of Machinery	3	0	0	3
5	18CE0152	Fluid Mechanics & Fluid Machines	3	0	0	3
6	18ME0305	Material Testing Lab	0	0	2	1
7	18ME0306	Machine Drawing Lab	0	0	3	1.5
8	18CE0153	Fluid Mechanics & Fluid Machines Lab	0	0	3	1.5
	Non-Credit Course					
9	18HS0804	Environmental Sciences	3		0	0
Contact Periods / Week			**18**		**8**	**20**
			Total/Week 27			

II YEAR – II SEMESTER

S No	COURSE CODE	NAME OF THE SUBJECT	L	T	P/ Drg	C
1	18ME0307	Non - Conventional Energy Resources	3	0	0	3
2	18EE0241	Basic Electrical & Electronics Engineering	3	0	0	3
3	18ME0308	Manufacturing Processes	3	0	0	3
4	18ME0309	Thermodynamics	3	1	0	4
5	18ME0310	Theory of Machines	3	0	0	3
6	18ME0311	Manufacturing Processes Lab	0	0	3	1.5
7	18EE0242	Basic Electrical & Electronics Engineering lab	0	0	3	1.5
		Credit Course				
8	COE-I	Comprehensive Online Examination-I	0	0	0	1
		Non-Credit Course				
9	18HS0817	Essence of Indian Traditional knowledge	3	0	0	0
Contact Periods / Week			**18**	**1**	**6**	**20**
			Total/Week 25			

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L	T	C
3	0	3

(18HS0830) Mathematics-I

Course Educational Objectives:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines. More precisely, the objectives are:

- *To introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Apart from some applications it gives a basic introduction on Beta and Gamma functions.*
- *To introduce the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.*
- *To develop the tool of power series and Fourier series for learning advanced Engineering Mathematics.*
- *To familiarize the student with functions of several variables that is essential in most branches of engineering.*
- *To develop the essential tool of matrices and linear algebra in a comprehensive manner.*

Course Outcomes:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

UNIT – I

Matrices:

Inverse and rank of a matrix; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigen values and eigen vectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

UNIT – II

Calculus:

Evaluation of definite and improper integrals; Applications of definite integrals to evaluate surface areas and volumes of revolutions; Beta and Gamma functions and their properties. Rolle's Theorem, Mean value theorems (without proof) Taylor's and Maclaurin's theorems.

UNIT – III

Multivariable Calculus : *(Differentiation)*

Limit, continuity and partial derivatives, total derivative; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, directional derivatives, curl and divergence.

UNIT – IV

Sequences and Series

Convergence of sequence and series, tests for convergence (Geometric test, P- test, limit comparison test, D' Alember ratio test, Cauchy' s nth root test); Power series, Taylor's series,
series for exponential, trigonometric and logarithm functions.

UNIT-V

Fourier Series:

Determination of Fourier coefficients- Fourier series- Even and odd functions, Fourier Series in an arbitrary interval, Periodic function, Half range sine and cosine series.

Text Books:

1. *Higher Engineering Mathematics*, B.S.Grewal, Khanna publishers-42nd Edition(2012)
2 *Engineering Mathematics Volume-I*, by T.K.V. Iyengar, S.Chand publication-12thEdition, 2010
3 *A Text book of B.Sc. mathematics volume-II*, V.Venkateswara Rao S.Chand Publications, 2011

References:

1. *Higher Engineering Mathematics*, Ramana B.V. Tata McGraw Hill New Delhi,11thReprint, 2010.
2. *Engineering mathematics, volume-I&II*, E.Rukmangadachari & E.Keshava Reddy
   Pearson Publishers. 2001
3. *Linear Algebra: A Modern Introduction*, D. Poole, 2nd Edition, Brooks/Cole, 2005.
4. *A text book of Engineering Mathematics*, N.P. Bali and Manish Goyal, LaxmiPublications, Reprint, 2008.
5. *Linear Algebra & Vector Calculus*, Bhavanari Satyanarayana, T.V.Pradeepkumar & D.Srinivasulu
   Studera Press, New Delhi. 2008

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(18HS0850) Physics

Course Educational Objectives:

- *Will understand properties of electromagnetic waves.*
- *Will recognize the basic concepts related Maxwell equations and properties of magnetic materials.*
- *Will recognize the various basic terms related to Waves, Optics and Acoustics.*
- *Will recognize the basic concepts related properties of Lasers..*
- *To understand the fundamentals Nano materials.*

Course outcomes:

Studies will be familiar with

- *Able to explain properties of electromagnetic waves.*
- *Some of the basic concepts related Maxwell equations and properties of magnetic materials.*
- *Various basic terms related to Waves, Optics and Acoustics.*
- *Some of the basic concepts related properties of Laser.*
- *Understand the importance of Nanotechnology.*

UNIT –I

Electromagnetism And Magnetic Properties Of Materials.

Laws of electrostatics, electric current and the continuity equation, laws of magnetism. Ampere's, Bio-Savart, Faraday's laws and Lenz's law – electromagnetic breaking and its applications - Maxwell's equations.

Magnetization - permeability and susceptibility - classification of magnetic materials, ferromagnetism - magnetic domains and hysteresis - applications.

UNIT –II

Electromagneticwaves.

The wave equation- plane electromagnetic waves in vacuum their transverse nature and polarization – relation between electric and magnetic fields of an electromagnetic wave – energy carried by an electromagnetic wave and examples – Momentum carried by electromagnetic waves and resultant pressure – Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

UNIT – III

Waves, Optics & Acoustics

Mechanical and electrical simple harmonic oscillators - damped harmonic oscillator - forced mechanical and electrical oscillators.

Interference in thin films by reflection - Newton's rings - Farunhofer diffraction from a single slit - Diffraction gratings and characteristics of grating spectrum.

Reverberation- Reverberation time (qualitative treatment) - Factors affecting acoustics of buildings and their remedies.

UNIT – IV

Lasers.

Properties of laser beams: mono-chromaticity, coherence, directionality and brightness Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne), solid-state lasers (Neodymium), applications of lasers in science, engineering and medicine.

UNIT-V

Physics of Nano Materials.

Introduction, significance of nano scale – surface area and quantum confinement- Quantum dot, quantum well -Quantum wire -Synthesis of nanomaterial- Top Down Process- Ball Milling ; Bottom Up Process: Sol-Gel method– CNT-Properties of Graphene- Applications.

Text Books:

1. *The physics of vibrations and waves*, H. J. Pain Wiley, 2006.
2. *Optics*, E. Hecht, Pearson Education, 2008.
3. O. Svelto, "Principles of Lasers", Springer Science & Business Media, 2010.

Reference books:

1. Halliday and Resnick, Physics, 2009
2. Electricity, W .Saslow Magnetism and light, 2008

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(18CE0101) Engineering Mechanics

Course Educational Objectives:

- *To learn about forces and force systems and their applications.*
- *To learn about friction and to use the concept of Friction.*
- *To learn how to find centroid of different objects using Mathematical formula.*
- *To learn how to find Moments of Inertia of different objects using Mathematical formula.*

Course Outcomes:

On completion of this course, the student will be able to

- *Construct free body diagrams and develop appropriate equilibrium equations.*
- *Understand the concepts of friction and to apply in real life problems.*
- *Determine the centroid for composite sections.*
- *Determine the Moment of Inertia for composite sections.*

UNIT-I

FORCES & FORCE SYSTEMS: Fundamental Principles – Resolution and Composition of Forces and Equilibrium of Particles – Lami's Theorem - Principle of Transmissibility – Principles of Continuum - Types of Force Systems – Resultant of Coplanar, Concurrent and Non-Concurrent Force Systems - Varignon's Theorem - Equilibrium of Coplanar Force Systems – Types of Beams and Supports – Support Reactions.

UNIT-II

FRICTION: Types of Friction– Laws of Friction–Limiting Friction–Cone of Limiting Friction - Ladder Friction - Wedge, Screw jack and differential Screw Jack

UNIT-III

CENTROID: Centroids of Simple Figures (From Basic Principles) – Centroids of Composite Figures

CENTRE OF GRAVITY: Centre of Gravity of Simple Body -Centre of Gravity of Composite Bodies- Pappus Theorem

UNIT-IV

MOMENT OF INERTIA: Definition – Parallel Axis Theorem and Perpendicular Axis Theorem – Polar Moment of Inertia – Radius of Gyration – Moment of Inertia of Basic Shapes - Composite Sections - Simple Solids.

UNIT-V

ANALYSIS OF PERFECT TRUSSES: Types of Trusses – Perfect, Deficient and Redundant Trusses - Cantilever Trusses and Simply Supported Trusses – Analysis of Trusses using Method of Joints and Methods of Sections.

Text Books:

1. *A Textbook of Engineering Mechanics*,3rd Edition, Bhavikatti S S , New Age International, 2016.
2. *Engineering Mechanics*, Dr. R. K. Bansal, 4th Edition, Laxmi Publications, 2011.
3. *Singer's Engineering Mechanics: Statics and Dynamics*, 3rd Edition, K. Vijaya Kumar Reddy, J. Suresh Kumar, B.S. Publications, 2011

References:

1. *Engineering Mechanics*, D.S. Kumar, 3rd Edition, S.K. KATARIA & SONS, 2008
2. *Engineering Mechanics: Statics, 6th Edition*, J L Meriam, L G Kraige, Wiley India Pvt. Ltd, 2001.

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(18CS0501) Programming for Problem Solving

Course Educational Objectives:

- *To understand the core aspects of computer problem solving techniques*
- *To understand the programming language constructs*
- *To understand the programming paradigms*

Course Outcomes:

- *Able to design the flowchart and algorithm for real world problems*
- *Able to learn and understand new programming languages*
- *Able to construct modular and readable programs*
- *Able to write C programs for real world problems using simple and compound data types*

UNIT I

Overview of Computers and C-Programming:

Description of Computer Hardware &Software.

