



Bansilal Ramnath Agarwal Charitable Trust's
Vishwakarma Institute of Technology
(An Autonomous Institute affiliated to Savitribai Phule Pune University)

Structure & Syllabus of
**Department of Engineering, Sciences &
Humanities (DESH)**

Pattern 'A-18'
F. Y. B. Tech.
Effective from Academic Year 2018-19

Prepared by: - Board of Studies in Engineering, Sciences & Humanities

Approved by: - Academic Board, Vishwakarma Institute of Technology, Pune

Signed by,

Chairman – BOS

Chairman – Academic Board

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Program Outcomes

- 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- 2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Academic Information – Please visit www.vit.edu

F.Y. B. Tech. Structure for Module I

FF No. 653

Course Code	Course Name	Teaching Learning Scheme					Assessment Scheme (% Weightages)				
		Th	Lab	Project	Hrs. / Week	Credits	In Semester Assessment			Viva	End Semester Examination
							HA	Lab Assessment	MSE		
Common for Semester I and Semester II (Note: * - Only in Semester I and # - Only in Semester II : for all ECIT and MCIP Students)											
ES1001	Calculus - *	4			4	4	10	-	10	20	60
CS1001/CS1002	C Programming- Python-@	3	2		5	4	10	30	10	20	30
ES1002	Applied Science	4			4	4	10	30	10	20	30
ES1003	Electrical Engineering	3	2		5	4	10	30	10	20	30
HS10XX	International Language	2			2	2	10	-	10	20	60
ES1012	Workshop		2		2	1					
ES1009	Engineering Design and Development - 1 - *	1	1	2	5	4					
ES1011	Professional Development 1 - \$		2		2	0					
ES1014/ES1013	Induction Training- * / Environmental Science- #		2		2	0					
Grand Total					31	23					

F.Y. B. Tech. Structure for Module II

FF No. 653

Course Code	Course Name	Teaching Learning Scheme					Assessment Scheme (% Weightages)				
		Th	Lab	Project	Hrs. / Week	Credits	In Semester Assessment			Viva	End Semester Examination
							HA	Lab Assessment	MSE		
Common for Semester I and Semester II (Note: * - Only in Semester I and # - Only in Semester II : for all ECIT and MCIP Students)											
ES1004	Linear Algebra - #	4			4	4	10	-	10	20	60
CS1001/CS1002	C Programming/ Python - @	3	2		5	4	10	30	10	20	30
ES1005/ES1006	Engineering Mechanics / Chemistry						10	30	10	20	30
ES1007	Applied Physics	3	2		5	4	10	30	10	20	30
HS1001	Behavioral Sciences	4			4	4	10	-	10	20	60
HS1002	Soft Skills	1	2		3	2	10	-	10	20	60
ES1008	Engineering Drawing		2		2	1					
ES1010	Engineering Design and Development - 2 - #	1	2	2	5	4					
ES1011	Professional Development 1 - \$		2		2	0					
ES1014/ES1013	Induction Training- * / Environmental Science- #		2		2	0					
HS10XX	General Proficiency		2		2	0					
Grand Total					34	23					

*	Irrespective of Module in Semester I for all divisions
#	Irrespective of Module in Semester II for all divisions
@	Irrespective of Module C Programming will be offered in Semester I to all ECIT divisions and Python will be offered to all ECIT divisions in Semester II
\$	(The course will run for full academic year however the registration will be done irrespective of module in semester II)

Course Name: Calculus

Course Code: ES1001

Credits: 4

Teaching Scheme: Theory: 4 Hours / Week

Section 1

Functions of single variable: Expansions of functions: Taylor's & Maclaurin's series, Curves (Cartesian, Polar and parametric standard curves) in 2D.

Functions of two or more variables: Introduction to functions of two or more variables, Level surfaces, limits and continuity, Partial derivatives, chain rules, Jacobian, maxima and minima of functions of two variables, Method of Lagrange's multipliers.

Double Integration: Beta and Gamma function, Evaluation of double integrals, change of order.

Section 2

Triple Integration: Evaluation of double integral using Jacobian transformation, Co-ordinate systems in 3 Dimensions, Standard surfaces, Evaluation of triple integrals, Dirichlet's integral, change of variables

Vector Differentiation: Scalar and Vector point functions, tangential and normal components of velocity and acceleration, gradient, directional derivative, divergence and curl.

Vector Integration: Line integral, work done, conservative vector field, Surface integral, Theorem of Green, Stokes and Gauss.

Text Books:

1. James Stewart, "Calculus; Early Transcendental with Course Mate". 7th Edition, Cengage Learning (Indian Edition), 2017.
2. Thomas G. B. and Finney, 'Calculus and analytic Geometry', 11th Edition, Pearson Publications
3. Ron Larson and Bruce H. Edwards, 'Text book of Calculus', Brooke/Cole, a part of Cengage Learning (Indian Edition), (c) 2011.

Reference Books:

1. Murray R. Spiegel, 'Advanced Calculus', Schaum's out line series, New Delhi, 1st Edition, 1981, McGraw Hill International Book Co.
2. Tom Apostol, 'Calculus', volume-II, 2nd Edition, Wiley India Edition
3. Erwin Kreyszig, 'Advanced Engineering Mathematics' 10th Edition, Dec. 2010, , John Wiley and sons, Inc

Course Outcomes:

The student will be able to –

1. recognize and identify Taylor series, infinite series and curves in plane
2. demonstrate the knowledge of partial derivative, chain rules, implicit functions, and extreme values of function of several variables
3. evaluate double integral
4. apply triple integral for engineering applications
5. interpret the properties of vector differentiation
6. use Gauss divergence and stokes's theorem

Course Name: Linear Algebra

Course Code: ES1004

Credits: 4

Teaching Scheme: Theory: 4 Hours / Week

Section 1:

System of Linear Equations: Rank of matrix, Elementary Matrices, System of linear equations, Gauss-Jordan Elimination. Applications of System of Linear equations.

Vector Spaces: Euclidean Vector space, Vector Space, Subspace, Span of a set, Spanning Set, Fundamental Subspaces, Linear Dependence, Independence, Basis and dimension of a vector space.

Inner Product of Vector Spaces: Inner product Spaces, Orthogonal Bases: Gram Schmidt Process, Mathematical Models and Least Squares Analysis.

Section 2:

Linear Transformations: Introduction to linear transformations, Matrices for Linear Transformation, Orthogonal Transformation, Geometric properties of linear operators on \mathbb{R}^2 and \mathbb{R}^3 .

Eigen Values and Eigen Vectors: Eigen Values and Eigen Vectors of a matrix, Diagonalization, Symmetric Matrices and Orthogonal Diagonalization, Quadratic forms and its Applications.

Probability distribution: random variable, distribution function, discrete random variable and probability mass function, continuous random variable and probability density functions, expectation and variance, some special distributions.

Text Books:

1. David Poole, “ *Linear Algebra: A Modern Introduction* ” 4th Edition, Cengage Learning 2015.
2. Ron Larson and David C. Falvo, ‘ *Linear Algebra An Introduction* ’, 1st Edition, Cengage Learning (Indian Edition).
3. Seymour Lipschutz and John J. Schiller, ‘ *Schaum's Outline of Introduction to Probability and Statistics* ’ (Schaum's Outline Series) 1 June 1998

Reference Books:

1. David C. Lay, ‘ *Linear Algebra and its Applications* ’, 3rd Edition, Pearson.
2. Jim DeFranza and DanielGagliardi, ‘ *Introduction to Linear Algebra with Applications* ’, Tata McGraw-Hill Edition.
3. Gilbert Starng, ‘ *Linear Algebra and its Applications* ’, 4th Edition, Cengage Learning.
4. B.V.Ramana, ‘ *Higher Engineering Mathematics* ’ Tata McGraw-Hill publishing co. Ltd.

Course Outcomes:

The student will be able to –

1. Set up , solve and interpret linear systems
2. Acquire the knowledge of vector spaces
3. Apply knowledge of inner product spaces to compute length of a vector, angle, distance between two vectors, to compute orthogonal basis using Gram-Schmidt process
4. Compute and apply the knowledge of eigenvalues and eigenvectors
5. Demonstrate linear transformations geometrically
6. Analyze and interpret probability distribution.

Course Name: C Programming

Course Code: CS1001

Credits: 4

Teaching Scheme: Theory: 3 Hours / Week

Lab. : 2Hours / Week

Section 1:

Introduction to programming

Problem solving using computers; algorithms and flowcharts; using simplecpp graphics commands; notion of syntax and semantics; Repeating a block of commands; Nested repeat; numerical functions; comments; Data types; identifiers; initialization; const; Input and Output; Arithmetic operators; programming idioms; Compound assignment; blocks; scope and shadowing.

Conditional Constructs: Relational and Logical Operators, various forms of if..else statements, ternary operator, switch..case statement;

Loops: Types of Loops, while, do..while, for, break and continue, goto statement.

Arrays: Definition, syntax, element operations, memory representation, initialization. Two dimensional array, row and column major;

Applications of arrays: sorting, searching and matrix operations;

Strings: Introduction, Array of characters, output, input, character string constant, Accepting multiword string, Array of strings.

Section 2:

Pointers: Definition, syntax, address of operator, pointer variables, relevance of data type in pointer variables, dereferencing operator, Pointer to pointer, address arithmetic; Accessing array elements using pointers

Functions: Introduction; definition; anatomy of function; execution of function; Scope of various types of variable; scope; local and global variables; nested function call; returning values from function; Menu driven programs;

Function and Pointers: Call by value v/s call by address, Passing array to function, returning pointers from function, dangling pointers;

Function and strings: Library functions from string.h library, building user defined functions for string operations;

Recursive Function: Definition, Examples, Types of recursion.

Structures: Need, Definition, syntax, declaration and initialization, structure variables, accessing and assigning values to structure variables, “dot” operator;

Applications of structure: Functions and structures, array and structure, structure within a structure, pointers and structures.

File handling

Introduction to file handling, using file pointers, file opening modes, reading from file, writing into file, closing file, fscanf, printf, fread, fwrite, fseek, ftell, rewind.

List of Practicals:

Sr. No.	Topic
1	Graphics: Drawing basic diagrams using Simple Cpp
2	Making computer calculate stuff : calculating average, finding roots of quadratic equation, complex numbers etc.
3	Switch statement: controlling the turtle
4	Loops, Conditionals and Arithmetic operations: Converting base of a number, Generating arithmetic and geometric progressions, Buttons on Canvas, Reversing n digit number etc.

5	Example: marks display program, find min/max Generate roll numbers
6	Linear and Binary Search
7	Bubble sort
8	Insertion and Selection Sort
9	Matrix arithmetic
10	Demonstrating pointer to pointer, pointer arithmetic
11	Assignment on functions – menu driven programs, etc.
12	Using library functions
13	Implementing User defined string functions
14	Calculate factorial, generating progressions, GCD, LCM using recursion
15	Create Structures for: student result, employee payroll, library book issuing
16	File handling: Store employee records in a file

Text Books:

1. *"An Introduction to Programming through C++ "*, AbhiramRanade, Mc Graw Hill Education. ISBN 978-9-33-290151-3
2. *"Let us C"*, Y. Kanetkar, Second Edition, BPB Publication. ISBN: 8176566217.

Reference Books:

1. *"Programming language – ANSI C"*, Brain W Kernighan and Dennis Ritchie, Second edition ISBN 0-13-110370-9
2. *"Programming with C- Schaum's outline Series"*, B. Gottfried, Second edition, Tata McGraw Hill Publication, ISBN 0-07-463491-7
3. *"C By Example"*, Kalicharan Noel, UK, Cambridge University Press.
4. *"C How to Program"*, Deitel H N, Deitel P J, third edition, New Delhi, Prentice Hall of India, 2002".
5. *"A first book of C- Fundamental of C Programming"*, Gary Bronson and Stephen Menconi, ISBN: 0314073361,

Course Outcomes:

Upon completion of the course, graduates will be able to –

1. Apply programming fundamentals to construct concise solutions.
2. Demonstrate available algorithmic principles to generate efficient solutions.
3. Justify modular programming approach by making use of elementary as well as superior data structures.
4. Implement programming constructs to solve real world problems.
5. Construct derived data type for real world entities.
6. Apply file handling for permanent storage of data.