Introduction to C:overview of C, executing a 'c' program, c-character set, constants, variables, data types, declaration of variables, assigning values to variables, managing input & output operations, operators and expressions, basics of algorithm and flow chart

UNIT II

Decision & Loop control Statements: Introduction, If Statement, If-else Statement, Nested- If-else Statement, Else if Ladder, Switch case – break – continue – go to Statement ,for loop, nested for loop, while loop, do-while, do-while statement with while loop

UNIT III

Arrays: Introduction, one-dimensional (1D)-Arrays, declaration and initialization of one-dimensional (1D)-Arrays, Two- dimensional (2D)-Arrays, initialization of Two-dimensional (2D)-Arrays, Multi-dimensional Arrays

Functions: Introduction, need for user-defined functions, a multi function program, elements of user-defined functions, definition of functions, return values and types, category of functions, recursion, scope and life time of variables, preprocessor commands:#define, #include, multi file programs

UNIT IV

Pointers: Introduction, understanding pointers, accessing address of a variable, declaring and initialization of pointer variables, accessing variable through pointers, chain of pointers, pointer expressions, pointer increment and scale factor, pointers and arrays, passing arrays to functions, array of pointers, pointers as function arguments, functions returning pointers.

Strings: Introduction, declaring and initializing string variables, reading and writing strings, arithmetic operations on characters, putting strings together, comparison of two strings, string handling functions, table of strings (array of strings)

UNIT V

Structures: Introduction , defining a structure , declaring structure variables ,accessing structure members, structure initialization, copying and comparing structure variables, operations on individual members , arrays of structures ,arrays within structures, structures within structures, structures and functions, unions, typed ef,enum

File Management in C: Introduction, Types of Files, Defining and Opening a File,
Closing a File, Input / Output Operations on Files, Error handling during IO Operations, Random access to files, Command line arguments.

Text Books:

1. *C and Data Structures* – Ashok Kamthane Pearson education, 2008
2. *Programming in C and Data Structures* – E Balagurusamy – Mc GrawHill, 2007
3. *C from Theory to Practice* - George S. Tselikis- Nikolaos D. Tselikas- CRC Press, 2010

References:

1. *Computer Fundamentals and C Programming* - Dr. P. Chenna Reddy, ISBN: 9789351045885, Publisher: Pothi.com, 1997
2. *Programming in C*, Second Edition – Pradip Dey, Manas Ghosh, Oxford University Press, 2002
3. *Programming with C* - R S Bichkar- University Press, 2001
5. *Programming in C and Data Structures*, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education, 2008

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(18HS0852) Physics Lab

Course Description:

Physics practical course is meant for making the students to gain practical knowledge to correlate with the theoretical studies. It covers experiments on principle of Mechanics and Optics, measurement of magnetic field and studying resonance using LCR circuit.

Course Objectives:

- *To explore the application of Interference and Diffraction by doing concerned experiments.*
- *Elucidate the concepts of Physics through involvement in the experiment by applying theoretical knowledge.*
- *To understand the concept of energy gap, B-H curve and resonance phenomena in LCR circuits.*
- *Develop an ability to apply the knowledge of physics experiments in the later studies.*

Suggested list of experiments from the following: (Perform any EIGHT experiments from the following)

1. Determination of wavelengths of various colors of Mercury spectrum using Diffraction Grating – Normal Incidence method.
2. Determination of Dispersive power of prism.
3. Rigidity Modulus – Torsional Pendulum
4. Study of Resonance effect in Series and Parallel LCR circuit.
5. Determination of thickness of thin object by wedge method.
6. Determination of radius of curvature of Plano convex lens – Newton's Rings.
7. Determination of wavelength of a given laser source by using diffraction grating.
8. Determination of particle size using laser source.
9. Determination of energy gap of a semi conductor using p – n junction diode.
10. B- H curve.
11. Magnetic field along the axis of current carrying coil – Stewart & Gee's Method.
12. Determination of frequency of tuning fork - Melde's Apparatus.
13. Determination of Spring constant – Coupled Oscillator.
14. Study of Characteristics of Solar Cell.
15. Determination of Numerical Aperture of an Optical fiber.

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(18CS0503) Programming for Problem Solving Lab

Course Educational Objectives:

- *To make the student learn C Programming language.*
- *To make the student solve problems, implement those using C & C++ programming languages.*
- *To strengthen the ability to identify and apply the suitable data structure for the given real world problem.*

Course Outcomes:

At the end of the course, students will be able to

- *Apply problem solving techniques of C to find solution.*
- *Use C language features effectively to implement solutions.*
- *Use C++ language features effectively to solve problems.*
- *Identify and develop apt searching and sorting technique for a given problem.*
- *Identity, design and develop the appropriate data structure for a given problem or application.*

Experiments List:

1. a) Acquainting students to "C" programming environment and DOS commands
   b) Calculate sum of three numbers using C-program
2. a) Swap(exchange) values of two integer variables using C-program
   b) Read an integer, a character and a float values through keyboard and display
   c) Check operators precedence and associativity using C-program
   d) Write a c-program using all basic data types of C language
3. a) Read 3 integer values through keyboard and display largest among them
   b) Read marks of 5 subjects obtained by a student through keyboard and display "fail" or "pass" message on console
   c) Using switch () statement implement arithmetic operations
4. a) Check whether entered number is prime number
   b) Display factorial of entered number
   c) Display all multiples of an entered number up to given value(n)
5. a) Generate fibonacci series up to entered number(n)
   b) Find out sum of the digits of a number
6. a) Find the binary equivalent of entered decimal number
   b) Generation multiplication table of entered number (n)

7. a) Calculate sum of two integer matrices
   b) Calculate product of two integer matrices
8. a) Create your header file by including 2 user(your) defined functions and include them in a c-program student
   b) Find out factorial of a number using recursive function
   c) Find square of an entered number using "call by address (reference)" technique
   d) A program that tells us purpose of few predefined functions in "math.h" header file]
9. a) Check whether entered string is palindrome
   b) Write a program to sort the entered set of strings using structure concept
10. a) Count number of vowels, consonants, digits, white spaces and special characters in entered string(a line of text)
    b) Swap(exchange) values of two integer variables using pointers
11. a) For 3 students with 3 subjects, calculate total marks and grade obtained by each
    b) Read data from a file (text) and display it on the monitor
12. a) Copy contents of one file(text) to other created file
    b) Merge contents of two files (text) and store it in another created file

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0 4 2

(18ME0301) Workshop Practice Lab

Part-A Engineering Workshop Lab

Course Educational Objectives:

- *The course provides hands-on training in the trades of Carpentry, Fitting, House-wiring, Tin Smithy, and Foundry. Overview of metal cutting processes, plumbing and welding is provided through live demonstrations.*

Course Outcomes:

After completion of this course, a successful student will be able to :

- *Utilize workshop tools for engineering practice.*
- *Employ skills for the production a component for real time applications.*
- *Appreciate the hard work and intuitive knowledge of the manual workers.*

LIST OF EXPERIMENTS

1. TRADES FOR EXERCISES

a. Carpentry shop: Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, Cross lap joint, Mortise and tenon T joint, Bridle T joint from soft wood stock.

b. Fitting shop: Two joints (exercises) from: Square joint, V joint, Half round joint or Dovetail joint out of 100 x 50 x 5 mm M.S. stock.

c. **Sheet metal shop**: Two jobs (exercises) from: Tray, Cylinder, Hopper or Funnel from out of 22 or 20 gauge G.I. sheet.

d. **House-wiring**: Two jobs (exercises) from: Wiring for ceiling rose and two lamps (bulbs)with independent switch, two way switch, controls with or without looping, wiring for stair case lamp, wiring for water pump with single phase starter.

e. **Foundry**: Preparation of two moulds (exercises): for a single pattern and a double pattern.

f. **Welding**: Preparation of two welds (exercises): Single V butt joint, Lap joint, Double V butt joint or T fillet joint.

2. TRADES FOR DEMONSTRATION:

a. Plumbing

b. Machine Shop

c. Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

Text Books/ Reference Books:

1. *Engineering Work shop practice for JNTU*, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009
2. *Work shop Manual*, P.Kannaiah & K.L.Narayana, SciTech Publishers, 2010
3. *Dictionary of Mechanical Engineering*, GHF Nayler, Jaico Publishing House, 2010

Part B - IT WORKSHOP

Course Objectives:

To provide students with hands-on experience in basic hardware, productivity tools and basic operating system installations.

Course Outcomes*:*

After Completion of this Course the Student would be able to

- *Identify the basic computer peripherals.*
- *Gain sufficient knowledge on assembling and disassembling a PC.*
- *Learn the installation procedure of Windows and Linux OS.*
- *Acquire knowledge on basic networking infrastructure.*
- *Learn productivity tools like Word, Excel and Power point.*
- *Acquire knowledge on basics of internet and worldwide web.*

Task 1:

Identification of the peripherals of a computer: To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

Task 2:

A practice on disassembling the components of a PC and assembling them.

Task 3:

1. Basic DOS commands, Installation of MS windows.
2. Basic Linux Commands, Installation of Linux.

Task 4:

Hardware Troubleshooting (Demonstration): Identification of a problem and fixing the solution (improper assembly or defective peripherals). Software Troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues

Productivity tools

Task 5:

1. **MS Word Orientation:** Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving
2. **Presentations:** Creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.
3. **Spread sheet:** Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 6:

Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

References:

1. *Introduction to Computers*, Peter Norton, McGraw Hill, 2001
2. *MOS study guide for word, Excel, Power point & Outlook Exams*, Joan Lambert,Joyce Cox, PHI. 2008
3. *Introduction to Information Technology*, ITL Education Solutions limited, Pearson Education.2009
4. *Networking your computers and devices*, Rusen, PHI, 2009
5. *Trouble shooting, Maintaining & Repairing PCs*, Bigelows, TMH, 2010

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I B. Tech. – II Sem. (ME) **L T C**

(18HS0810) English **3 0 3**

Course Educational Objectives*:*

- *To develop interest in reading English Literature for language learning.*
- *To improve knowledge and understanding of Grammar.*
- *To enhance the ability for making use of grammar in writing English.*
- *To enrich communication skills among the students.*
- *To develop their insight and positive attitude towards English language.*
- *To impart LSRW skills and inculcate the habit of learning.*
- *To build vocabulary.*
- *To enhance employability skills.*

Course Outcomes

Students will be able:

1. *To understand the rules of English grammar and their usage in writing English.*
2. *To use LSRW skills through the prescribed text and develop their ability to communicate effectively.*
3. *To get the mastery of language to express ideas, views, feelings and experience.*
4. *To communicate well among themselves.*
5. *To inculcate values and ideal characteristic qualities in themselves.*

UNIT-I

Reading:

1. *All the World's a Stage* by William Shakespeare. (Act-II, Scene-VII).
2. *After Twenty Years* by O. Henry.

Writing: Nature and Style of Sensible Writing: Describing & Defining.

Speaking: Oral Communication (involves interactive practice sessions) Self -introduction and introducing a friend.

Listening: Listening activity (Present tense).

Vocabulary: The concept of word formation & root words from foreign languages.

Grammar: Subject – Verb Agreement. Sentence Structures & use of phrases and clauses in sentences. Identify in common errors in noun, pronoun and adjectives.

UNIT-II

Reading:

1. *I Have a Dream* Martin Luther King sjr.
2. *Knowledge and Wisdom* by Bertrand Russell.

Writing: Importance of proper punctuation and creating coherence- Simple sentences.

Speaking: Expressing apology.

Listening: Listening activity. (Past tense)

Vocabulary: Prefixes and Suffixes.

Grammar: Identifying common errors in Articles, Modifiers and degrees of comparison.

UNIT-III

Reading:

1) Nelson Mandela (Biography)
2) "The Happy Prince" by Oscar wilde.

Writing: Paragraph writing – letter writing.

Speaking: Situational dialogues.

Listening: Listening activity. (Future tense)

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying common errors in Prepositions and Link words and complex sentences.

UNIT-IV

Reading:

1. *Where the Mind is without Fear* by Rabindra Nath Tagore.
2. Cause - Effect and Control Measures of Pollution (Air, Water, Noise) and Nuclear Hazards.

Writing: Essay writing - Organizing principles of essay writing - Introduction and Conclusion.

Speaking: Public speaking dynamics.

Listening: Listening activity. (Active voice and passive voice)

Vocabulary: Abbreviations and Acronyms.

Grammar: Identifying common errors in redundancies and compound sentences.

UNIT-V

Reading:

1. *The Road not Taken* by Robert Frost.
2. *An Astrologer's Day* by R K Narayan.

Writing: Techniques for writing precisely.

Speaking: Interviews and formal presentations.

Listening: speeches of A P J Abdul Kalam, Steve Jobs and so on.

Vocabulary: One word substitutes.

Grammar: Identifying common errors in clichés.

Text Books:

1. *Practical English Usage.* Michael Swan. OUP. 1995.
2. *Remedial English Grammar.* F.T. Wood. Macmillan. 2007.
3. *On Writing Well.* William Zinsser. Harper Resource Book, 2008
4. *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press, 2006.

Reference Books:

1. *Communication Skills*. Sanjay Kumar and Pushp Lata. Oxford University Press, 2011.
3. *Exercises in Spoken English.* Parts. I-III. CIEFL, Hyd. Oxford University Press, 2005.
4. Oscar Wilde, Create Independence Publisher, Kindle Edition, 2017.
5. The Complete Works of William Shakespeare, Kindle Edition, 2017.
6. G. P. Editors, The Complete Works of William Shakespeare, Global Classic, 2018.
7. Robert Frost, Robert Frost Collection, Wider Publication, 2011.

R18 **B.Tech – M.E**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

I B. Tech. – II Sem. (ME) **L T C**

(18HS0831) Mathematics II **3 1 4**

Course Educational Objectives:

The objective of this course is to familiarize the prospective engineers with techniques in Multivariate integration, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines. More precisely, the objectives are:

- *To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.*
- *To introduce effective mathematical tools for the solutions of differential equations that model physical processes.*
- *To introduce the tools of differentiation and integration of functions of complex variable that are used in various techniques dealing engineering problems.*

Course Outcomes:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariable calculus and complex analysis. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of Mathematics and applications that they would find useful in their disciplines.

UNIT-I

First order ordinary differential equations:

Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-II

Ordinary differential equations of higher orders:

Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

UNIT-III

Multivariable Calculus (Integration):

Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes,
Triple integrals (Cartesian), orthogonal curvilinear coordinates.

UNIT-IV

Complex Variable – Differentiation :

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

UNIT-V

Complex Variable – Integration:

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine.

Text Books:

1. *Higher Engineering Mathematics*, B.S.Grewal, Khanna publishers, 2001
2. *Engineering Mathematics Volume-I &III* by T.K.V. Iyengar, S.Chand publication, 2007
3. *Higher Engineering Mathematics*, Ramana B.V., Tata McGraw Hill New Delhi, 11thReprint, 2010.

Reference Books:

1. *Engineering Mathematics, volume-I&III*, E. Rukmangadachari& E.Keshava Reddy Pearson Publishers, 2009
2. *Engineering Mathematics-I & III*, T.K.V.Iyengar S.Chand Publications, 2011
3. *Linear Algebra: A Modern Introduction*, D. Poole,2nd Edition, Brooks/Cole, 2005.
4. *A text book of Engineering Mathematics*, N.P. Bali and Manish Goyal, Laxmi Publications, Reprint, 2008.

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

I B. Tech. – II Sem. (ME) **L T C**

(18HS0801) Chemistry **3 1 4**

Course Educational Objectives:

- *Developed in this course will aid in quantification of several concepts in chemistry that have been introduce at the 10+2 levels in schools.*
- *Technology is being increasingly based on the electronic, atomic and molecular level modifications.*
- *Quantum theory is more than 100 years old and to understand phenomena at Nanometer levels, one has to base the description of all chemical processes at molecular levels.*

Course Outcomes:

- *Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.*
- *Able to design the flowchart and algorithm for real world problems*
- *Able to learn and understand new programming languages*

UNIT-I

ATOMIC, MOLECULAR STRUCTURE AND PERIODIC PROPERTIES

Schrodinger wave equation, Molecular orbital's of diatomic molecules. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties.

Effective Nuclear charge, variations of s, p, d and f orbital energies of atoms in the periodic table, atomic and ionic sizes, oxidation states, hard soft acids and bases, molecular geometries.

UNIT-II

USES OF FREE ENERGY AND CHEMICAL EQUILIBRIA

Thermodynamic functions: Energy Entropy and free energy, Cell potentials, Nernest equations and Its Applications. Acid base Oxidation, reduction and Solubility Equilibria.

Corrosion: Types of Corrosion, Factors Influencing the rate of Corrosion, Prevention of Corrosion (Sacrificial anodic protection, Impressed Cathodic Protection), Anodic and Cathodic Inhibitors, Electro plating (Copper, Nickel, Chromium) and Electroless Plating.

UNIT-III

WATER TECHNOLOGY

Hardness of water and its units, Estimation of Hardness by EDTA method. Boiler Troubles: Scale & Sludge, Priming and Foaming and Boiler corrosion. Municipal Solid waste water Treatment. Break point chlorination, Water softening methods (Lime-Soda, Zeolite, Ion- Exchange resins). Demineralization of Brackish Water: Reverse Osmosis and Electro Dialysis.

UNIT-IV

ORGANIC REACTIONS AND ORGANIC POLYMERS

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, Synthesis of a commonly used drug molecules (Paracetamol, Penicillin, Prodrugs - Asprin, Sulfa drugs)

Organic polymers types (Thermosetting and Thermoplastics), Preparation, Properties and Engineering Applications of PVC, Teflon, Nylon6,6, Bakelite), Moulding Process and its uses, Conducting polymers (Polyacetylene, Polyaniline).

UNIT-V

SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

Principles, selection rules and applications of absorption (UV/Visible, Atomic Absorption, Infrared) and Emission spectroscopy (Flame photometry and Fluorescence and its applications in medicine. Advanced Instrumental Techniques and their Significance: XRD, Scanning Electron microscope (SEM) and Transmission electron microscopy (TEM).

Text Books:

1. *University chemistry*, by B. H. Mahan, 2001
2. *Chemistry: Principles and Applications*, by M. J. Sienko and R. A. Plane, 2005
3. *Fundamentals of Molecular Spectroscopy*, by C. N. Banwell, 2010

Reference Books:

1. *Engineering Chemistry (NPTEL Web-book)*, by B. L. Tembe, Kamaluddin and M. S. Krishnan, 2009
2. *Physical Chemistry*, by P. W. Atkins, 2011
3. *Organic Chemistry: Structure and Function* by K. P. C. Volhardt and N. E. Schore, 5th Edition, 2012

R18 **B.Tech – M.E**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

I B. Tech. – II Sem. (ME) **L P C**

(18ME0302) ENGINEERING GRAPHICS & DESIGN **1 4 3**

Course Objectives:

- *To familiarize the students in basic concept of conic sections, projections and Development of Objects.*
- *To develop the imagination and drafting skills of students.*

Course Outcomes:

Students undergoing this course are able to

- *Frame ideas based on the conceptual modeling and design*
- *Provide good understanding of the methods involved in preparing various views in Engineering drawings*
- *Can prepare 2D and 3D diagrams of various objects*

UNIT-I

Introduction to Engineering Drawing - Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections, Cycloids and Involutes.

UNIT-II

Projections of Points - Principles of Orthographic Projections-Conventions - Projections of Points, Traces

Projections of straight lines - Inclined to both the planes (Trapezoidal Method & Rotating line method) - simple problems only, Traces

UNIT-III

Projections of planes – Surface inclined to both reference planes

Projections of Solids- Introduction– Projections of right regular solids-Prisms, Pyramids in different positions. (Inclined to one plane only).

UNIT-IV

Sections of solids - Sectional Views of Right regular Solids - Prisms, Pyramids.

Development of surfaces - Development of surfaces of Right Regular Solids - Prisms, Pyramids.

UNIT-V

Orthographic Projections - Principles of Orthographic projection, Conversion of objects from 3D to 2D

Isometric Projections - Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids, Conversion of 2D to 3D.

Auto CAD (for Practice only not for External Exam)

Introduction to CAD, Applications, commands, Tool bar, modeling of Simple parts, isometric problems.

Text Books:

1. *Engineering Drawing*, N.D.Bhatt, Charotar Publishers,2005.
2. *A text Book of Engineering Drawing*, K.L.Narayana, Kannaiah, Scitech Publishers, 2010
3. *Engineering Graphics with using AutoCAD,2007*. Jeyapoovan.T, Vikas Publishing House, 2007

References:

1. *Fundamentals of Engineering Drawing*, Warren J.Luzadder and Jon. M.Duff Prentice Hall of India Pvt., Ltd., Eleventh Edition, 2001.
2. *Engineering Graphics*, Bhattacharyya, S.C.Bera, I.K .International Pvt Ltd. 2009.
3. *A text Book of Engineering Drawing and Graphic*, K.Venugopal New Age Publishin New Delhi, 2008.