Course Name: Python

Course Code: CS1002

Credits: 4

**Teaching Scheme: Theory: 3 Hours / Week
Lab.: 2 Hours / Week**

Section 1:

Fundamentals of Python

Features of Python , How to Run Python , Identifiers , Reserved Keywords , Variables , Comments in Python , Indentation in Python , Input, Output statements.

Operators : Arithmetic Operators , Comparison Operators , Assignment Operators , Logical Operators , Operator Precedence .

Data Types and Operations: Numbers , Mathematical Functions , Trigonometric Functions , Random Number Functions , Strings , Escape Characters , String Formatting Operator , String Formatting Functions ;List : Built-in List Functions , Built-in List Methods ;Tuple : Built-in Tuple Functions ,Set : Built-in Set Functions , Built-in Set Methods ;Dictionary : Built-in Dictionary Functions . Mutable and Immutable Objects, Data Type Conversion

Flow Control and Loops

Decision Making: if statement, if...else statement, if .. elif .. else statement , Nested if statement.

Loops : for loop ;range() function for loop with else statement , while loop , while loop with else statement ; Nested Loops ; Control Statements : break statement , continue statement , pass statement ;List Comprehensions : Nested List , Nested List Comprehensions ; Set Comprehensions ; Dictionary Comprehensions ; Nested Dictionaries

Functions and Modules

Function Definition, Function Calling, Function Arguments, Anonymous Functions (Lambda Functions) , Function with more than one return value

Modules and Packages :Built-in Modules , Creating Modules ; import Statement , import with renaming , from...import statement , import all names , Locating Modules , PYTHONPATH variable Namespaces and Scope : The dir() function , The reload() function , Packages in Python

Importing modules from a Package : The time module , The calendar Module , The datetime Module

Section 2:

GUI Programming: Easygui and Tkinter

boolbox(),buttonbox(),ccheckbox(),choicebox(),codebox(),diropenbox(),enterbox(),
exceptionbox(),fileopenbox(),filesavebox(),indexbox(),integerbox(),msgbox(),
multichoicebox(),multienterbox(),multipasswordbox(),passwordbox(),textbox(),ynbox()

Tkinter Widgets , Label , Message Widget , Entry Widget , Text Widget , tk Message Box , Button Widget , Radio Button , Checkbutton , Listbox , Frames , Toplevel Widgets , Menu Widget , Menubutton Widget , Scrollbar , Scale Widget(Slider Widget) , Canvas , Layout Managers , Pack

Place , Grid

File Handling and Database Programming

Opening a File , Modes for Opening a File , Attributes of file object , Closing a File , Writing to a File with Statement , Reading from a File , File Methods , Renaming a File , Deleting a File , Directories in Python , mkdir() method , chdir() method , getcwd() method , rmdir(), method

Connecting to a Database , Creating Tables ,INSERT Operation , UPDATE Operation , DELETE Operation , READ Operation , Transaction Control , COMMIT Operation , ROLLBACK Operation Disconnecting from a Database

Exception Handling and Regular Expressions

Exception Handling : Built-in Exceptions , Handling Exceptions , try...except , except clause with no Exception , except clause with multiple Exceptions , try...finally , Exception with Arguments , Raising an Exception , User-defined Exception , Assertions in Python , Exception Handling in Databases

Regular Expressions : The match() function , The search() function , Search and Replace , Regular Expression Modifiers: Option Flags , Regular Expression Patterns ,Character Classes, Special Character Classes , Repetition Cases , findall() method

Text Books:

1. *"Programming And Problem Solving With Python"*, Ashok Kamthane and Amit Ashok Kamthane , ISBN 9789387067578
2. *"Beginning Programming with Python for Dummies"*, John Paul Mueller, Wiley Publishing, 9788126553488

Reference Books:

1. *Dive into Python 3: Mark Pilgrim, Jesse Noller, Wiley Publishing , ISBN 9788184899115.*
2. *Python in Easy Steps, Tata Mc Graw Hill Education, ISBN 9789351343080*
3. *Learning Python, 5th Edition, Mark Lutz, O'Reilly, ISBN 978-1449355739*

Course Outcomes:

Upon completion of the course, graduates will be able to –

1. Understand the power and simplicity of Python Programming.
2. Demonstrate various features and operators available in Python Programming.
3. Justify modular programming approach by making use of functions and modules
4. Implement real world problems using GUI libraries available in Python.
5. Apply file handling and data base concepts for permanent storage of data.
6. Use exception handling and regular expressions to build flawless applications.

Course Name: Applied Science

Course Code: ES1002

Credits: 4

Teaching Scheme: Theory: 4 Hours / Week

Section 1:

(10 + 06 Hours)

Spectroscopic Techniques:

Introduction, Principles of Spectroscopy, Beer – Lambert's Law, Electronic (Ultra Violet – Visible) Spectroscopy - Principle, Theory, Instrumentation and Working , Vibrational (Infrared) Spectroscopy of diatomic molecules - Principle, Theory, Instrumentation and Working and Nuclear Magnetic Resonance Spectroscopy - Principle, Theory, Instrumentation and Working with Applications and Numerical of all the methods

Separation Techniques:

Introduction, Principles of Chromatography, Types and Classification of Chromatographic Techniques, Thin Layer Chromatography – Principle, Theory, Working and Applications, Paper Chromatography – Principle, Theory, Working and Applications, Column Chromatography - Principle, Theory, Working and Applications, High Performance Liquid Chromatography – Principle, Theory, Instrumentation, Working, Applications, Gas Chromatography – Principle, Theory, Instrumentation, Working and Applications

Section 2:

(08 + 08 Hours)

Fuel and Combustion:

Types of Calorific Value, Proximate Analysis of coal, Ultimate Analysis of coal, Numerical on Analysis of coal, Refining of Petroleum, Combustion- Theoretical Air requirement, Theoretical Oxygen Requirement of Solid Fuels, Theoretical Oxygen Requirement of Liquid /Gaseous Fuels, Numerical on Combustion

Biology & Physics for Chemistry:

Biophysics : Introduction, Physical Properties applied to Biology - Surface Tension, Viscosity, Adsorption, Diffusion, Osmosis, Biopotentials : Bioelectric Signals: Structure of Neuron, Resting Potential, Action Potential, Nernst Equation, Combined Action Potentials of the Human Body ECG, EEG, (in brief), Bioelectrodes - Half Cell Potential, Polarizable and Non - Polarizable Electrodes, Metal and Glass Electrodes, Other types of Electrodes

List of Project areas: (For THP Courses)

1. Colorimetric analysis for quantitative estimation of metal ion
2. To make a model of diatomic molecules and illustrate different types of vibrational transitions.
3. Study of UV -Visible spectra of different organic compounds.
4. Study of IR spectra of different organic compounds.
5. Study of NMR spectra of different organic compounds.
6. Designing working model of colorimeter / UV – Visible spectrophotometer.
7. Designing working model IR spectrophotometer.
8. Designing working model NMR spectrophotometer.
9. Separation of organic compounds with the help of Thin Layer Chromatography
10. Separation of chlorophyll from leaves with the help of Paper Chromatography
11. Separation of metal ions with the help of Column Chromatography.
12. Separation of nucleic acid, morphine and heroin with the help of HPLC.
13. Separation of components in serum with the help of HPLC.
14. Separation of pharmaceuticals with the help of HPLC.
15. Separation of biochemical compounds with the help of HPLC.
16. Separation of cyclo hexane and benzene with the help of GC.

17. Determination of G.C.V. and N.C.V. of a solid or liquid fuel with the help of Bomb Calorimeter.
18. Determination of G.C.V. and N.C.V. of a gaseous fuel with the help of Boy's Gas Calorimeter.
19. Calculate the percentage of ethyl alcohol in the given sample of petrol (Power Alcohol).
20. Calculate the percentage of triglycerides in the given sample of diesel (Bio – Diesel).
21. Determination of Octane number of given petrol sample.
22. Determination of cetane number of given diesel sample
23. Determination of amount of lead in the given sample of petrol.
24. Determination of energy liberated during the explosion of atom bomb (Festival Crackers).
25. Recording and Analysis of ECG signals.
26. Recording and Analysis of EEG signals.
27. Absorption spectrum of blood / chlorophyll.
28. Extraction and separation of biological matrices.
29. To design the model for measuring pulse rate.
30. To design the model for measuring stress.
31. To design the structural model of neuron on the basis of function.
32. To design the structural model of neuron on the basis of structure.
33. To design and measure the potential of Ag – AgCl electrode.

Text Books:

1. *Dr. Sunita Rattan; A Textbook of Engineering Chemistry; Third Edition, S. K. Kataria & Sons, New Delhi, 2012*
2. *Prassna Rath, Engineering Chemistry, 1st Edition, Cengage Learning, 2015.*
3. *P.C. Jain and Dr. Monika Jain; Engineering Chemistry; Sixteenth Edition, Dhanpat Rai Publishing Company(P) Ltd., New Delhi, 2013*

Reference Books:

1. *D. A. Skoog and J. J. Leary; Principles of Instrumental Analysis; Fourth Edition, Saunders College Publishing, 1992*
2. *A.K.Shaha; Combustion Engineering and Fuel Technology; Edition Oxford & IBH Publishing Company*
3. *R. S. Khandpur; Handbook of Biomedical Instrumentation; Second Edition, Tata McGraw Hill Education Private Limited, 2003*

Course Outcomes:

Learner will be able to,

1. Apply the principles of different spectroscopic methods and find out the unknown concentration of given solution of complex compound by Colorimetry
2. Understand the basics of different chromatographic techniques Separate and identify the components in the given mixture from retardation / retention factor
3. Apply appropriate logic, Solve problems and arrive at solution based on spectroscopic principles, grading of fuels (from the results of proximate analysis)
4. To analyze and quantify the electro analytical parameters.

Course Name: Electrical Engineering

Course Code: ES1003

Credits: 4

**Teaching Scheme: Theory: 3 Hours / Week
Lab. : 2Hours / Week**

Section 1:

1. DC Circuits -- Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton's Theorems. **(8 hours)**
2. AC Circuits--Representation of sinusoidal waveforms, peak and rms values, phasor representation,. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations. Real power, reactive power, apparent power, power factor (series and parallel), Three-phase balanced circuits, voltage and current relations in star and delta connections. **(8hours)**
3. Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption. **(4 hours)**

Section2:

1. Construction, working, characteristic dc motor. **(8 hours)**
2. Transformers-- BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections. **(4 hours)**
3. Electrical Machines-- Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. **(8 hours)**

List of Practicals:

1. Types of wires, wiring components, Earthing
2. Verification of superposition theorem using simulation software.
3. Verification of Thevenin's theorem using simulation software.
4. RLC series circuit –Three voltmeter method
5. Voltage and current relations in three phase star and delta circuits
6. Visit to VIT substation
7. Load test on single phase transformer
8. Speed Control of DC shunt motor.
9. Load test on DC shunt motor
10. Load test on three phase induction motor

Text Books:

1. *P.V. Prasad, R. Prasad and Sivanagaraju, "Basic Electrical and Electronics Engineering" 1st Edition, Cengage Learning, 2013.*
2. *D. P. Kothari and I. J. Nagrath, " Basic Electrical Engineering" Tata Mcgraw Hill 2010*
3. *D. C. Kulshreshtha, "Basic Electrical Engineering", Oxford University Press*

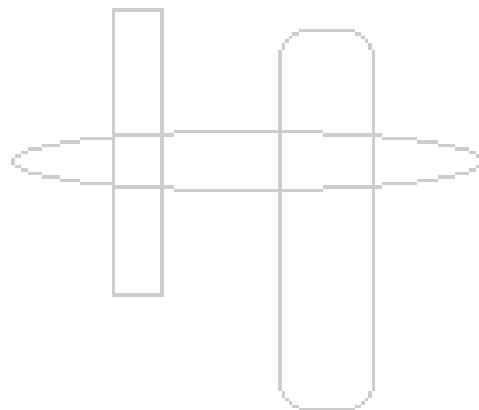
Reference Books:

1. *Edward Hughes, "Electrical and Electronics Technology", Pearson*
2. *V. D. Toro, "Electrical Engineering Fundamentals" Prentice Hall India*

Course Outcomes:

The student will be able to –

1. Understand different theorems and able to solve numerical on it.
2. Understand concept of single phase a.c.circuit.
3. Understand concept of three phase a.c. circuit
4. Find losses and efficiency of single phase transformer.
5. Understand construction and working of DC machines and able to solve numerical on it.
6. Understand construction and working of induction motor and the T-S characteristic.



Course Name: French

Course Code: HS1003

Credits:2

Teaching Scheme: Theory: 2 Hours / Week

Section 1:

Introduction

Alphabets, Numbers (0-100), Months, days of the week, Difference between Tu/Vous., Self Introduction, Date of birth, Telephone numbers, Basic salutations

Ecole de français, Paris: Au secretariat

Indefinite Articles (c'est ce sont) Definite Articles, Introduction of third person, Nationalities, professions, Irregular verbs –Etre / Avoir.

Autour de l'école

Vocabulary related to family and colours, Regular « er » ending verbs, Prepositions, Directions

Section 2:

La vie quotidienne

Quelle heure est- il? , Verbs « aller, venir, faire », Interrogation (yes /no), Reflexive verbs.

Ma chambre

Vocabulary for room and house, Regular “ir” ending verbs, Concept of si, oui and non, Les adjectifs possessifs

Une Randonnée

La négation, Concept of Jouer a/jouer de, Basic question formation.

Text Books:

1. “Jumelage”. Niveau 1, Roopa Luktuke, Manjiri Khadekar, Saraswati House Pvt Ltd, Educational Publishers New Delhi.
2. “Jumelage”. Niveau 1 Cahier d'exercices, Roopa Luktuke, Manjiri Khadekar, Saraswati House Pvt Ltd, Educational Publishers New Delhi.

Reference Books:

1. “**Encore En Echanges**” French for beginners, Neelima Raddi, Anjali Paranjpye, Oxford University Press
2. “**Synchronie**” Methode de francais, Pierre Koest, D.K. Singh, K. Madavane, Asha Pande, German Book Centre New Delhi

Course Outcomes:

The student will be able to –

1. Greet formally as well as informally and introduce himself or herself in French, Read and write numbers, dates, telephone numbers, days of the week.
2. Describe the culture of France and form grammatically correct sentences and introduce third person.
3. Ask or tell the directions to reach the destination and describe your family.
4. Tell and ask time, frame basic questions and describe your routine.
5. Write emails, letters and small essays in French and describe your room using relevant vocabulary.
6. Make negative sentences and use them in the dialogues.

Course Name: Japanese

Course Code: HS1004

Credits: 2

Teaching Scheme: Theory: 2 Hours / Week

Section 1:

Orientation (Jikoushokai, Aisatsu & Moji): Theory: Orientation Lecture, Introduction of Hiragana script with basic words, Youon, Sokuon, Chouon – Methods of writing words, Greetings and Classroom Expressions, Etiquettes and mannerisms

Introduction Of Katakana (Moji Katakana): Introduction of Katakana script, Introduction of Katakana rules, Katakana words used in daily life

Calendar & Numbers (Suji, Youbi, Hizuke, Jikaaan): Introduction of numbers, Writing Days of the week, Dates, Time, Months in Hiragana, Special Greetings used in different situations in Japan

Section 2:

Basic Grammar Pattern (Bunnokatachi, Keiyoushi-To, Doushi): Introduction of ~は~です pattern, Affirmative, Negative and interrogative sentences, Introduction of demonstrative pronouns, Learning い and な adjectives and opposites, Introduction of some basic and useful verbs and their simple present tense

II: Culture Of Japan (Nihon-No-Bunka): Some festivals in Japan, Arts of Japan, Foods and Dress of Japan, Islands and seasons of Japan, Some special things about and in Japan, Revision of all topics and paper

Text Book Name :- Minnano Nihongo

Course Outcome :

The Student will be able to :

1. Greet formally and introduce himself/herself in Japanese language with appropriate etiquettes and mannerism.
2. Read and write Hiragana, Katakana, Scripts along with basic words, numbers, dates, telephone nos., days of the week, months, year, time.
3. Read/Write sentences using basic sentence pattern including all three scripts.
4. Describe things using basic adjectives and actions by using basic verbs.
5. They become familiar to fascinating country like Japan & Japanese culture.

Course Name: German

Course Code: ES1005

Credits: 2

Teaching Scheme: Theory:2 Hours / Week

Section 1:

Introduction to German

Alphabets and sounds. International words in German. Introducing oneself and others. Times of the day. Greetings according to time of the day. Listening to conversations in day life situations. Cities and countries. Nationalities and languages

Grammar: Personal pronouns. Conjugations of weak verbs.

Friends Colloques Professions and responsibilities

Introducing various professions, Different professions and professional life. Responsibilities at the workplace. Small Passages and Dialogues related to that. Classroom related objects.

Numbers. 1-1000. Tell and understand telephone numbers. Dates., Days of week, Months, Seasons

Grammar: Conjugation of verbs sein and haben (to be and to have), Singular and Plural form of nouns. Definite articles.

In the city, Family Relations

Places in Germany, Vocabulary related to different places in the city like Railway station, Museum, Bus stop etc. Directions and telling location. Family and relationships.

Grammar: Possessive pronouns, Negation, Imperative, Definite and Indefinite Articles

Section 2:

Time Learning clock hours, Taking formal appointments and casual meetings. Describing daily routine . Giving excuses for delays and absence. Professions and the describing responsibilities involved in that professions.

Grammar: Questions and prepositions associated with clocktime, Strong verbs

Hobbies, Journey, Trip, Excursion

Hobbies and free time activities. Journey, small trips, Mode of transport for the same

Grammar: Introduction of cases Nominative case, Forming and answering Wh questions Ordinary numbers,

Food and drinks

Starting conversations. Meeting in Cafes. Vocabulary for food and drinks

Ordering food and paying the bill.

Grammar: Introduction of Akkusative case, Introduction of Modal Verb möchten, wollen and können

Text Books:

1. *Netzwerk Deutsch als Fremdsprache A1* by Stefanie Dengler
2. *Fit In Deutsch 1*

Reference Books:

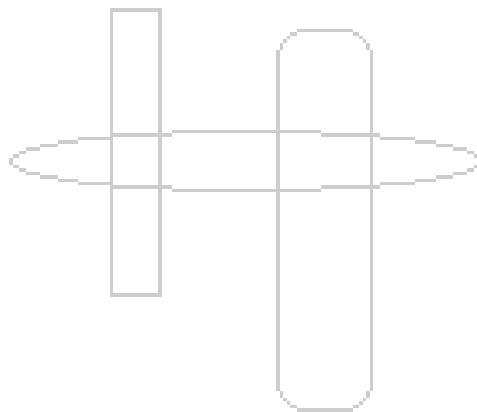
1. *So geht das 1,2,3*
2. *Deutsch KreativAktiv*
3. *Deutsch KreativInteraktiv*

Course Outcomes:

The student will be able to –

1. Pronounce the words correctly according German language rules and formulate small and simple sentences in German using basic grammar structures. Introduce himself or herself

2. Say, write numbers, number names. Recognize professions of male and female. Play dialogs related to classroom object. Recognize definite articles of classroom objects. Recognize Singular/Plural form. Tell and write days of week, Months and seasons
3. Tell directions, locations. Write passage on Family and professions, ages of family members. Write, formulate negation sentences. To give orders, make polite requests using Imperative.
4. Read and tell clock time and use it for taking and cancelling formal/ informal appointments using Possessive pronouns, and Modal verbs.)
5. Read and understand small texts about Hobbies, free-time activities and read and write ordinal number, date of birth and important days, holidays in year.
6. Make conversation related to Restaurant, Cafes using Accusative and Modal verb (möchten, wollen and können)



Course Name: English

Course Code: ES1007

Credits: 2

Teaching Scheme: Theory: 2 Hours / Week

Section 1:

Vocabulary: Word Formation, Correct Usage, Idiomatic Expressions

Basic Grammar: Articles , Parts of Speech, Sentence Structure, Verbs and Concord, Question tags , short responses

Listening Skills: Kinds of Sentences, Verbs Modals, Conjunctions

Section 2:

Speaking Skills: Direct and Indirect speech, Description, Narration, Conversation.

Reading Skills: Active Passive Voice, Prepositions, Improved Spelling.

Writing Skills: Paragraph Writing, Punctuation, Note-making

Text Books:

1. *Rogers, Kenny "The complete Guide to IELTS: Students book"*
2. *Harrison, Whitehead " Exam Essential Practice test IELTS level 1 "*
3. *Gough, Hitchson, " Exam Essential Practice test IELTS level 2 "*
4. *Wren and Martin, "English Grammer and Composition" S. Chand Publications*

Reference Books:

1. *Bansal and Harrison- Spoken English in India*
2. *Essentials of Grammar and Composition*
3. *Lewis- The New Roget 's Thesaurus in Dictionary Form*
4. *Oxford English for Careers:Engineering 1 Student 's Book. Oxford University Press*

Course Outcomes:

The student will be able to –

1. Enhance their vocabulary skills
2. Construct and use grammatically correct sentences.
3. Develop good listening skills.
4. Speak confidently in English.
5. To be able to comprehend the printed content
6. Write appropriately to communicate effectively

Course Name: Hardware and Software Workshop

Course Code: ES1012

Credits: 1

Teaching Scheme: Lab.: 2 Hours / Week

Section 1:

Installation and Configuration of Operating system Operating system installation: Disk formatting, Disk partitioning (Dual boot), Linux installation and configuration, Software Installation: Device drivers, Anti-virus software

Introduction to Computer Network LAN setup (IP address, DNS), Basic networking commands (ipconfig, ping, etc), Accessing Remote desktop, Cable Crimping

Circuit Testing Identification of Components, Bread board circuit and PCB circuit testing

Section 2:

PCB Manufacturing Prepare PCB from given circuit layout

Sheet Metal Work Introduction. Use of marking tools & hand tools such as steel rule, marker, scissors, centre punch, measuring gauge, etc. Safety precautions. Demonstration of few operations such as marking, cutting, bending etc& one job on sheet metal.

Carpentry Introduction, use of marking tools and hand tools such as marking gauge, try squares, steel rules, saws, jackplane, chisels, etc. Use of power tools, safety precautions. Demonstration & hands on experience of different operations such as sawing, planing, chiseling, etc.

Text Books:

1. *“Computer Fundamentals”, Sinha P K, Sinha Priti, fourth edition, New Delhi, BPB Publications, 2010.*
2. *“Computer Hardware and Organization”, Sloan M E, second edition, New Delhi Galgotia Publications, 1992.*
3. *Bosshart, Printed Circuit Boards: Design and Technology, Tata McGraw-Hill Education, 1983.*
4. *Robert L. Boylestad , Nashelsky Electronic Devices and Circuit Theory, Pearson Education India, 1996.*
5. *S.k. HajraChudhary. Elements of Workshop Technology .media Promoters and Publishers Pvt., Ltd.*
6. *K.T. Kulkarni. Introduction to Industrial Safety. K.T. Kulkarni. Pune.*

Reference Books:

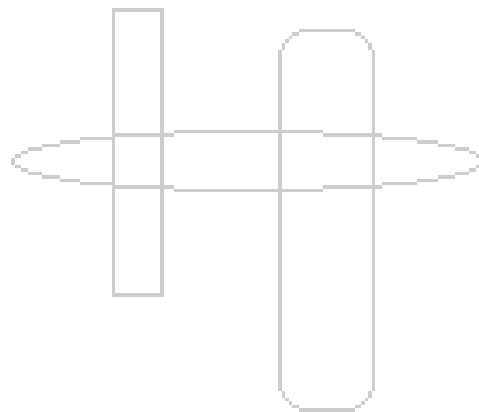
1. *“Computer Architecture and Organization: Design Principles and Applications”, Govindarajulu B, New Delhi, Tata McGraw Hill, 2004.*
2. *“Computer Networks”, Andrew Tanenbaum, third edition, Pearson Education, India, 1993.*
3. *“Data Communications and Networking”, Forouzanbehrouz A, second edition, New Delhi, Tata McGraw Hill, 2000.*
4. *“Electronic Devices”, Floyd Thomas L., sixth edition, New Delhi, Pearson Education, 2006*
5. *“Troubleshooting Electronic Equipments Includes Repair and Maintenance”, Khandpur R S, second edition, New Delhi, Tata McGraw Hill, 2003.*
6. *Hwaiyu Geng. Manufacturing Engineering Hand Book, McGraw Hill Publishing Co. Ltd.*
7. *Lawrence E. Doyle, Manufacturing Processes and Materials for Engineering, Prentice Hall Inc.*

Course Outcome:

The student will be able to

1. Understand basics of operating system and system administration

2. Study computer networking fundamentals
3. Built the circuit on PCB
4. Simulate the circuit operation on Simulation software
5. Perform few sheet metal work and carpentry operations
6. Follow safety practices



Course Name: Machining Workshop

Course Code: ES1013

Credits: 1

Teaching Scheme: Lab.: 2 Hours / Week

Section 1:

Fitting: Introduction, Use of marking tools such as vernier caliper, vernier height gauge, micrometer, center punch, try squares, steel rule, and hand tools such as files, hand saw, chisels, taps, bench vice, angle plate, surface plate etc. Safety Precautions, one job involving different operations such as sawing, tapping, filing and chiseling etc.