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SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

I B. Tech. – II Sem. (ME) **L T C**

(18ME0303) Materials Engineering **3 0 3**

***Course Educational Objectives*:**

- *To understand the structure, properties, testing methods and heat treatment methods of metals and non-metals so as to gain knowledge in the selection of suitable materials for various engineering applications.*

Course Outcomes:

Students undergoing this course are able to

- *Describe fundamental scientific (chemistry, physics) and engineering principles (material science) in materials processes and material systems.*
- *Students will get knowledge on bonds of solids and knowing the crystallization of metals*
- *Students should be able to understand the equilibrium diagrams and their usage in the production processes.*

UNIT-I

Structure of Metals: Classification of Materials - Engineering properties of Materials, Bonds in Solids – Metallic bond - Crystallization of Metals, Grain and Grain boundaries, Effect of grain boundaries on the properties of metal / alloys – Determination of grain size

Constitution of Alloys: Necessity of alloying, Types of solid solutions, Hume Rothery's rules, Intermediate alloy phases, and Electron compounds, BIS**.**

UNIT-II

Equilibrium of Diagrams - Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, Equilibrium cooling and heating of alloys, Lever rule, Coring miscibility gaps, Eutectic systems, Congruent melting intermediate phases, Peritectic reaction.

Transformations in the solid state – Allotropy, Eutectoid, Peritectoid reactions, Phase rule, Relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, and Fe-Fe_3C.

UNIT-III

Cast Irons and Steels: Structure and properties of White Cast iron, Malleable Cast iron, Grey cast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, Structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, Tool and die steels, Applications.

Non-Ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminum and its alloys, Titanium and its alloys.

UNIT-IV

Heat Treatment of Alloys: Effect of alloying elements on Iron – Iron carbon system, Annealing, Normalizing, Hardening, TTT diagrams, Tempering, Hardenability, Surface hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

Fracture Mechanism: Mechanical properties of materials& fracture. Introduction to Non Destructive Testing (NDT).

UNIT-V

Ceramic Materials: Crystalline ceramics, Glasses, Cermet, Polymeric Materials

Introduction to Composite Materials: Classification of composites, various methods of component manufacture of composites, Particle – Reinforced materials, Fiber reinforced materials, Polymer matrix composites, Metal – Matrix composites and Carbon – Carbon composites-Applications.

Text Books:

1. *Introduction to Physical Metallurgy*, Sidney H. Avner, US, Tata McGraw-Hill, 2nd Edition, 2007.
2. *Engineering Materials and Metallurgy*, R.K.Rajput, S.Chand, 1st Editon, 2008.
3. *A Text Book of Material Science and Metallurgy for Engineers*, Dr.Kodgiri And Susheel Kodgiri Everest Publishing House, 37th Edition, 2007

References:

1.*Mechanical Metallurgy*, Dieter, G. E., McGraw Hill, Singapore, 2012.
2. *Material Science and Metallurgy,* Kodgire, V.D, Everest Publishing House, 12th Edition 2002.

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SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

I B. Tech. – II Sem. (ME) **L P C**

(18HS0811) English Lab **0 3 1.5**

Course Objectives:

To get the job students dream of today largely depends on the way they communicate. Due to globalization, civilization and fast growing technologies, communication has become a very important factor. Good communication skills increase the possibilities of getting good jobs. To meet the requirement of corporate word one has to be capable of expressing oneself.

- *To provide Computer Assisted Language Learning facility for the students on self-instructional method for improving language.*
- *To improve the correct articulation as English is international language.*
- *To enhance the communication skills with a variety of activities and practice sessions.*

Course Outcomes:

Students will be able:

- *To recognize sounds of English language with different classifications.*
- *To know phonetic transcription and phonemic symbols of English language.*
- *To understand international accent and utilize the same in their daily conversation.*
- *To crease confidence for public speaking, for facing interviews, for making effective oral presentations, for having discussions, and for delivering impromptu speeches.*

UNIT -I

a) Importance of Phonetics – Introduction, organs of speech, classification of sounds, and Phonetic transcriptions.

UNIT-II

a) Syllable, Syllabification, Word stress, Stress Rules and Intonation.
b) Intonation (Falling, Raising, and fall-raise) - Pitch and Rhythm.
c) Influence of mother tongue (MTI) - Common Indian Variants in pronunciation.
d) Difference between British and American Pronunciation

UNIT- III

a) Vocabulary building.
b) Functional English; Telephone skills; Giving Directions; Situational dialogues; Role play.
c) JAM, Oral presentation-Prepared and extempore and PPT presentation.

UNIT- IV

a) Describing people, places, things and situations- Body language–- listening some

UNIT- V

a) Preparation of resume (C.V) & Cover Letter.
b) Interview Skills - mock interviews.
c) Group Discussion, Debate and Dress code.

Minimum requirement for ELCS LAB

1. Computer Assisted Language Learning (CALL) Lab: The Computer Aided Language Lab for 60 Students with 60 systems one Master Console, LAN facility and English Language Software for self-study by learners.
2. The Communication Skills Lab with movable chairs and audio visual aids with a P. A. system, Projector, a Digital stereo audio & video system and Camcorder etc.
   System Requirement (Hardware component):
   Computer network with: LAN with minimum 60 multimedia systems with the following.
   Specifications:
   i) P- IV Processor
      a) Speed 2.8 GHZ
      b) RAM – 512 MB Minimum
      c) Hard Disk – 80 GB
   ii) Headphones of High quality.

Suggested Software

1. Clarity pronunciation power--- Part 1(sky pronunciation)
2. Clarity pronunciation power--- Part 2
3. K-Van Advanced Communication Skills.
4. Walden Info tech Software.

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

I B.Tech – II Semester (ME)

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(18HS0802) Chemistry Lab

List of Experiments

1. Estimation of copper by EDTA method
2. Determination of chloride content of water
3. Determination of acidity of water sample.
4. Determination of alkalinity of water sample
5. Potentiometric determination of Fe^{2+} by potassium permanganate.
6. Determination of Viscosity of an oil by Redwood Viscometer
7. Determination of dissolved oxygen in a water sample by Winkler's method
8. Conductometric titrations of strong acid against strong base.
9. Chemical analysis of a salt
10. Synthesis of a polymer/drug

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(AUTONOMOUS)

I B. Tech – II Semester (ME)

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(18HS0816) Indian constitution

Course Objectives:

Students will be able to:

- *Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.*
- *To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.*
- *To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.*

Course Outcomes:

Students will be able to:

- *Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.*
- *Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.*
- *Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.*
- *Discuss the passage of the Hindu Code Bill of 1956.*

UNIT-I

- Meaning of the Constitution Law

UNIT-II

- Historical Perspective of the Constitution of India
- Salient features and characteristics of the Constitution of India

UNIT-III

- Scheme of the fundamental rights
- The scheme of the Fundamental Duties and its legal status
- The Directive Principles of State Policy – Its importance and implementation
- Federal structure and distribution of legislative and financial powers between the Union and the States

UNIT-IV

- Parliamentary Form of Government in India – The constitution powers and status of the President of India.
- Amendment of the Constitutional Powers and Procedure.
- The historical perspectives of the constitutional amendments in India.
- Emergency Provisions : National Emergency, President Rule, Financial Emergency

UNIT-V

- Local Self Government – Constitutional Scheme in India.
- Scheme of the Fundamental Right to Equality.
- Scheme of the Fundamental Right to certain Freedom under Article 19
- Scope of the Right to Life and Personal Liberty under Article 21

Text Books:

1. *The Constitution of India*, 1950 (Bare Act), Government Publication.

2. *Framing of Indian Constitution*, Dr. S. N. Busi, Dr. B. R. Ambedkar 1st Edition, 2015

Reference Books:

1. *Indian Constitution Law*, M. P. Jain 7th Edn., Lexis Nexis, 2014.

2. *Introduction to the Constitution of India*, D.D. Basu, Lexis Nexis, 2015.

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

II B.Tech - I Semester (ME)

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(18HS0835) Probability &Statistics

Course Objectives:

- *To train the students thoroughly in Mathematical concepts fundamentals of probability, test of hypothesis, Test of significance.*
- *To prepare students for lifelong learning and successful careers using mathematical concepts of probability, test of hypothesis, Test of significance.*
- *To develop the skill pertinent to the practice of the mathematical concepts including the Student abilities to formulate and modeling the problems, to think creatively and to Synthesize information*

Course Outcomes:

At the end of the course, students would be expected to:

- *Have acquired ability to participate effectively in group discussions*
- *Have developed ability in writing in various contexts*

UNIT-I

Basic Probability: Probability spaces, Addition theorem, conditional probability, independence, Baye's rule.

Random variables: Discrete and Continuous random variables- distribution functions, densities and their properties. Expectation of Discrete and Continuous Random Variables, Moments

UNIT-II

Probability Distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions.

UNIT-III

Basic Statistics: Measures of Central tendency: Moments, skewness and Kurtosis.Correlation and regression – Rank correlation.

UNIT-IV

Applied Statistics:

Curve fitting: Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves (Exponential & Power curve).

Test of Hypothesis: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

UNIT-V

Test of significance: Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Text Books:

1. *Higher Engineering Mathematics*, B.S. Grewal, Khanna Publishers, 2000
2. *Statistical methods* by S.P. Gupta, S.Chand publications. 2009
3. *Probability & Statistics* by T.K.V. Iyengar, S.Chand publications, 2008
4. *Probability & Statistics* by E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher, 2009

Reference Books:

1. *Probability & Statistics for engineers* by Dr. J. Ravichandran WILEY-INDIA publishers, 2009
2. *Probability & Statistics for Science and Engineering* by G.Shanker Rao, Universities Press, 2008
3. *Probability and Statistics for Engineering and Sciences* by Jay L.Devore, CENGAGE, 2010
4. *Probability and Statistics* by R.A. Jhonson and Gupta C.B, 2006

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY:PUTTUR
(AUTONOMOUS)

II B.Tech - I Semester (ME)

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(18HS0803) Biology for Engineers

Course Objectives

- *Describe how biological observations of 18th Century that lead to major discoveries.*
- *Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological*
- *Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring*
- *Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine*

Course Outcomes

- *Classify enzymes and distinguish between different mechanisms of enzyme action.*
- *Identify DNA as a genetic material in the molecular basis of information transfer.*
- *Analyze biological processes at the reductionistic level*
- *Apply thermodynamic principles to biological systems.*
- *Identify and classify microorganisms.*

UNIT-I

Introduction & Classifications of Organisms

Introduction - classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) energy and Carbon utilisation -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitata- acquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. Model organisms - study of different groups - E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus.