Carpentry: Introduction, use of marking tools and hand tools such as marking gauge, try squares, steel rules, saws, jackplane, chisels, etc. Use of power tools, safety precautions. Demonstration & one job of different operations such as sawing, planing, chiseling, etc.

Section 2:

Welding: Introduction, Principle of manual metal arc welding, equipment and its operation, welding electrodes, welding joints, welding symbols, Safety precautions. Demonstration & one job of few operations such as filing, welding, chipping and drilling.

Text Books:

1. *S. K. Harja Chudhary, Elements of Workshop Technology, Media Promoters and Publishers Pvt. Ltd.*
2. *K. T. Kulkarni Introduction to Industrial Safety,*

Reference Books:

1. *H. Geng, Manufacturing Engineering Hand Book, McGraw Hill Publishing Co.Ltd..*
2. *L. E. Doyle, Manufacturing Processes and Materials for Engineering, Prentice Hall Inc.,*

Course Outcome:

The student will be able to

1. Perform few Fitting, Carpentry and Welding operations.
2. Follow safety practices.

Course Name: Environmental Science

Course Code: ES1014

Credits: Audit

Teaching Scheme: Theory: 2 Hours / Week

Section 1 :

Nature of environmental studies: Definition, scope, importance, multidisciplinary nature of environmental studies, need of public awareness, Role of an individual in conservation and equitable use of natural resources, sustainable lifestyles, Natural resources and associated problems : Forest, water, mineral, food, energy, land resources

Ecosystems: Concept, Structure, function, characteristics of ecosystems, energy flow in ecosystem, producers, consumers, and decomposers, ecological succession

Biodiversity and its conservation: Introduction, value, hot spots, of biodiversity, threats to biodiversity, conservation of biodiversity

Section 2:

Environment pollution: Introduction, definition, types of pollution, cause and effect of pollution, solid waste management, role of an individual in prevention of pollution, disaster management

Social issues and the environment: Unsustainable to sustainable development, urban problems related to energy, water conservation, environmental ethics, climate change, global warming, ozone layer depletion, wasteland reclamation, consumerism and waste products

Environmental protection: Environmental protection act, AIR (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife protection act, Forest conservation act, population growth and human health, human rights

Text Books:

1. Erich Bharucha; *Textbook of Environmental Studies for Undergraduate Courses, Second Edition, UGC Publications.*
2. Mackenzie L. Davis and David A. Cornwell. 2010. *Introduction to Environmental Engineering, 4e. Tata McGraw-Hill Education Private Limited New Delhi.*
3. J. Tyler Jr. Miller and Spoolman, *Environmental Science with Mindtap, 14th Edition, Cengage Learning, 2014.*

Reference Books:

1. Gilbert M. Masters. 2007. *Introduction to Environmental Engineering and Science, 2e. Pearson Education. Dorling Kindersley (India) Pvt. Ltd. Delhi.*
2. J. Glynn Henry and Gary W. Heinke. 2004. *Environmental Science and Engineering, 2e. Pearson Education (Singapore) Pte. Ltd.*

Course Outcomes:

The student will be able to –

1. Recognize renewable and non-renewable resources and associated problems and plan different activities to create awareness among the people and hence to conserve resources by minimizing degradation of environment.
2. Understand different types of ecosystems and their importance in balancing the nature.
3. Understand concept of biodiversity at national and global level and need to preserve it.
4. Understand different types of pollutions and hence to find the remedial measures to minimize ill effects.
5. Recognize various disaster and solid waste management techniques.
6. Understand and appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems

Course Name: Engineering Design and Development 1

Course Code: ES1009

Credits: 4

Teaching Scheme: Theory: 1 Hours / Week

Lab.: 2 Hours / Week

Project Lab: 2 Hours / Week

What is research?

- Innovation, Novelty, Creativity with example. Difference between Innovation, Novelty, Creativity. Videos of great inventions
- **Engineering research:** Meaning with one example (Case study)
- **Types of research:** Fundamental and applied with example and importance of both.

Why to do research?

- Socio-economic development, research impact on society and research impact on economy, explanation with one example for each.

Research components

- Tools, techniques and algorithms and domains in which it is used innovatively

How to arrive at research problem?

- Finding and reviewing the literature, Sources of literature, Types of research papers: Conference, Journals etc.

Conference Paper

- (International and National), what is International conference? Format of International conference: Theme, Invitation, selection process, keynote address, parallel sessions, oral and poster presentation, valedictory, selected papers for journals and explorer, conference proceedings.

Journals

- (International and National), Types of journals, Scopus, peer reviewed, refereed, Transactions and letters, various journal publishers like Elsevier, Springer, Taylor and Francis, ASME etc. Journal formats.
- List of standard professional societies like IEEE, ASME, SAE etc.

Literature review:

- Effective searching of literature, cross referencing, identifying research gaps, organizing the selected papers, Summary of literature review

How to rate a Journal?

- Meaning of impact factor and citation index like h-index.
- What is impact factor? Who gives it and how gives it? Calculation of impact factor
- Example for calculation of impact factor and h-index
- Importance of publication house in selecting a journal.

Research Paper

- Structure of research paper; Title and abstract, Introduction, Method, Evaluation, Conclusion, References, Writing a research paper-Style of writing and formatting

Processing and displaying data

- Charts –Various types of charts through ms-excel format, Types of charts, Error bars, trend line; Figures; Tables, PPT, Preparation of posters.
- **Referencing:** Writing reference to research paper; Use of referencing style and tool; Typical format of references like Books, Book Chapters, Journal Articles, Conference Papers, Technical Reports, Internet Source.
- Process for journal paper review

Intellectual property (IP)

- Introduction to IPR, Overview & Importance, Patents, their definition; Patent search, process of patent application; Copyrights, their definition; granting; searching & filing, Trademarks,

role in commerce, importance, protection, registration; Case studies in IPR, charges for filing patents.

Research Ethics

- Plagiarism, Authorship, Use of language, Protecting confidentiality, Conflicts of interest, Research with humans and animals

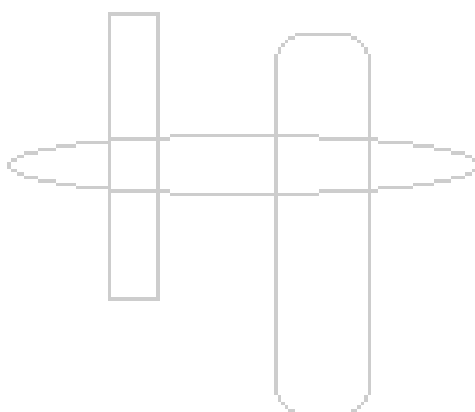
Exercises

- Calculate H-index and impact factor for given journal and given situation
- Finding list of journals in your domain
- Writing Summary of literature review
- PPT based on literature review outcomes
- Project and writing research paper based on the project

Course Outcomes:

The student will be able to –

1. Understand concepts of discovery, invention, innovation, research etc.
2. Know socio-economic impact of research
3. Understand various research tools , its application and methods
4. Understand process paper publication
5. Understand the concept and process IPR
6. Know ethical practices in research



Course Name: Engineering Design and Development 2

Course Code: ES1010

Credits: 4

Teaching Scheme: Theory: 1 Hours / Week

Lab.: 2 Hours / Week

Project Lab : 2 Hours / Week

Section 1: Basics for Projects

(05 Hours)

Importance of Project Centric Learning, *Domain Project Areas:* Awareness and identification of appropriate areas for project work such as: Agriculture, Defense, Healthcare, Smart city, Smart energy, Security Systems, Automobile, Space, Green Earth, Automobiles, Assistive Aid, Water Management, Swachh Bharat (any other socially relevant research area)

Tools: Learn and use latest engineering tools as per the project need such as : Programming (C, C++, Java, Python), Design and Modeling (MATLAB, SCILAB, Lab VIEW, Simulink), VLSI (Xilinx, Modelsim ,)Cadence learn , System Automation (PLC , SCADA), PADS, ORCAD ,Eagle, Kicad, Embedded System (AVR Studio, Arduino ,Kiel uvision), Computer Vision (OPENCV,MATLAB), Circuit Simulation (Pspice, Simulink,Workbench), Wired / Wireless and Ad-hoc Networking (NS-2 , Packet Tracer), Signal Processing (Code Composer Studio) along with Integrated circuits, processor based integrated circuits :Microcontroller, electronic prototype platforms: Arduino, single board computers: Raspberry Pi, AutoCAD,(student version),CATIAV5 student edition, Protieus, Graph 4.4.2, Graphing calculator, Triplot, Origin, (any other suitable tool as per the project requirement)

Technology: Map the appropriate technology:

Artificial Intelligence, Block Chain, Robots, Cloud Computing, Energy Technology, Nanotechnology, Human Computer Interaction, New Touch Interfaces, Quantum Computing, Faster, Better Internet, Internet of Things, Big Data, Immersive Media,3 D Printing, Cyber Security, Collaborative Technology, Geo-Spatial Technology, Wireless Power, Smart Cities, Proximity Technology, Mobile/social Internet Automation, Mobile Technologies, CX, Voice Assistants, Health Technology, Advanced Material, Clean Technology, Edge/Computing, New Screens along with Electronics, Wireless, GPS, , Sensors, Laser, Ultrasonics, automation, Remote sensing, organic electronics, mechatronics, Photovoltaics, Energy harvesting, Energy storage, automobile, remote smart grid, biomedical, waste management, food processing, signal processing, image processing, construction and structural technology, Human Machine Interface (HMI) Technology, Cloud computing, Artificial Intelligence (any other technology as per the project requirement)

Section 2: Methodology

(05 Hours)

Implementation: Selection of the domain area, Literature review, Identify and finalize the Problem Statement (student in consultation with Guide), Understand and select and use the appropriate tools, Map the technologies learned with the project needs (refer available Resources books, soft materials, relevant MOOCs, consult with domain expertise)

Designing & Testing: Designing of project prototype based on domain areas by incorporating appropriate tools and technology, validation and Testing of the prototype to give the best possible solution

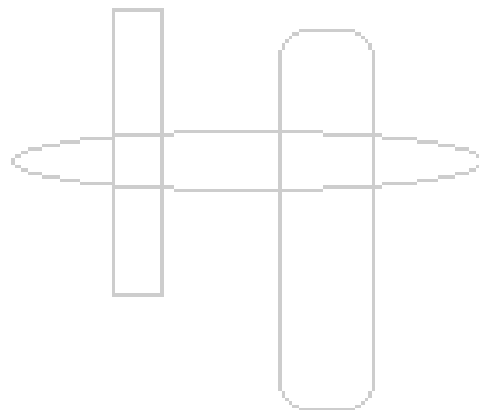
Documentation and Defence: Develop and demonstrate the optimized prototype /working model, Documentation of project report in stipulated format (IEEE Research paper), defence of Mini Project work at final viva voce

Note: *Theory part will be discussed some needful inputs will be provided in 10 Theory sessions and 50 sessions lab+project will be actual Hand's on in absence of Faculty*

Course Outcomes:

The student will be able to –

1. Identify projects relevant societal needs
2. Map the technologies learned with the project needs
3. Apply the technological knowledge to design various feasible solution
4. Select best possible solution to solve a the problem
5. Develop/Fabricate a working model of proposed solution



Course Name: Engineering Mechanics

Course Code: ES1005

Credits: 4

**Teaching Scheme: Theory: 3 Hours / Week
Lab.: 2 Hours / Week**

Section 1:

Basics of Mechanics:

Classification of Mechanics, historical development, Fundamental concepts (Length, mass, time, Force, concentrated force, surface forces, body forces, internal and external force, push and pull force, Action and Reaction, Tension and Compression force, weight, idealization as a particle and rigid body), six fundamental principles of mechanics (Newton's 3 laws of motion, Law of gravitation, Law of Parallelogram, Principle of transmissibility), SI units, prefixes & their conversions, Vector operations, scope of study, Various force systems.

Coplanar Force System: Skew resolution and composition of force, Rectangular resolution and composition of force, resultant of concurrent force system, equilibrium of a particle, free body diagram of particle, Use of Lami's theorem. Moment of force, Principle of moments/Varignon's theorem, couple & its properties, Conversion of force in to force & couple, equivalent force couple system.

Non-coplanar Force System: Rectangular components of a force, co-ordinate direction angles, direction cosines, unit vector, addition of vectors, position vector, Force defined by its magnitude and two points on its line of action, application of dot product, Resultant and equilibrium of concurrent force system, cross product, Moment of force about a point & about an axis, Resultant and equilibrium of parallel force systems.

Equilibrium: Conditions of equilibrium in coplanar and non coplanar force system, types of supports and support reaction, types of loading, Free body diagram, support reactions of determinate beams (simply supported, cantilever, overhang, compound), equilibrium of two force body & equilibrium of three force body, equilibrium of parallel and general forces in plane

Centroid: concept of center of mass, center of gravity & centroid, use of Varignon's theorem of moment, application of standard formulae to find centroid of composite plates and wires.

Moment of Inertia: Concept & its significance, parallel & perpendicular axis theorems, polar moments of inertia, radius of gyration, application of standard formulae to find M.I. of simple and composite areas.

Section 2:

Analysis of Structures:

-Plane truss: Concept of plane and space truss, two force and multi force member, perfect, imperfect, deficient, redundant plane truss, assumptions in analysis of truss, method of joints, zero force member, method of section.

-Frames: Analysis of plane frames

-Friction: concept of friction, Coulomb's laws of dry friction, limiting force of friction, coefficient of friction, angle of friction, angle of repose, cone of friction, variation of frictional force for various conditions (no friction, no motion, impending motion and motion conditions), Wedge friction, problems on dry friction (with no impending motion, impending motion at all points of contact, impending motion at some point of contact).

Kinematics of Particles:

-Rectilinear motion: Definition of motion, types of motion (plane, space, translation, rotation, general plane motion). Concept of position, displacement, distance, speed, average & instantaneous velocity and acceleration, uniform motion, uniformly accelerated motion, constant acceleration equations, gravitational motion & its equations. Variable acceleration: primary and secondary equations of motion, general approach for determination of motion of a particle, Numerical on variable acceleration. Graphical solution of rectilinear motion.

-Curvilinear motion: Concept of position, displacement, distance, speed, average & instantaneous velocity and acceleration, curvature, radius of curvature, point of inflexion. Rectangular coordinate system (x-y), normal and tangential system (n-t), radial and transverse system(r-θ).

Kinetics of particles:

Introduction to kinetics, Newton’s second law of motion, D-Alembert’s principle, dynamic equilibrium, concept of FBDE, application of $F = ma$ in rectangular coordinate system.

-Work energy: concept of work, work done by (externally applied, gravity, friction, spring) force, power, efficiency, derivation of work energy principle and impulse momentum principle, conservative and non conservative forces, principle of conservation of energy.

-Impact: concept of impact, impulse, coefficient of restitution, types of impact (elastic, plastic, elasto-plastic, with fixed surfaces), numerical on direct central impact.

Practical/Activity	
A	Set A : Experiments (4 turns)
1	Verification of: i) Lami’s theorem ii)Varignon’s theorem
2	Equilibrium of concurrent space force system
3	Equilibrium of parallel space force system
4	Reactive forces in (i) simple beam, (ii) compound beam.
B	Set B : Project based Activity (7 turns)
5	Project based Activity:- ANY ONE (from a to i) <i>Student will do exercises related to the subject in a small group (of 3 to 5 students), Student has to complete course project on ideas concern to the subject but not limited to.</i>
a	Making of one working model based on concept or problems / mechanism from any unit along with its validation of results/measurements
b	Modeling of physical system using laws of mechanics/Design new experiment in engineering mechanics
c	Poster presentation and Seminar
d	Preparation of question bank with solutions (Match the pairs).
e	Animation of mechanisms/computer program to solve numerical
f	Development of 60 minutes video lecture on any one topic from syllabus
g	Completion of one MOOC (massive open online course) along with its certification, in engineering mechanics
h	Writing and publishing one research paper in the field of engineering mechanics
i	Development of any one virtual experiment in mechanics of materials

Reference/ Text Books:

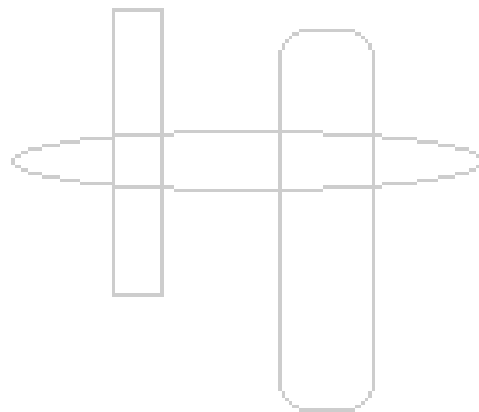
1. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill.
2. R. C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics,
3. Pearson Press.J. L. Meriam, L. G. Kraige; Engineering Mechanics Statics & Dynamics - 5th edition, John Wiley & Sons, Inc. Publication.
4. Bansal R.K.(2010), A Text Book of Engineering Mechanics, Laxmi Publications.
5. Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.
6. S. S. Bhavikatti; Engineering Mechanics; New Age International (P) Limited Publisher.

Course Outcomes:

After successful completion of this course, students will be able to

1. Evaluate resultant, moment of force and apply equilibrium equations to coplanar and non-coplanar force system.
2. Apply equilibrium equations to beams and simple frictionless rigid body assemblies to determine unknowns.
3. Determine centroid and second moment of area of simple and composite lamina.

4. Analyze co-planar systems of forces to determine the forces in members of trusses, frames and assemblies including friction.
5. Analysis of motion of the particle along rectilinear and curved path.
6. Evaluate forces acting on a particle in motion using D-Alembert's, work energy and impulse momentum principles.



Course Name: Chemistry

Course Code: ES1006

Credits: 4

**Teaching Scheme: Theory: 3 Hours / Week
Lab.: 2 Hours / Week**

Section 1:

(20 Hours)

Chemical Kinetics: The rates of chemical reactions- experimental techniques, the rates of reactions. The temperature dependence of reaction rates, basic equations of enzyme kinetics, enzyme inhibition. Numerical on reaction rates and kinetics. Surface Chemistry: Adsorption and Chemisorptions, adsorption isotherms (Langmuir, Freundlich and B.E.T.), Chemisorptions and Catalysis. Numerical problems on isotherms and adsorption. Thermodynamics: First law of thermodynamics, Second law of thermodynamics, entropy, entropy changes of an ideal gas, third law of thermodynamics. Volumetric properties of pure fluids. PVT behavior of pure substances, virial equation of state, the ideal gas, application of virial equations, cubic equation of state. Chemical bonding in molecules: VBT and MO theory, Structure, bonding and energy levels of bonding and shapes of many atom molecules, Coordination Chemistry, Electronic spectra and magnetic properties of complexes with relevance to bio-inorganic chemistry, organometallic chemistry

Section 2:

(20 Hours)

Principles of organic synthesis –: Formation of Aliphatic Carbon-Carbon Bonds: Base Catalyzed Reactions, Formation of Aliphatic Carbon-Carbon Bonds: Acid Catalyzed Reactions, Electrophilic Aromatic Substitution, Nucleophilic Aromatic Substitution, Molecular Rearrangements, Free-Radical Reactions. Classification of organic reactions, Carbanion and free radical generation and their stability order. Formation of Aliphatic Carbon-Nitrogen Bonds, Aromatic Diazonium Salts. Stereochemistry and Heterocyclic compounds: Structure, Reactions and synthesis. Conformational isomerism of monosubstituted cyclohexane, Problems on designation of organic compounds. Synthesis of Naturally Occurring Compounds The Synthesis of Some Naturally Occurring Compounds. Instrumental method of analysis of chemicals. Methods for investigation of mechanism. Spectrophotometric analytical tools study.

List of Practicals:

1. Study of adsorption of acetic acid on activated charcoal from solution.
2. To standardize $\text{Na}_2\text{S}_2\text{O}_3$ solution by preparing $\text{K}_2\text{Cr}_2\text{O}_7$ and to estimate percentage of Cu from brass.
3. To study the effect of concentration of the reactants on the rate of hydrolysis of an ester and study of kinetics of the reaction.
4. Preparation of potassium trioxalato aluminate.
5. Preparation of Tetraamminecoppersulphate.

Organic qualitative analysis - preliminary tests, type, elements, functional group and physical constants-

6. Acids, Phenols.
7. Bases, Neutral.

Organic Estimations-

8. Determination of the amount of glucose in the solution by hypoiodite method.
9. Determination of the amount of acetamide in the solution.

Organic preparations-

10. Oxidation of an organic compound using oxidizing agent- Theory explanation, and analysis of product.

11. Synthesis of p-nitroacetanilide from acetanilide– Theory explanation, and analysis of product.
12. Methyl orange- Theory explanation and analysis of product.

Text Books:

1. *Principles of Physical Chemistry*, B. H. Puri and L.R Sharma.; 7th Edition S. Chand Company, New Delhi, 1994.
2. *Inorganic Chemistry*, D.F Shriver.; P.W Atkins, 3rd Edition, Oxford University Press, 2000.
3. *Instrumental method of analysis*, B.K.Sharma; Goel Publishing House, 1995.
4. *Organic Chemistry*, J.Clayden, N.Greeves, S.Warren, P, Wothers; Oxford University Press.

Reference Books:

1. J.M. Smith, H.C Van Ness, M.M. Abbot;. *Introduction to Chemical Engineering Thermodynamics*, 7th Edition, Tata McGraw Hill, 2005.
2. S.Warren; *Organic Synthesis, The Disconnection Approach*, John Wiley, 2004.
3. P.G.M.Wuts, Greene, T.W.; *Greene's Protective Groups in Organic Synthesis*, 4th edition, Wiley Interscience, 2006.
4. J.M. Coxon, R.O.C.Norman; '*Principles of Organic Synthesis*', 3rd edition Blackie Academic and Professional, 1993.

Course Outcomes:

The student will be able to –

1. Find out the rate of chemical reaction and different kinetic parameters e.g. order or reaction, michaelis menten kinetics and rate constant etc.
2. Get adsorption isotherms and its study e.g. surface area determination and find out the structure and catalytic properties of metals etc.
3. Find out different thermodynamic parameters of chemical reactions e.g. Helmholtz and Gibbs energies, Cp and Cv and get PV diagram of pure substances, calculation and application of virial equation to calculate volumetric parameters.
4. To select the reagents and physical and chemical conditions to carry out the desired reaction.
5. Get the stereo chemical structure and optical activity of organic compounds, synthesis mechanism of heterocyclic compounds and spectrophotocemical behaviour of organic compounds.
6. Find out the effect of solvents on the reaction rate, the product formation and synthesis mechanism of some natural compounds.