UNIT-II

Genetics Purpose

Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis- Concepts of recessiveness and dominance - Concept of mapping of phenotype to genes - single gene disorders in humans - Complementation in human genetics.

UNIT-III

Biomolecules Purpose & Enzymes Purpose

Building blocks of Molecules of life & it's types. Introduction & Concepts- Monomer units and polymeric structures, Sugars, starch, cellulose, Amino acids, proteins, Nucleotides, DNA/RNA, Two carbon units and lipids.

Role of catalysis life in existed on earth Enzymology: Enzyme classification. Mechanism of enzyme action. Enzyme kinetics and kinetic parameters related to Biology. RNA catalysis. Classifications and Procedure for Enzyme catalysed reactions with two examples.

UNIT-IV

Information Transfer Purpose & Macromolecular Analysis Purpose

Molecular basis of coding and decoding genetic information is universal Molecular basis of information transfer. Genetic material of DNA, Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Introduction and Explanation of genetic code and degeneracy of genetic code. Gene - complementation and recombination.

Biological processes at the reductionist level Proteins - structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements.

UNIT-V

Metabolism Purpose

The principles of energy transactions - in physical and biological world. Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergoinc reactions. Concept of Keq and its relation to standard free energy. Spontaneity. ATP as an energy currency- including breakdown of glucose to CO2 + H2O (Glycolysis and Krebs cycle) and synthesis of glucose from CO2 and H2O (Photosynthesis). Energy yielding and energy consuming reactions.

Microbiology -single celled organisms -species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics.

Text Books:

1.Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd

2.Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H. John Wiley and Sons

3.Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company

References:

1.Molecular Genetics (Second edition), Stent, G. S.; and Calender, R. W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher

2. Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

II B.Tech - I Semester (ME)

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(18CE0151) Strength of Materials

Course Objectives:

- *To learn about simple stresses and strains and their applications.*
- *To learn how to find shear force and bending moment and construction of SFD & BMD.*
- *To understand about the concept of simple bending and shear stress distribution.*
- *To learn about deflections of Beams by using different methods.*
- *To learn about columns and struts and their applications.*

Course Outcomes:

Students undergoing this course are able to:

- *The students would be able to understand the behaviour of materials under different stress and strain conditions.*
- *The students would be able to draw bending moment, shear force diagram, bending stress and shear stress distribution for beams under the different conditions of loading.*
- *The student would be able to apply knowledge to analyse concept of deflection, bending moment and shear force diagram in beams under various loading conditions.*
- *Determine shear stress in the shaft subjected to torsional moments.*

UNIT - I

Simple Stresses and Strains: Elasticity and plasticity – Types of stresses and strains – Hooke's law – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – Composite bars – Temperature stresses.
Strain Energy: Resilience – Gradual, sudden, impact and shock loadings- Simple applications.

UNIT - II

Shear Force And Bending Moments: Types of supports – Types of beams – Shear force and bending moment diagrams for simply supported - Cantilever and over hanging beams with point loads, uniformly distributed load , uniformly varying loads and couples – Relationship between shear force and bending moment.

UNIT - III

Theory Of Simple Bending: Assumptions made in the theory of simple bending – Derivation of bending equation: M/I = f/y = E/R –Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I-Tangle and Channel sections – Design of simple beam.

Shear Stress Distribution: Derivation of formula – Shear stress distribution in rectangular, triangular, circular, I and T sections.

UNIT- IV

Deflections of Beams: Bending into a circular arc – Slope - deflection and radius of Curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads - Uniformly distributed load, uniformly varying load.

Torsion of Circular Shafts And Springs: Theory of pure torsion – Torsional theory applied to circular shafts – Power transmission - Close and open coiled helical springs under axial loads and axial twist – Carriage springs.

UNIT - V

Thin Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop , longitudinal and volumetric strains – changes in diameter and volume of thin cylinders – Riveted boiler Shells - Thin spherical shells.

Thick Cylinders: Thick cylinders – Lame's equation – Design of thick cylindrical shells – Compound cylinders – Shrink fit allowance – Initial difference of radii at the junction.

Text Books:

1. *Strength of Materials (Mechanics of Solids),* 6th Edition, Dr. R.K. Rajput, S. Chand Publishing, 2015.
2. *A Textbook of Strength of Materials*, 6th Edition, Dr. R. K. Bansal, Laxmi Publications, 2016.

References:

1. *Mechanics of Materials*, Revised, 2016 Edition, Dr. B. C. Punmia, Dr. Ashok Kr. Jain, Dr. Arun Kumar Jain, Laxmi Publications, 2016.
2. *Strength of Materials,* 3rd Edition, R. Subramanian, Oxford University Press, 2010.
3. *Strength of Materials,* 24th Edition, R. S. Khurmi, S. Chand Publishing, 2015.
4. *Strength of Materials*, 11th Edition, Sadhu Singh, Khanna Publishers, 2013.

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(AUTONOMOUS)

II B.Tech - I Semester (ME)

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3	0	3

(18ME0304) KINEMATICS OF MACHINERY

Course Objectives:

- *To understand the basic concepts of mechanisms, cam, gear train and their kinematics.*
- *To understand the effects of friction in the motion of machine components.*

Course Outcomes:

Students undergoing this course are able to

- *Familiarity with common mechanisms used in machines and everyday life.*
- *Identify different mechanisms, Inversions of kinematic chains*
- *Ability to perform analysis of different types of links, position, velocity, acceleration analyses.*

UNIT-I

Basics Of Mechanisms - Classification of links and kinematic pairs – Sliding, Turning, Rolling, Screw and spherical pairs- Lower and higher pairs- Degree of freedom, Mobility – Kutzbach criterion, Gruebler's criterion – Grashof's Law

Kinematic Inversions of four-bar chain, Single and double slider crank chains –Quick return mechanisms

UNIT-II

Mechanisms With Lower Pairs - Straight line motion mechanisms, Peaucellier, Hart, Scottrussel, Grasshopper, Watt, Tchebicheff, Robert and pantograph.

Steering Mechanisms - Conditions for correct steering – Davis Steering gear, Ackermanns steering gear. Hooke's Joint (Universal coupling) -Single and double Hooke's joint — applications – Simple problems.

UNIT-III

Kinematics - Displacement, Velocity and acceleration analysis of simple mechanisms – Graphical method– Velocity and acceleration of polygons

Velocity Analysis using instantaneous centers – kinematic analysis of simple mechanisms – Coincident points – Coriolis component of Acceleration

UNIT-IV

Cams - Classification of cams and followers – Terminology and definitions – Displacement diagrams – Uniform velocity, Parabolic, Simple harmonic and Cycloidal motions.

Cam Profiles – Specified contour cams – Circular arc and tangent cams – Pressure angle and undercutting – Sizing of cams.

UNIT-V

Gears - Law of toothed gearing – Involutes and Cycloidal tooth profiles –Spur Gear terminology and definitions –Gear tooth action – Contact ratio –Condition for constant velocity ratio for transmission of motion - Interference and undercutting. Helical, Bevel, Worm, Rack and Pinion gears [Basics only].

Gear Trains – Speed ratio, Train value – Parallel axis gear trains – Epicyclic Gear Trains, Differential gear of an automobile, Simple problems only.

Text Books:

1.*Theory of Machine*, S.S. Rattan, Tata McGraw-Hill, 3rd Edition, 2013.
2.*Theory of Machine*, R.S Khurmi,, S Chand Publications, 14th Edition, 2005 .
3.*Kinematics and dynamics of machinery*, R.L.Norton, Tata McGraw-Hill, 1st Edition, 2013.

References:

1. *Theory of Machines and Mechanisms*, J.E. Shigley 4rd Edition" Oxford International student Edition
2. *Theory of Machines*, Thomas bevan, Pearson (P), 3 rd Edition, 2012
3. *Mechanics of Machines*, Ramamurthy, V. Narosa Publishing House, 2002.

R18

B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

II B.Tech - I Semester (ME)

L	T	C
3	0	3

(18CE0152) Fluid Mechanics & Fluid Machines

Course Objectives:

- *To understand the basic concepts of Fluid properties and fluid statics.*
- *To understand the applications of fluid kinematics and dynamics.*
- *To understand the behavior of pipe flow and losses in pipe flow.*
- *To understand the concepts of flow measurements and boundary layer flows.*
- *To understand the working principles of hydraulic machinery*.

Course Outcomes:

After completion of this course the student will be able to,

- *How to find frictional losses in a pipe when there is a flow between two places.*
- *Know types of flow and its measurements and applications.*
- *Identify the suitable pump required for different purposes.*
- *Classify the turbines and design criteria based on water availability.*

UNIT-I

Fluid Properties: Dimensions and units - Definition of a fluid – Physical properties of fluids-Density, Specific weight, Specific volume, Specific gravity, Compressibility, Vapour pressure, Surface tension and capillarity and Viscosity.

Fluid Statics: Pascal's law, Pressure variation in a static fluid – Atmospheric, gauge and absolute pressures, Measurement of pressure – Piezometer – U–tube and inverted U–tube manometers and Bourdon's pressure gauge, Hydrostatic forces on plane and curved surfaces, Center of pressure.

UNIT-II

Fluid Kinematics: Types of flow – Streamline – Streak line – Path line – Stream tube – Control volume – Continuity equation in one and three dimensional forms – Stream function and velocity potential function – Flow net – Acceleration of a fluid particle – Local and convective accelerations – Tangential and normal accelerations.

Fluid Dynamics: Euler's equation of motion along a streamline – Bernoulli's energy equation – Energy correction factor – Impulse–momentum equation – Momentum correction factor – Force on a bend – Energy gradient line – Hydraulic gradient line – Analysis of free liquid jets – Forced vortex and free vortex.

UNIT-III

Analysis of Pipe Flow: Reynolds's experiment – Reynolds's number - Minor losses in pipe flow - Darcy–Weisbach 1equation – Variation of friction Factor – Moody's chart – Pipes in series – Pipes in parallel, Boundary Layer Theory.