Course Name: Applied Physics

Course Code: ES1007

Credits: 4

Teaching Scheme: Theory: 3 Hours / Week
Lab.: 2 Hours / Week

Section 1: Optics

(20 Hours)

Interference: Coherence, Thin film interference, Wedge shaped film, Fringe width, Colours in thin films, Newton's rings, Michelson's interferometer and its applications, General applications: (*Optically flat surface, Antireflection coatings, Interference filters*)

Diffraction: Fresnel and Fraunhofer diffraction, Single slit Fraunhofer diffraction, diffraction grating (*Qualitative*), Dispersive power, Rayleigh's criterion, Resolving power of grating and telescope, X-ray diffraction, Braggs Law, Bragg's Spectrophotometer,

Polarization: Brewster's law, Malus law, Double refraction (*Huygen's theory*), Retarders, Quarter and half wave plate, circular and elliptical polarization, Production and Analysis of PPL, EPL and CPL, Optical Activity, Specific Rotation, Polarimeter, Applications: (*Polaroid goggles, 3D – Movies, Liquid Crystal Display*).

Section 2: Modern Physics

(20 Hours)

Wave Mechanics: Introduction, de-Broglie's hypothesis, Davisson - Germer Experiment, Phase velocity, Group velocity, Heisenberg's uncertainty principle, Single slit electron diffraction, γ – ray microscope, Wave function (ψ), Max Born's interpretation, Physical significance of ψ and ψ^2 , Schrödinger's wave equations, 1 D - Infinite potential well, Finite potential well (*Qualitative*), Tunneling effect: Tunnel Diode, Scanning Tunneling Microscope,

Semiconductors: Quantum numbers, Band Theory of Solids, Energy Bands in C, Si, Ge, Sn, Li, Be, Ohm's Law, Conductivity of Conductor and Semiconductors, Hall Effect, Fermi Level, Fermi-Dirac Function, Fermi Level in Intrinsic (*derivation*) and Extrinsic Semiconductors (*Effect of Temperature and Doping*), Working of p-n Junction Diode on the basis of Energy Band picture, Light Emitting Diode, Photovoltaic Effect, Solar Cell and I-V Characteristics,

Lasers: Stimulated Absorption, Spontaneous and Stimulated Emission, Einstein's coefficients, Population Inversion, Requirements for Laser Action, Properties, Ruby Laser, He-Ne Laser, Semiconductor Diode Laser, Applications: (*Industry : Drilling, Welding etc., Medical: Laser Surgery, Military: Range Detection, Guided Missiles*), Optical Fiber Communication

List of Practical: (Students will perform any Six experiments as per following code of conduct in physics laboratory)

Sr. No.	Name of the Experiment	Mode of Conduct
1.	Determination of wavelength of light / radius of curvature of plano-convex lens using Newton's ring experiment	Any one of two to be performed by students and other for demonstration of working principle.
	Determination of Wavelength of Light using Michelson's Interferometer	
2.	Use of diffraction grating for the determination of wavelength of spectral line and determination of resolution of spectral lines using diffraction grating and spectrometer	
	Polarization by Refraction: Malus Law	
3.	Determination of Brewster's angle for glass surface and refractive index of glass.	
	Demonstration of Lissajous figures using a CRO	

	(Principle of interference) concepts of polarization – Plane, Circular and Elliptical Polarization	
4.	Determination of band gap of a semiconductor. Hall Effect, determination of Hall coefficient.	
5.	Characteristics of solar cell, calculation of fill factor. Study of diode characteristics (PN, Zener, Tunnel, Photodiode, Light Emitting Diode etc.)	
6.	Determination of wavelength and thickness of wire using LASER and determination of beam divergence of LASER. Determination of divergence of LASER beam	Projects will be allotted in groups at the beginning of semester.
7.	Course Project Work	
8.	Course Project Work	
9.	Course Project Work	
10.	Course Project Work	
11.	Course Project Work	
12.	Course Project Work	

In addition to above experiments students must perform the following all experiments in virtual laboratory environment which is developed by Amrita Vishwa Vidyapeetham under the NME ICT initiative of MHRD, Government of India.

Sr. No.	Name of the Experiment	Link
1	<u>Newton's Rings-Wavelength of light</u>	http://vlab.amrita.edu/index.php?sub=1&brch=189&sim=335&cnt=1
2	<u>Newton's Rings-Refractive index of liquid</u>	http://vlab.amrita.edu/index.php?sub=1&brch=189&sim=1520&cnt=1
3	<u>Michelson's Interferometer-Refractive index of glass plate</u>	http://vlab.amrita.edu/?sub=1&brch=189&sim=1519&cnt=1
4	<u>Michelson's Interferometer-Wavelength of laser beam</u>	http://vlab.amrita.edu/?sub=1&brch=189&sim=1106&cnt=1
5	<u>Diffraction Grating</u>	http://vlab.amrita.edu/?sub=1&brch=281&sim=334&cnt=1
6	<u>Brewster's Angle determination</u>	http://vlab.amrita.edu/?sub=1&brch=189&sim=333&cnt=1
7	<u>Emission spectra</u>	http://vlab.amrita.edu/?sub=1&brch=195&sim=359&cnt=1
8	<u>Photoelectric effect</u>	http://vlab.amrita.edu/?sub=1&brch=195&sim=840&cnt=1
9	<u>Determination of Planck's Constant</u>	http://vlab.amrita.edu/?sub=1&brch=195&sim=547&cnt=1
10	<u>Hall effect experiment:- Determination of charge carrier density</u>	http://vlab.amrita.edu/?sub=1&brch=282&sim=879&cnt=1
11	<u>Characteristics of Zener diode</u>	http://vlab.amrita.edu/?sub=1&brch=282&sim=1522&cnt=1
12	<u>Solar Panel Experiment (Remote Trigger)</u>	http://vlab.amrita.edu/?sub=1&brch=195&sim=360&cnt=1
13	<u>Laser beam divergence and spot size</u>	http://vlab.amrita.edu/?sub=1&brch=189&sim=342&cnt=1

List of Course Projects:

1	Investigate Colors in thin films
2	Analyze an Antireflection Coating; a theoretical study
3	Design an antireflection coating
4	Application of Newton’s rings to determine Wavelength of light source
5	Design and study a Newton’s rings setup
6	Determine refractive index of different liquids by using Newton’s rings set up
7	Design Wedge shaped film set up to investigate the optical flatness of a glass material
8	Demonstration and study of diffraction phenomenon using CD as a diffraction Grating
9	Rayleigh's criterion demonstration
10	Resolving power of grating
11	X-ray diffraction
12	Braggs Law
13	Bragg’s Spectrophotometer
14	Study of polarization phenomenon using two polaroids
15	Study of Liquid Crystal Display
16	Study of Polaroid goggles
17	Use of polarization phenomenon in 3-D movies
18	Use of polarization phenomenon in Antennas
19	Photo elasticity
20	Optical Activity
21	Need and importance of Quantum Mechanics
22	Dual nature of light
23	Study of Photoelectric Effect
24	Study of Davisson - Germer Experiment
25	Single slit electron diffraction
26	γ – ray microscope
27	Application of Tunnelling Phenomenon: Study of Tunnel diode
28	Application of Tunnelling Phenomenon: Study of Scanning Tunnelling Microscope
29	Need and importance of Band Theory of Solids
30	Study of Hall Effect
31	Study of pn Junction diode
32	Study of light emitting diode
33	Study of solar cell
34	Study of laser phenomenon: basic requirements in laser set up
35	Study of interaction of light with matter and Einstein’s coefficients
36	Comparative study of different lasers
37	Applications of laser in Industry
38	Applications of laser in Medical field
39	Applications of laser in Military
40	Applications of laser in Optical Fiber Communication

Text Books:

1. M.N. Avadhanalu, P.G. Kshirsagar; *A Textbook of Engineering Physics, Revised Edition 2014*, S. Chand Technical Publishers, New Delhi, Serway and J. W. Jewett,
2. B. K. Pandey and S. Chaturvedi, *Engineering Physics, 1st Edition, Cengage Learning, 2013.*
3. P. K. Palanisamy, *Engineering Physics, 3rd Edition, Scitech Publications, Chennai.*
4. H. K. Malik, A. K. Singh, *Engineering Physics, 2010, Tata McGraw Hill, New Delhi,*

Reference Books:

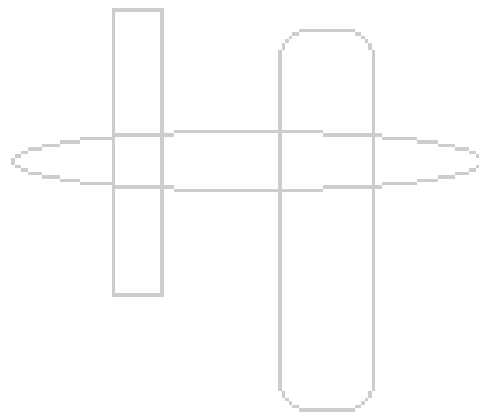
1. *Physics for Scientists and Engineers with Modern Physics, 5th / 6th / 7th Edition 2010,* Thomson / Cengage Learning, New Delhi,

2. *Young and Freedman, University Physics, 10th / 11th / 12th / 13th Edition, Pearson Education*
3. *Resnick and Halliday, Fundamentals of Physics, 8th /9th /10th Edition, John Wiley and Sons.*
4. *A. Beiser, Concepts of Modern Physics, (6th) New 2005, Tata McGraw Hill Pub. Co., New Delhi,*

Course Outcomes:

The student will be able to –

1. Determine, derive, analyze the physical terms from thin film interference and do experiment in lab
2. Obtain, differentiate and appraise different key terms from diffraction and do experiment in lab
3. Justify, calculate and evaluate basic terms from polarization and do experiment in lab
4. Derive, classify, compute, analyze, formulate the fundamental terms from quantum mechanics
5. Derive, draw, compare, evaluate the physical terms in semiconductor physics and do experiments in lab
6. Interpret, distinguish and analyze basic terms and working mechanisms of different lasers and do experiment in lab



Course Name: Behavioral Sciences

Course Code: HS1001

Credits: 4

Teaching Scheme: Theory : 4 Hours / Week

Section 1:

Introduction & The Philosophy of Logic and Reasoning (Nyaya) (6 Hours)

Introduction to “The Six Systems of Indian Philosophy of Ancient India”. The Philosophy of Logic and Reasoning (Nyaya). Sources of Valid Knowledge with their merits and de-merits. Importance of Testimony and the Logic presented to argue for the sake of a creator v/s the argument presented against one. The various objects of knowledge (Prameya)

Dualism (Sankhya) and Analysis of Aspects of Reality (Vaisheshika) (6 Hours)

The Dualistic Model, French Philosopher Rene Descartes and his ideas on Dualism, Indian system of Dualism (Sankhya) : Analogies and Validations presented for the idea of self separate from the body, Reincarnation cases, Consciousness: The mysterious missing link. The three modes of material nature and their effects on consciousness.

Analysis of aspects of Reality (Vaisheshika) : Effect of Illusion on the mind and the goal of the six systems of Indian philosophy.

Self Discipline for Self Realization (Yoga sutra) (4 Hours)

Detailed analysis of the nature of mind and the interaction of the mind and senses. The 8-fold path of Ashtanga Yoga as per Patanjali Yoga sutras and the purpose of the Yoga system.

Psychology :

Introduction

Introduction to Behavioral science and Psychology, Definitions, Goals of Psychology & applications in various fields.

Personality & memory

Definition, factors influencing personality, big five factors, Models of memory, types, forgetting.

Youth Psychology:

Identity, Relationships, Careers.

Section 2 :

The Higher Deliberation (Uttara Mimamsa) (4 Hours)

The Vedantic Model : The various aspects of Absolute Truth, The interaction between material nature (Prkrti) , Self (Jiva) and Absolute Self (Purusha). Comparison of the Vedantic Model with other theistic philosophies. The Bhakti Yoga model as compared to Yoga Sutras of Patanjali.

Elevation through performance of duty (Karma Mimamsa) (4 Hours)

The Universal Law and Order (The web of Karma), Polytheistic model v/s Monotheistic model, Karma Yoga model. Universal utilities and the purpose of ritualism.

Ethics from Indian Epics (4 Hours)

Ethics related to Leadership, Cooperation, Team Spirit, Competitiveness, Wealth and Friendship from Chanakya Niti and Mahabharat.

Social Application of Psychology :

Emotional Intelligence (4 Hours)

Definition, theories: MAYER AND SALOVEY MODEL OF EMOTIONAL INTELLIGENCE & Goleman’s model , gender differences, applications in family setting and in interpersonal skills, Introduction to REBT.