Flow Measurement: Velocity measurement by Pitot tube and Pitot static tube – Discharge measurement by Venturimeter and orifice meter – Orifices and mouthpieces

UNIT-IV

Dimensional Analysis and Similitude: Introduction, dimensions; dimensional homogeneity; Methods of dimensional analysis- Rayleigh's method; Buckingham – Pi theorem. Similitude - Types of Similarities. Model Laws.

UNIT-V

Hydraulic Turbines: Elements of hydroelectric power plants- Heads and efficiencies of turbines – Classification of turbines –Pelton Wheel-Modern Francis turbine – Kaplan turbine. Main components and working principle- Expressions for work done and efficiency – Working proportions and design of each.

Centrifugal Pumps: Classification and types of pumps – Components and working of a centrifugal pump – Work done by the impeller– Heads and efficiencies – Net positive suction head(NPSH)- Priming – Priming devices – Minimum starting speed – Multistage pumps – Pumps in series and parallel – Submersible pumps – Limiting suction head – Cavitation – Expression for specific speed.

Text Books:

1. *Hydraulics and Fluid Mechanics Including Hydraulics Machines (A-4-Size)*, 20th Edition, Dr. P.N. Modi & Dr. S.M. Seth, Standard Book House, 2015.
2. *A Textbook of Fluid Mechanics and Hydraulic Machines*, 9th Edition, Dr. R. K. Bansal, Laxmi Publications, 2016.
3. *Fluid Mechanics*, 9th Edition, Victor Streeter, E. Benjamin Wylie, K.W. Bedford, McGraw Hill Education, 2010.

References:

1. *Fluid Mechanics and Machinery*, 1st Edition, C.S.P.Ojha, P.N.Chandamouli & R.Berndtsson, Oxford University Press, 2010.
2. *Fluid Mechanics and Hydraulic Machines*, 1st Edition, S. C. Gupta, Pearson India Education Services Pvt. Ltd, 2006.
3. *Fluid Mechanics and Machinery*, 1st Edition, Rama Durgaiah D., New Age International, 2002.

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester

L	P	C
0	2	1

(16ME305) Materials Testing Lab

Course Educational Objectives:

- *Experiments to find Types of Metals, Steels, Cast irons and their Microstructures;*
- *To determine Mechanical Properties of Various Engineering materials*

Course Outcomes:

After completion of this course, a successful student will be able to:

- *Prepare metallographic samples for microscopic examinations.*
- *Analyze the microstructure and estimate the amount of porosity and grain size of the casted specimen.*
- *Analyze the mechanical Properties of Various Engineering materials*

List of Experiments

1.Preparation and study of the Micro Structure Iron.

2.Preparation and study of the Micro Structure Cu.

3.Preparation and study of the Micro Structure Al.

4.Preparation and study of the Microstructure of low carbon steels.

5.Study of the Micro Structures of Non-Ferrous alloys

6.Study of the Micro structures of Heat treated steels.

7.Bending test on simple support beam.

8.Compression test on wood or Brick.

9.Impact test on metal specimen (Izod and Charpy).

10.Compression test on helical spring.

11.Tension test on mild steel rod.

12.Torsion test on mild steel rod.

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester

	L	P	C
(16ME306) Machine Drawing Lab	**0**	**3**	**1.5**

Course Objectives:

- *To make the students to understand the concepts of Indian Standard conventions, methods of dimensioning, the title boxes, to draw the machine elements and simple parts.*
- *To make the students to understand and draw assemblies of machine parts and to draw their sectional views.*
- *To develop the imagination and drafting skills of students.*

Course Outcomes:

- *Students can understand the working principles of an assembly or subassembly so that he/she will be able to produce the final product by procuring the units from various sources/suppliers and still produce any useful product serving effectively.*
- *The drawings can be easily prepared and understood by the people in a manufacturing industry.*

List of Experiments

1. **Exercises on machine drawing conventions using drafting software.**
    - Conventional representation of materials.
    - Conventional representation of machine components.
    - Conventional representation sectional views.
    - Conventional representation of limits, Fits and tolerances-form and positional tolerances and machining symbols.
    - Conventional representation of dimensioning on the drawings.
2. **Exercises on drawing of machine elements and simple parts using drafting software.** (Any three exercises out of five)
    - Types of thread profiles-Square, Metric, ACME, Worm.
    - Bolted joints-Hexagonal bolt and nut, Square bolt and nut.
    - Locking arrangements for nuts-Locking by split pin, castle nut.
    - Foundation bolts- Eye, Bent, Rag foundation bolts.
    - Keys-Saddle key, Sunk key, Woodruff key.

3. Assembly drawings.

Drawing of assembled views for the part drawings of the following, using conventions and easy drawing proportions. (Any three ONLY)

- Stuffing boxes
- Eccentrics
- Petrol Engine-connecting rod
- Screw jack
- Machine vice

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester

L	P	C
0	3	1.5

(18CE0153) Fluid Mechanics & Fluid Machines Lab

Course Objectives:

- *To learn the concepts of Venturimeter & Orifice meter*
- *To learn the concepts of notch's*
- *To learn the basic concepts of turbines*
- *To learn the basics concepts of different types of pumps.*

Course Outcomes:

Students undergoing this course are able to

- *Calibrate Venturimeter & Orifice meter*
- *Calculate losses in flows*
- *Estimate the efficiency of different pumps.*
- *Study the performance of different turbines.*

List of Experiments:

Cycle 1:

1. Verification of Bernoulli's equation.
2. Calibration of Coefficient of discharge for Venturimeter.
3. Calibration of Coefficient of discharge for Orifice meter.
4. Calibration of Friction factor. (major losses experiment)
5. Determination of loss of head due to sudden contraction. (minor losses experiment)
6. Calibration of Discharge over Notches (Rectangular/Triangular Notch.)
7. Determination of Coefficient of discharge for a small orifice / mouthpiece by a constant head method / variable head method.

Cycle 2:

8. Impact of jet on vanes.
9. Performance test on Pelton wheel turbine.
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Study on Hydraulic jump.
13. Performance test on Kaplan turbine

***Minimum Four experiments** must be conducted in the lab from each cycle

List of Equipment:

1. Venturimeter Setup.
2. Orifice meter setup.
3. Friction factor and Minor losses test setup.

4. Impact of jets.
5. Pelton wheel and Francis turbines.
6. Centrifugal pumps.
7. Bernoulli's theorem setup.
8. Hydraulic jump test setup.
9. Kaplan turbine.
10. Rectangular and Triangular notch setups
11. Small orifice and mouth piece setup.

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester

(18HS0804) Environmental Sciences

L	T	C
3	0	0

Course Objectives:

- *Students have got an idea about the importance of pollution free air, water, soil and food.*
- *They know about global environmental problems like Acid Rains, Global Warming, Green House Effects, Ozone layer depletion.*
- *To understand the impacts of developmental activities and mitigation measures along with the environmental policies and regulations.*
- *To recognize major concepts in environmental studies and demonstrate in-depth understanding the environment.*

Course Outcomes:

- *Based on this course, the Engineering Student will be able to understand/evaluate/develop technologies on the basis of Ecological principles and environmental regulations along with Legislation, Laws and Policies which in turn help in sustainable development.*
- *Take preventive measures to reduce air, water, soil pollutions and contaminants in food.*
- *Effectively carry out waste disposal at individual level.*
- *Involve in preservation of natural resources.*

UNIT- I

Introduction:

Definition, Scope and Importance-Need for Public Awareness

Natural Resources:

Classification of resources-Forest resources: Use and over-exploitation, deforestation- Mining, dams and their effects on forests and tribal people – Water resources - Use and over utilization of surface and ground water- Floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources –Energy resources: Renewable and Non- Renewable sources of energy- Solar energy, Hydro electrical energy, Wind energy, Nuclear energy, etc.

UNIT-II

Ecosystems:

Concept of an ecosystem– structural features of ecosystem- Producers, Consumers and Decomposers–-Biogeochemical cycles- Ecological succession-Food chains, food webs and ecological pyramids – Energy flow in the ecosystem-Types of ecosystems (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems.

UNIT-III

Biodiversity and its Conservation:

Introduction, Definition, genetic, species and ecosystem diversity, Bio-geographical classification of India, India as a Mega-diversity Nation, Hot spots of biodiversity, Value of biodiversity, threats to biodiversity, endemic, endangered and extinct species of India, In-Situ and Ex-situ conservation of biodiversity.

UNIT-IV

Environmental Pollution and Global Environmental Issues:

Natural Disasters: Droughts, Floods, Cyclone, Landslides, Earthquake,

Pollution episodes: Air pollution, Water pollution, Land pollution, Noise pollution, Automobile pollution and Nuclear pollution –Effects-Global warming, Acid Rain and Ozone layer depletion and controlling measures.

Global Environmental Issues: Population Growth, Urbanizations, Land Management, Water and Waste Water Management. Climate change and impacts on human environment

Solid Waste Management: causes, effects and control measures of Municipal solid wastes – E-waste and management, Role of an individual in prevention of pollution – pollution case studies.

UNIT-V

Environmental Legislation, Laws, Policies For Sustainable Development:

Environmental Legislation, Environmental Protection act – Air Prevention and Control of Pollution act– Water Prevention and control of Pollution act– Wildlife protection act – Forest conservation act – Municipal Solid Waste management, International conventions/Protocols : Earth summit, Kyoto protocol and Montreal Protocol. From Unsustainable to sustainable development, Role of NGO's for Sustainable development, Concepts of Green belt development, Role of IT in Environment-Remote Sensing and GIS methods for Sustainable development.

Field work- visit to a local area to document environmental assets-river forest grassland/hill, mountain and polluted sites (urban/rural/industrial/Agriculture)- study simple ecosystems (pond/river/hill slopes)

Text Books:

1. *Environmental Sciences*, A.Kaushik and C.P.Kaushik, 5th edition, New age international publishers, 2015.
2. *Text Book of Environmental Science and Technology* by M.Anji Reddy, BS Publications, 2009
3. *Environmental Studies-From Crisis to Cure*, Rajagopalan.R, Oxford University Press, 2005.