Motivation (6 Hours)

What is motivation, motivational cycle, theories: McClelland & Maslow, Stress: common

sources, Fight and flight response, managing stress, application in Industrial Psychology.

Social Psychology

(6 hours)

Crowd psychology, collective animal behavior, Aggressive behavior: Bobo doll experiment, Prosocial and Antisocial Behaviour, impact of social media on mental health.

Text Books:

1. *Rajiv Malhotra ,Being Different' : An Indian Challenge to Western Universalism, Happer Collins Publishers India. ISBN No : 978-93-5116-050-2*
2. *Suhotra Dasa Tapovanachari,The Six systems of Vedic Philosophy, (Online PDF book)*
3. 'Understanding Psychology' by Robert S. Feldman (10th Edition) by McGraw Hill.
4. 'Psychology' by Saundra Ciccarelli and Glenn Meyer (Pearson)

Reference Books:

1. *Devamrita Swami, Searching for the Vedic India, Bhaktivedanta Book Trust. ISBN 0-89213-350-3*
2. *Patita Pavan , Sri Chanakya Niti: Ancient Sense for Modern Success, ISBN 978-93-82109-25-9. Abhay Ashram Publishing.*
3. *Govinda das, Voice your choice:Ethics from Epics, White Woods Publishing House. ISBN : 978- 93-81-283042*
4. *Hornyanszky, Istvan Tasi. Nature's IQ Balazs Torchlight Publishing ISBN: 978-0-9817273-0-1.*
5. *Introduction to Psychology by Morgan, King, Weisz, Schopler (McGraw Hill)*

Course Outcomes:

The student will be able to –

1. Apply the most appropriate tool of acquiring knowledge for a suitable object of knowledge.
2. Evaluate the purpose of the 8 steps of the Yoga sutras and their consequence on the human mind.
3. Practice ethics in one's personal, professional and family life.
4. Be introduced to the subject matter of Psychology as a science & Understand its various applications.
5. Study the concept of emotions and motivation to be able to apply in various areas of their life.
6. Be introduced to Social Psychology to become an aware and responsible citizen

Course Name: Soft Skills

Course Code: HS1002

Credits: 2

**Teaching Scheme: Theory: 1 Hours / Week
Lab.: 2 Hours / Week**

Section 1:

Introduction to soft skills and writing skills: Goal setting and career planning: dreams and goals; Short term, medium and long term goals. Setting SMART goals, Introduction and meaning of soft skills; difference between soft skills and hard skills, importance of soft skills in corporate world, Concepts of IQ, EQ and SQ, SWOT (activity based explanation), Application, email, Report (Informal) writing.

Professional etiquettes: Etiquettes and manners: meaning and significance, Attitude, organizational ethics, Telephonic etiquettes, table manners, professional etiquettes, hygiene and clothing manners.

Communication skills: Communication skills: Meaning, need, significance and types (written/oral, formal/informal, internal/external etc), Barriers in communication, How to start a communication?, Communication process (Articulation of thought) Concept of KISS(Keep It Short and Simple), Importance of non-verbal communication. Public speaking meaning, do's and don'ts

Section 2

Listening skills: Meaning, difference between listening and hearing, process of listening, Types: active, passive, evaluative, discriminative listening, intuitive, selective, pretence, Barriers in listening. Physical barriers, People related barriers (Physiological barriers, Psychological barriers), Tips for being a good listener

Team building: Team building and leadership, Concept of team: difference between team and group, process of team building, significance and methods to develop team spirit, Characteristics of a leader. Walk the talk.

Time management and Group discussion: Time management (Concept and importance), Techniques and rules and regulations during GD, Do's and don'ts in GD.

Text Books:

1. *Soft Skills by Dr. K Alex. S.Chand and company ltd.*

Course Outcomes:

The student will be able to –

1. Set his / her goals for future and use writing skills for formal documents.
2. demonstrate professional etiquettes in a workplace
3. Apply proper communication skills and hence enable him to be an effective communicator.
4. Become a good listener and perform his / her tasks as per expectations.
5. Lead a team successfully and work as a good team player as well.
6. Apply time management skills and participate in group discussions.

Course Name: Engineering Drawing

Course Code: ES1008

Credits: 1

Teaching Scheme: Lab.: 2 Hours / Week

Section 1:

Introduction to Lines, Lettering and Dimensioning (2 Sessions)

Demonstration of various drawing tools, Learning and using BIS standards of lettering, lines, dimensioning

Orthographic Projections (4 Sessions)

Concept, types and methods of projections with symbols, Projections of various objects, and sectional views

Section 2:

Isometric Drawing (3 Sessions)

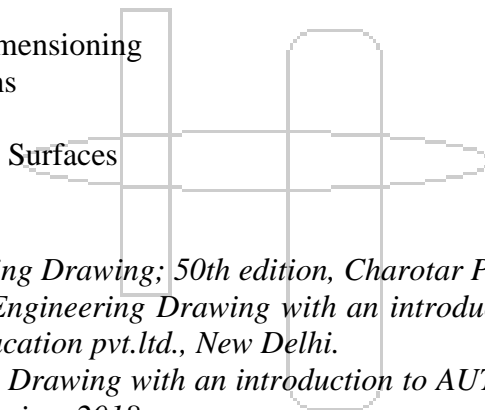
Types of pictorial projections, isometric Projections and Isometric views, Construction of Isometric views from given orthographic views.

Development of Lateral Surfaces (3 Sessions)

Development of Lateral Surfaces of prism and pyramids - concept, methods, applications

List of Practicals:

1. Lines, Lettering and Dimensioning
2. Orthographic Projections
3. Isometric Drawing
4. Development of Lateral Surfaces



Text Books:

1. N. D. Bhatt; *Engineering Drawing; 50th edition, Charotar Publication.*
2. Dhananjai A. Jolhe; *Engineering Drawing with an introduction to AUTOCAD; 5th edition, Tata McGraw Hill education pvt.ltd., New Delhi.*
3. S. N. Lal, *Engineering Drawing with an introduction to AUTOCAD first angle projection, 1st Edition, Cengage Learning, 2018.*
4. C. M. Agrawal, Basant Agrawal; *Engineering Drawing; 2nd edition, Tata McGraw Hill education pvt.ltd., New Delhi.*
5. Sham Tickoo; *CATIA V5-6R2014 for Engineers and Designers; Dreamtech press.*

Reference Books:

1. Warren J. Luzzader ; *Fundamental of Engineering Drawing; Prentice Hall of India, New Delhi.*
2. Venugopal K; *Engineering Drawing and Graphics; New Age Internation Publishers.*
3. K. L. Narayana and P. Kannaiyah; *Text book of Engineering Drawing; Scitech Publications, Chennai.*

Course Outcomes:

The student will be able to –

1. To learn standard practices of lines, lettering and dimensioning in Engineering Drawing.
2. Visualize and draw orthographic projections of 3D objects
3. Visualize the object and draw isometric views from given orthographic projections.
4. To develop lateral surfaces of solids.

Course Name: Aerobics

Course Code: HS1008

Credits: NA

Teaching Scheme: Lab: 02 Hours / Week

Section 1:

Revision of block and beats, introduction of floor exercises, Revision of block and beats, introduction of floor exercises, Introduction of steps

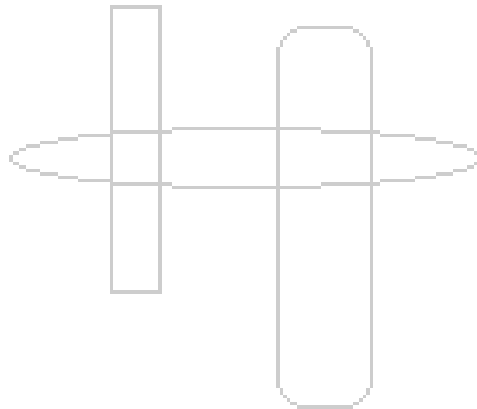
Section 2:

Revision of block, beats, floor exercises, steps, Introduction of choreography, Revision of block, beats, floor exercises, steps, choreography, Introduction of beat caching, Self Choreography

Course Outcomes:

The student will be able to –

1. Demonstrate blocks and beats
2. Demonstrate floor exercise
3. Make their own steps
4. Make their own choreography
5. Coordinate their own steps with songs
6. Self independent of aerobic workout



Course Name: Bharatnatyam

Course Code: HS1009

Credits: NA

Teaching Scheme: Lab: 2 Hours / Week

Section 1:

Basic groups of bharatnatyam ,knowledge about all classical dance style, learning first two groups in three speeds, Getting started with hand gestures or Mudras, demonstrations of use of ‘Hasta Mudras’, saying ‘Taal’ on your hand, Learning 3rd and 4th groups, introduction to ‘Abhinaya’ or 9 ‘emotions’ in dance, demonstration of ‘Abhinay’

Section 2 :

Practical learning of 5th and 6th groups, next level ‘Mudras’ and uses, knowledge about ‘Anarya Abhinaya’ , Performing 3,4,5,6 in 3 speeds, demonstration of saying steps in different Taals, learning 5 ‘Gaatis’ , Small dance drama based on ‘Navaras’ using all adavus learnt before and setting a dance , saying all steps in different ‘Laya’ and ‘Taals’

Reference Books:

1. *“Natyashashtra” Bharat Mano*
2. *“Abhinaydarpana” A.C. Nandikeswara*

Course Outcomes:

The student will be able to –

1. Perform the basic steps of bharatnatyam
2. Demonstrate ‘Mudras’ and their uses in dance.
3. Perform the groups in different speeds.
4. Use the 9 Emotions in dance
5. Set up or choreograph a small dance piece on music
6. Set up a dance drama in groups set to music

Course Name: Chess

Course Code: HS1010

Credits: NA

Teaching Scheme: Lab: 2 Hours / Week

Section 1:

Origin of the game, Setting up the board, How to move pieces,

Notation, Basic Notation, Special Notation(castling, capturing of pieces),

Special Moves, Castling, En-passant, How a game is won, How a game is drawn, Types of draw, Attack, Support, Check, Check-Mate, Stale-Mate, Exchange of pieces, Revision + Remaining Portion,

Three stages- Opening, Middle game, Endgame, Basic rules of development, Types of openings

Section 2:

Basic elementary mates: The Queen mate, The two rooks mate, The one rook mate, Challenging problems, The double bishops mate, The bishop & knight mate

Middle games themes - Pin, Fork, Double Attack, Back Rank, Discovered Attack, Discovered Check, Passed Pawn, under promotion, Smothered Mate, Destroying the defender.

Endgame: King Pawn ending, Rook pawn ending, Selected games of great players, Tournament (Playing Practise)

Course Outcomes:

The student will be able to –

1. Improve concentration, planning, calculations and management skills (management skills includes time management as well as resource management)
2. Calculate at least next 3 to 4 moves at the time of playing a game
3. Solve all types of checkmates (1 Queen, 2 Rooks, 1 Rook, and 2 Bishops)
4. Know all types of themes that are used in chess.
5. Participate in the chess tournament and can score very well.

Course Name: Drawing and Painting

Course Code: HS1011

Credits: NA

Teaching Scheme: Lab: 2 Hours / Week

Section 1:

Elements of Art: Introduction to art media and its applications- different art media- pencils, color pencil, crayons, poster, erasers, acrylic, rendering, and shedding skills

2D and 3D design: Introduction to basic sketching techniques- drawing with different sketching techniques, freehand sketching of objects of day –to - day life

Color theory:Introduction to color painting and color theory- color schemes

Section 2:

Figure drawing: Figure drawing –Human proportion and figure construction, study of bone and muscle structure

Art History: Prehistoric to Renaissance, Renaissance to modern art

Graphics Design: Graphics Design process of visual communication and more of typography, photography and illustration

Text Books:

1. *“Contemporary Indian art other realities”* Yashodhara Dalmia, Marg Publications.
2. *“Contemporary art in India- A perspective”* Pran Nathmago, National book trust India
3. *“Contemporary art in Baroda”* G. M. Shaikh, Tulika books Delhi
4. *“Color Theory”,* J. J. Jagtap, Jagtap Publishing House Pune.
5. *“Visual Art”,* J. J. Jagtap, Jagtap Publishing House Pune.