Reference Books:

1. *Environmental Studies*, Anil Kumar and Arnab Kumar De New Age International Publishers, New Delhi, 3rd Edition 2015.
2. *Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards*, R.K. Trivedi Vol.I and II, Enviro Media, 2001
3. *Environmental Studies* Dr.K.Mukkanthi, S.Chand Publishers, 2002
4. *Text Book of Environmental Studies*, Erach Bharucha, University Grants Commission, University Press (India) Pvt.Ltd., Hyderabad,2010

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

II B.Tech - II Semester (ME)

L	P	C
3	0	3

(18ME0307) Computer aided Design

Course Educational Objectives:

- *To provide an overview of how computers can be utilized in mechanical component design*

Course Outcomes:

- *Upon completion of this course, the students can use computer and CAD software for modelling mechanical components*

UNIT-I
Fundamentals of Computer Graphics
Product cycle- Design process- sequential and concurrent engineering- Computer aided design – CAD system architecture- Computer graphics – co-ordinate systems- 2D and 3D transformations homogeneous coordinates - Line drawing -Clipping- viewing transformation

UNIT-II
Geometric Modeling
Representation of curves- Hermite curve- Bezier curve- B-spline curves-rational curves-Techniques for surface modeling – surface patch- Coons and bi cubic patches- Bezier and B-spline surfaces. Solid modeling techniques- CSG and B-rep

UNIT-III
Visual Realism
Hidden – Line-Surface-Solid removal algorithms – shading – colouring – computer animation.

UNIT-IV
Assembly of Parts
Assembly modelling – interferences of positions and orientation – tolerance analysis-mass property calculations – mechanism simulation and interference checking.

UNIT-V
CAD Standards
Standards for computer graphics- **Graphical Kernel System** (GKS) - standards for exchangeimages- **Open G**raphics Library **(OpenGL)** - Data exchange standards - IGES, STEP, CALSetc. - communication standards.

Text Books:

1. Ibrahim Zeid, Mastering CAD CAM, Tata McGraw Hill Publishing Co. 2007.
2. C. McMohan and J. Browne, CAD/CAM Principles, II edition, Pearson Education, 1999.

Reference Books:

1. W. M. Neumann and R.F. Sproul, Principles of Computer Gra[hics, McGraw Hill, 1989.
2. D. Hearn and M.P.Baker, Computer Graphics, Prentice Hall Inc., 1992.

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

II B.Tech - II Semester (ME)

L	T	C
3	0	3

(18EE0241) Basic Electrical and Electronics Engineering

Course Objectives:

- *To understand the nature of different circuit elements, fundamental laws and network Theorems.*
- *Understand the operation of dc machines and single phase transformers.*
- *Understand the characteristics of the p-n junction diode.*
- *Understand the characteristics of BJT,FET,MOSFET and characteristics of special purpose electronic devices.*

Course Outcomes:

Upon completion of the course, students will:

- *Determine the equivalent impedance of given network by using network reduction techniques.*
- *Determine the current through any element and voltage across any element*
- *Apply the network theorems suitably.*
- *Analyze the operating principles of motor and transformer.*
- *Analyze the operating principles of major electronic devices, its characteristics and applications.*
- *Design and analyze the DC bias circuitry of BJT and FET.*

PART-A

UNIT – I

Introduction to Electrical Engineering

Ohm's Law, Basic Circuit Components, Kirchhoff's Laws, Types of Sources, Resistive Networks, Inductive Networks, Capacitive Networks, Series Parallel Circuits, Star Delta and Delta Star Transformation. Principle of AC Voltages, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities.

UNIT- II

Network Theorems & Two Port Networks

Network Theorems: Thevenin's, Norton's, Maximum Power Transfer, Reciprocity and Superposition Theorems for DC Excitations.

Two Port Networks: Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations.

UNIT-III

DC MOTORS and TRANSFORMERS

DC Motors: Principle of Operation of DC Motors, Types of DC Motors, Torque Equation, Losses and Efficiency Calculation in DC Motor - Swinburne's Test and Applications.

Transformers: Principles of Operation, EMF equation, Losses and Efficiency, Regulation of Transformer, Testing: OC & SC Tests.

PART-B

UNIT-I

Semiconductor Devices: Intrinsic semiconductors-Electron-Hole Pair Generation, Conduction in Intrinsic Semiconductors, Extrinsic Semiconductors-N-Type and P-Type Semiconductors, Comparison of N-Type and P-Type Semiconductors. The p-n Junction –Drift and Diffusion Currents, The p-n Junction Diode-Forward Bias, Reverse Bias, Volt-Ampere Characteristics- Diode Specifications, Applications of Diode, Diode as a Switch. Diode as a Rectifier-Half-wave Rectifier, Full-Wave Rectifier, Full-Wave Bridge Rectifier, Rectifiers with Filters, Zener Diode-Volt-Ampere Characteristics, Zener Diode as Voltage Regulator.

UNIT-II

BJT: Bipolar Junction Transistor (BJT) **–** Types of Transistors, Operation of NPN and PNP Transistors, Input-Output Characteristics of BJT-CB, CE and CC Configurations, Relation between IC, IB and IE. Transistor Biasing- Fixed Bias, Voltage Divider Bias,Transistor Applications- Transistor as an Amplifier, Transistor as a Switch.

UNIT-III

JFET & MOSFET: Junction Field Effect Transistor (JFET)- Theory and Operation of JFET, Output Characteristics, Transfer Characteristics, Configurations of JFET-CD, CS and CG Configurations, JFET Applications- JFET as an Amplifier, JFET as a Switch, Comparison of BJT and JFET,MOSFET-The Enhancement and Depletion MOSFET, Static Characteristics of MOSFET, Applications of MOSFET.

Text Books:

1. *Basic Electrical Engineering*, M.S.Naidu and S. Kamakshiah – TMH, 2007
2. *Basic Electrical Engineering*, T.K.Nagasarkar and M.S. Sukhija Oxford University Press, 2004
3. *Theory and Problems of Basic Electrical Engineering*, D.P.Kothari & I.J. Nagrath PHI, 2008

References:

1. *Principles of Electrical Engineering*, V.K Mehta, S.Chand Publications, 2007
2. *Fundamentals of Electrical Electronics Engineering*, T.Thyagarajan, SCITECH Publications 5th Edition-2007.

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

II B.Tech - II Semester (ME)

L	T	C
3	0	3

(18ME0308) Manufacturing Processes

Course Educational Objectives:

- *To understand the various manufacturing processes and machining related to casting, joining of metals, moulding and advanced processes.*
- *Metal forming, extrusion, processing of plastic materials and rapid manufacturing processes are highly nonlinear because they involve geometric, material and contact non linearity and hardening, hot and cold working process.*

Course Outcomes:

Students undergoing this course are able to

- *Demonstrate knowledge of engineering principles (metallurgy, mechanics, and/or material science) in manufacturing processes.*
- *Use appropriate machine tool equipment, standardized methods and apparatus or manufacturing processes.*
- *Use finite element software to simulate physical behaviors of mechanical structures or systems.*
- *Apply FEA principles for component and assembly design*

UNIT-I

Metal Casting Processes -Sand Casting – Sand Mould – Type of patterns – Pattern Materials – Pattern allowances – Moulding sand Properties and testing – Cores –Types and applications – Moulding machines – Types and applications– Melting furnaces. Principle of special casting processes- Shell, Investment – Ceramic mould – Pressure die casting –Centrifugal Casting – CO2 process – Stir casting - Defects in casting.

UNIT-II

Joining Processes - Fusion welding processes – Type of Gas welding – Flame characteristics – Filler and Flux materials – Arc welding, Electrodes, Coating and specifications – Principles and types of Resistance welding – Solid state welding – Laser beam welding - Gas metal arc welding –Submerged arc welding – Electro slag welding – Gas Tungsten arc welding - Electron Beam Welding- Weld defects – Brazing and soldering – methods and process capabilities –Adhesive bonding, Types and applications.

UNIT-III

Metal Deformation Processes- Hot working and cold working of metals – Forging processes – Open, impression and closed die forging – Characteristics of the processes – Typical forging operations. Rolling of metals – Types of Rolling – Flat strip rolling – shape rolling operations – Defects in rolled parts – Principle of rod and wiredrawing – Tube drawing – Principles of Extrusion – Types – Hot and Cold extrusion.

UNIT-IV

Sheet Metal Forming Processes - Sheet metal characteristics – Typical shearing, bending and drawing operations – Stretch forming operations – Formability of sheet metal– Metal spinning. Introduction to High energy rate forming, magnetic pulse forming, peen forming, Superplastic forming – Micro forming.

UNIT-V

Manufacture of Plastic Components- Types and characteristics of plastics –Moulding of thermoplastics – working principles and typical applications – injection moulding – Plunger and screw machines – Compression mounding, Transfer Moulding –Typical industrial applications
Introduction to blow moulding –Rotational moulding – Film blowing – Extrusion – Thermoforming – Bonding of Thermoplastics.

Text Books:

1. *Elements of workshop Technology*, S.K Hajra Chouldhary and AK Hajra Choudhury, Volume I and II, Media promoters and Publishers Private Limited, Mumbai, 1997
2. *Manufacturing Technology Foundry, Forming and Welding*, P.N. Rao, , 4th Edition, Tata Mc Graw Hill, 2003
3. *Manufacturing Technology*, Kalpakjian, Pearson Education India Edition, 2006

Reference Books:

1. *Production Technology*, R.K. Jain, Khanna Publishers, 17th edition, 2012
2. *Materials and Process in Manufacturing*, Paul Degarma E, Black J.T and Ronald A.Kosher, 8th Edition, Prentice – Hall of India, 1997.
3. *Principles of Metal Castings*, Rosenthal, 2nd Edition, Tata Mc Graw Hill, 2001
4. *Manufacturing Technology*, R.K. Rajput, 1st Edition, Laxmi Publishers, 2007

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester

L	T	C
3	1	4

(18ME0309) Thermodynamics

Course Educational Objectives:

- *To understand the basic laws of thermodynamics and their application to the non-flow and flow processes.*
- *To understand the thermodynamic properties of ideal and real gases, gaseous mixtures.*
- *To get the awareness on thermodynamic principles, skills to perform the analysis and design of thermodynamic systems.*

Course Outcomes:

Students undergoing this course are able to

- *Apply the laws of thermodynamics to analyze thermal systems.*
- *Can understand the energy transformation from one system to other system.*
- *Can understand the working principles of I.C. Engines.*

UNIT-I

Basic Concepts: Definitions of system, boundary, surrounding control volume. Types of thermodynamic systems, Properties of system, definitions for properties like pressure, volume, temperature, enthalpy, internal energy, density, with their units. State, Property, Process and Cycle, Quasi Static Process, Thermodynamic Equilibrium.

Work & Heat Transfer: Work transfer, Types of work transfers, Point and Path Functions, Heat transfer, Comparison of Work and Heat transfers.

UNIT-II

Zeroth Law of Thermodynamics: Zeroth Law of Thermodynamics. Heat and temperature - concept of thermal equilibrium

First Law of Thermodynamics: First law of thermodynamics- simple problems on heat and work conversions in process and cycle. Non flow energy equation (NFEE), Steady flow energy equation (SFEE).Limitations of First law of thermodynamics.

Second Law of Thermodynamics: Heat Engine, Statements of Second law and their equivalence, Refrigeration and Heat Pump, Reversibility and Irreversibility, availability and unavailability – concept of change in entropy – expression for change in entropy.

UNIT-III

Law of Perfect Gas: Ideal Gas, Equation of State, Avogadro's Law, Internal Energy and Enthalpy of Ideal Gas, Entropy Change of Ideal Gas, Mixture of Gases- Dalton's Law of Partial Pressure, Specific Heats, Internal Energy and Enthalpy of Gas.

Thermodynamic Processes on Gases: Flow process, Non Flow Process, P –V and T-S diagrams on Isochoric process, Isobaric, Isothermal process, Isentropic process, Polytrophic process. Problems on Non flow Processes.

UNIT-IV

Thermodynamic Cycles: Carnot Cycle, Sterling Cycle, Ericson Cycle, Otto Cycle, Diesel Cycle, Dual Cycle, Problems.

Pure Substances: P-V, P-T, T-S diagrams of Pure Substances, Mollier Diagram, Dryness Fraction, Enthalpy and Entropy of Steam using Steam Tables. Problems.

UNIT-V

Boilers: Classifications of Boiler, Water Tube boilers- Bob cocks and Will cocks , Benson, Lamount boilers and Fire Tube boilers- Cochcraon boiler

Boiler mountings and Accessories–pressure gauge, water level indicator, fusible plug, blow down cock, stop valve, safety valve– feed pump, economizer, super heater and air pre-heater. Problems on Performance of Boiler and Heat balance sheet.

Irreversibility and Availability, Availability functions for systems and Control volumes undergoing different processes, Loss of work. Second law analysis for a control volume.

Text Books:

1. *Engineering Thermodynamics*, P K Nag, Tata McGraw Hill, 6th Edition, 2013
2. *Thermal Engineering*, R.K.Rajput, Lakshmi Publications, 7th Edition, 2015
3. *Thermal Engineering*, P.L.Balleny, Khanna Publications, 9th Edition.2009

Reference Books:

1. *Thermodynamics* - An Engineering Approach, Yunus A Cengel / Michael A Boles, Tata McGraw Hill India, 7e,Special Indian Edition 2011.
2. *Thermodynamics and Heat Engines*, Yadav R., Vol 1, Central Publishing House, 2011.
3. *Engineering Thermodynamics*, J.B. Jones and R.E.Dugan.,Prentice Hall of India, 2010.
4. *Basic Engineering Thermodynamics*, T. Roy Choudry, Tata McGraw Hill, Second Edition 2012.

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester

	L	T	C
(18ME0310) Theory of Machines	**3**	**0**	**3**

***Course Educational Objectives*:**

- *To understand the static and dynamic force analysis of Mechanisms.*
- *To understand the static and dynamic balancing of rotating and reciprocating masses, concept of free and forced vibration and their analysis.*

***Course Outcomes*:**

Students undergoing this course are able to

- *Understand and apply the basic principles of dynamics.*
- *Relate the motion of parts in a machine using the principles of kinematics*

UNIT -I

Precession- Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships.

Turning Moment Diagrams and Fly Wheels: Turning moment diagrams for steam engine, IC Engine and multi cylinder engine. Crank effort - Coefficient of Fluctuation of energy, Coefficient of Fluctuation of speed – Fly wheels and their design, Fly wheels for Punching machines.

UNIT-II

Clutches - Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch

Brakes and Dynamometers - Simple block brakes, Band brake, internal expanding brake, braking of vehicle. Dynamometers – absorption and transmission types-Prony brake, Rope brake, Epicyclic-train & torsion dynamometers- General description and methods of operation.

UNIT-III

Governors - Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung governors with auxiliary springs. Sensitiveness, isochronism and hunting. Effort and power of a governor.

UNIT-IV:

Balancing - Balancing of rotating masses - single and multiple – single and different planes

Balancing of Reciprocating Masses: Primary and Secondary balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples – V-engine, multi cylinder in- line and radial engines for primary and secondary balancing.

UNIT-V

Mechanical Vibrations - Free and forced vibration of single degree of freedom system, Role of damping, whirling of shafts and critical speeds. Simple problems on free, forced and damped vibrations. Vibration Isolation & Transmissibility. Transverse vibrations of beams with concentrated and distributed loads. Dunkerly's method,. Torsional vibrations - two and three rotor systems.

Text Books:

1. *Theory of Machines, R.S.* Khurmi, Khanna Publishers, 2003.
2. *Theory of Machines*, S. S. Ratan, Tata McGraw Hill, 2 nd Edition, 2005
3. *Theory of Machines*, Thomas Bevan, CBS Publishers, 3rd Edition, 1984

References:

1. *Theory of Mechanisms and Machines*, Ghosh A. and Mallick A.K, Affiliated Pvt.Ltd., 1988.
2. *Theory of Machines and Mechanisms,* Shigley J.E. and Uicker J.J., McGraw-Hill,Inc., 1995.
3. *Mechanism and Machine Theory,* J.S Rao. And R.V Dukkipati, Wiley-Eastern Limited 1992.

R18

B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester

	L	P	C
(18ME0311) Manufacturing Processes Lab	**0**	**3**	**1.5**

***Course Educational Objectives*:**

- *To understand the various manufacturing processes and machining related to casting, forming, joining of metals, moulding and extrusion processes of plastic materials.*

Course Outcomes:

Students undergoing this course are able to

- *Demonstrate knowledge of engineering principles (metallurgy, mechanics, and/or material science) in manufacturing processes.*
- *Use appropriate machine tool equipment, standardized methods and apparatus for manufacturing processes.*

I. Metal Casting Lab:

a. Pattern Design and making - for casting drawing.
b. Sand properties testing - Exercise -for strengths, Moisture, Grain size and permeability
c. Moulding: and Casting

II. Welding Lab:

a. Arc Welding: Lap & Butt Joint
b. Spot Welding

III. Mechanical Press Working:

a. Blanking & Piercing operation and study of simple, compound and progressive press tool.
b. Hydraulic Press: Deep drawing and extrusion operation.

IV. Processing of Plastics:

a. Injection Moulding
b. Blow Moulding

V. Soldering Processing

R18

B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester

	L	P	C
(18EE0242) Basic Electrical And Electronics Engineering Lab	**0**	**3**	**1.5**

Course Objectives:

- *To enhance the student with knowledge on electrical and electronic equipment's.*

Course Outcomes:

- *Students will understand all the fundamental concepts involving electrical engineering.*
- *Students will understand all the fundamental concepts involving electronics engineering.*

PART – A
Basic Electrical Engineering Lab

1. Verification of Superposition Theorem.
2. Verification of Thevenin's Theorem.
3. Determination of Open circuit and Short circuit parameters
4. Swinburne's Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine Working as Motor and Generator).
5. Brake Test on DC Shunt Motor. Determination of Performance Characteristics.
6. OC & SC Tests on Single-Phase Transformer (Predetermination of Efficiency and Regulation at Given Power Factors).

PART – B
Electronics Laboratory

(Any Six Experiments)

1. P-N Junction Diode and Zener Diode Volt-Ampere Characteristics.
2. Bipolar Junction Transistor in CB Configuration-Input and Output Characteristics, Computation of α.
3. Half-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
4. Full-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
5. Bipolar Junction Transistor in CE Configuration-Input and Output Characteristics, Computation of β.
6. Junction field effect Transistor in Common Source Configuration Output and Transfer Characteristics.
7. Verification of Logic Gates- AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.

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B.Tech – M.E

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY: PUTTUR
(AUTONOMOUS)

II B. Tech - II Semester (ME)

L	T	C
3	0	0

(18HS0817) Essence of Indian Traditional Knowledge

Course objective

The course aims at imparting basic principles of thought process, reasoning and inference. Sustainability is at the core of Indian Traditional knowledge Systems connecting society and nature. Holistic life style of yogic science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions. The course focuses on introduction to Indian Knowledge Systems, Indian perspective of modern scientific world-view, and basic principles of Yoga and holistic health care system.

UNIT-I

- Basic structure of Indian Knowledge System: Astadash Vidya- 4 ved
- 4 Upaved (Ayurved, Dhanurved, Gandharva Ved & Sthapthya Adi.,)

UNIT-II

- 6 Vedanga (Shisha, Kalppa, Nirukha, VYkaran, Jyothish & Chand)
- 4 Upanga (Dharma Shastra, Meemamsa, Purana & Tharka Shastra)

UNIT-III

- Modern Science and Indian Knowledge System
- Yoga and Holistic Health care
- Case studies

UNIT-IV

- Philosophical Tradition (Sarvadarshan) Nyaya, Vyshepec,Sankhya, Yog, Meemamsa, Vedantha, Chavanka, Jain & Boudh
- Indian Linguistic Tradition –(Phonology, morphology, syntax and semantics)

UNIT-V

- Indian Artistic Tradition - Chitra kala, Moorthi kala, Vasthu kala , Sthapthya, Sangeetha, Nruthya Yevam Sahithya
- Case studies

Text Books:

1. *Cultural Heritage of India-course material*, V. Sivaramakrishnan (Ed.), Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014
2. *Modern Physics and Vedant*, Swami Jitatmanand, Bharatiya Vidya Bhavan, 2011

References Books

1. *Tao of Physics*, Fritzof Capra, 2012
2. *Holistic Science and Vedant*, Swami Jitatmanand Bharatiya Vidya Bhavan, 2012