Course Outcomes:

The student will be able to –

1. Understand fundamental of visual art, colour study, human proportion etc
2. Enable student to enhance their practical skills
3. Facilitate awareness of current trend and movement in the field of visual art
4. To cultivate good communication skills and appreciation of work.
5. Develop leadership competency qualities among follow binges.
6. Provide interdisciplinary approach in visual art.

Course Name: Flute

Course Code: HS1012

Credits: NA

Teaching Scheme: Lab: 2 Hours / Week

Section 1 :

Introduction with Flute & Flute Parts, Basic Finger Movement Exercises, Theory of Swaras & Ragas and Basic Element of Music, Prepare Alankaras & Dhuns, Small lead tunes with finger exercises

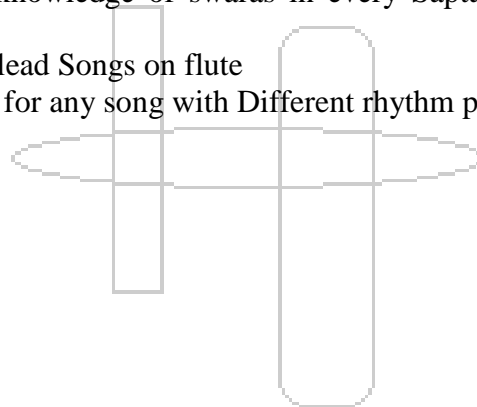
Section 2 :

Introduction of Saptak, Komal and Trivra Swaras, Full length lead Songs, Basic Dhun Patterns and few songs

Course outcome:

After successful completion of course Students will be able to:

1. Knowledge of basic Theory of Flute & Music and Best Finger movements on flute.
2. Knowledge of Swaras & Ragas and also know relationship between them. Able to play Sargams, Dhuns, and songs.
3. Play any lead song with the help of Notation.
4. Able to recognize the knowledge of swaras in every Saptak. (Shudha, Komal and Trivra Swaras)
5. Able to play full length lead Songs on flute
6. Able to accompaniment for any song with Different rhythm patterns.



Course Name: Guitar

Course Code: HS1013

Credits: NA

Teaching Scheme: Lab: 02 Hours / Week

Section 1 :

Introduction of guitar and its parts, basic finger movement exercises, Advance figure movements exercises and small tunes, Introduction of scale and it's positions

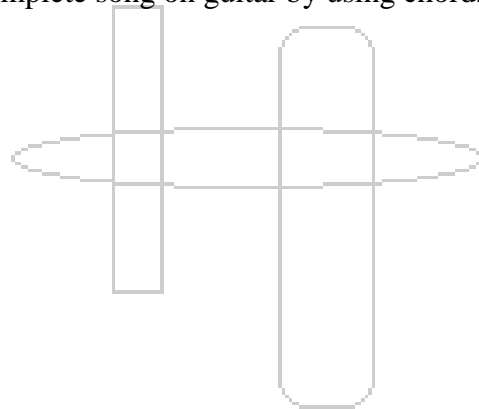
Section 2

Long length songs and introduction of chords, how to construct the chords form scale, Recognize the notes, chords of the song and play notes, chords of the songs by different strumming patterns

Course outcome:

After successful completion of course Students will be able to:

1. Identify different parts of guitar
2. Recognize different scale of music for guitar
3. Play the skills and identify notes and scales for song
4. Demonstrate the chords based on scales
5. Play chords and rhythm pattern on guitar
6. Accompany and play complete song on guitar by using chords and scales



Course Name: Photography

Course Code: HS1014

Credits: NA

Teaching Scheme: Lab: 02 Hours / Week

Section 1:

Introduction and history of Photography: Introduction: Course Syllabus discussion, Overall roadmap, grading criteria

History of Photography: Camera, Black and white film, Colored images, Milestones in photography

Creative Camera modes: Exposure, Automatic Modes, Semi-Automatic Modes and Fully Manual Mode

Basic techniques and knowledge of Compositional aspects: Composition elements, rules, dos and don'ts, Subject placement, Setting up the camera angle to create different meaning and tone of the photograph captured

Section 2:

Aesthetics: Perspective creation and distortion, Theme based photography, Creating intentional blurred images

Digital Knowhow: Introduction to Digital Sensor, Image Sharpness, Histogram, High Dynamic Range (HDR) imaging

Field Assignments: Practicing various techniques to create good photographs based upon the covered tricks and techniques

Course Outcomes:

The student will be able to –

1. Handle digital camera confidently
2. Use different camera modes and also understand the difference between these modes
3. Capture photograph with different composition techniques
4. Put desired aesthetic sense and effects in the created photograph
5. Convey the story through photograph
6. Understand different types of digital cameras and basic digital sensor technology

Course Name: Tabla

Course Code: HS1015

Credits: NA

Teaching Scheme: Lab: 02 Hours / Week

Section 1:

Tabla and Rhythm Introduction, Playing basic tukda, Padhant tukda

Section 2:

Taal Introduction, Padhan Teen Taal, Playing Teen Taal with Padhan

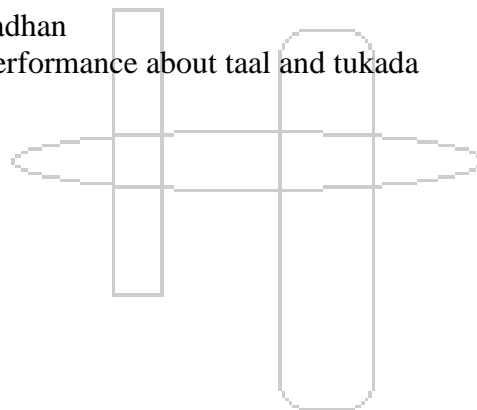
Text Books:

1. *Tabla Guide*

Course Outcomes:

The student will be able to –

1. Identify the various components of Tabla and know the beats
2. Know the language of Tabla
3. Understand how to utter the padhan
4. Know about the taal
5. Know about taal with padhan
6. Know about the basic performance about taal and tukada



Course Name: Taekwondo

Course Code: HS1016

Credits: NA

Teaching Scheme: Lab: 02 Hours / Week

Section 1:

Basic Stance: Introduction of Stances, Type of stance, Use of Stance, etc.

Basic Blocks: Introduction of Blocks, Type of Blocks, Use of Blocks, etc.

Basic Kicks: Introduction of Kicks, Type of Kicks, Use of Kicks, etc.

Section 2:

Combination of Blocks & Kicks : Combination of various Blocks & Kicks together

Taekwondo Sparring: Professional Taekwondo Fight

Self Defense Techniques: Wrist Grab, Shirt Grab, Defense from Punch & Kick, Headlock, Bear Hug from Behind or Front, Two Attackers, etc.

Course Outcomes:

The student will be able to –

1. Demonstrate and identify different basic stances
2. Demonstrate and identify different blocks and to use them
3. Demonstrate and identify different kicks
4. Demonstrate Sparring Stance and variety of kicks and double or even triple kicks can be performed in quick succession.
5. Engage and attempt to best each other in a controlled form of mock combat or fight.
6. Demonstrate certain self defence techniques like wrist grab, headlock etc.

Course Name: Vocal

Course Code: HS1017

Credits: NA

Teaching Scheme: Lab: 02 Hours / Week

Section 1:

Introduction of basic vocal music , Basic knowledge of Swaras, Basic swara Alankar or Sargam.
One song

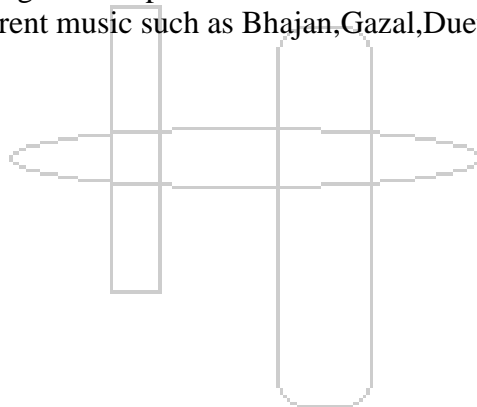
Section 2:

raag yaman and one song based on it, Raag sarang and bhimplas and one song based on them,
Different types of music, difference between classical and light music, bhajan, gazhal, duet
song,etc.

Course Outcomes:

The student will be able to

1. To know what is vocal music
2. Sing basic swaras
3. Sing & knowledge of swaralankar
4. knowledge of Raag Yaman
5. knowledge of Raag Sarang & Bhimpalas
6. Knowledge & sing different music such as Bhajan,Gazal,Duet song etc.



Course Name: Yoga and Pranayam

Course Code: HS1018

Credits: NA

Teaching Scheme: Lab: 02 Hours / Week

Section 1:

Breathing exercises: Various types of “Pranayam” like Bhasrika, Anulom-Vilom, Sooryabhyas, Chandrabhyas, Kapalbhathi, Shwasawarodh, Bhramari

Omkar Sadhana: Breaking down of Omkar into Akar, Ukar and Makar. Chanting of all these. Chanting of the whole Omkar. Mudra Pranayam (6 types), Group Omkar.

Yogasan:Yogasanas in different postures- while lying down on back, while lying down on stomach, while standing up, while sitting down. Correct postures of all Yogasanas and their benefits.

Section 2:

Sooryanamaskar: Correct method of performing the sun salutations and their benefits.

Sooryanamaskar with Pranayam: Correct method of performing the sun salutations coupled with Pranayam and their benefits.

Guided Meditation and Yoganidra: Guided Meditation for positive thinking and Yoganidra for a relaxed body and mind.

Course Outcomes:

The student will be able to –

1. Perform various types of Pranayam like Nadishodhan, Sooryabhyas, Chandrabhyas, Bhasrika, Rapid inhalation and exhalation and various types of Mudra Pranayam.
2. Chant “Omkar” in its root form as well as modified form. Students shall be able to feel the positive vibrations created by correct chanting of “Omkar”.
3. Perform various yogasans in their correct posture form and experience their benefits towards health, body posture and flexibility.
4. Demonstrate scientifically correct Sun Salutations i.e Sooryanamaskars and reap its benefits.
5. Harmonise Sooryanamaskars alongwith Pranayam and energies themselves.
6. Relax their body and mind through guided Meditation and Yoganidra helping thereby to calm down, channelize their energy in the right manner and concentrate better.

Course Name: Film Appreciation

Course Code: HS1019

Credits: NA

Teaching Scheme: Lab: 02 Hours / Week

Section 1:

The Purposes & Development of Art: What is it? Why we create? Prehistoric – Paleolithic art forms, Art in daily lives – Designs for better livelihood, Birth of architecture and sculpture, Rules of Aesthetics in Painting, Architecture and Photography, Basic elements of Art; Colour wheel; Colour Theory; Colour schemes

Precursors, Birth, and Development of Cinema: Story telling through pictures, Magic lantern, Shadow puppets, Birth of Photography, first motion photography and first attempt to film, Narrative based films, Early special effects, Animation and early documentaries, Cinema in twenties and thirties

Technological developments, World Wars, & Modern Cinema: Sound in cinema, Emerging Studio systems around the world and its reparations over cinema, Cinema as political critique of war, Italian Neorealism; depicting Socio-Political-Economical-Cultural situation in Europe, Non-conventional style of Filmmaking, European Art Cinema, French new wave, Cinema around the world

Section 2:

Cinema of India & Genres in Cinema, in Sixties and Seventies: Parallel Cinema movement in India, Genres: Noir, Western, Comedy, Drama, Sci-Fi and Musical, Cinema representing Changing Political Ideologies, Experimentation through Documentaries and non-fiction

Influences & Contemporary Practices: Experimentation in world cinema using other art forms, Non-traditional use of technological and Narrative mediums, Experimentation in Fiction, non-fiction films, Independent cinema; Socio-political and cultural representation through cinema, Influence of Cinema over other audio-visual art forms, Theatre and literature

Changing media: Cinema in 21st century, Changing cinema in digital age; new avenues

Reference Books:

1. James Monaco, '*How to Read a Film: Movies, Media, and Beyond*' (Fourth Edition), Oxford University Press, 2009
2. Robert Sklar, '*An International History of the Medium*' (Second edition), Pearson, 2001
3. Satyajit Ray, '*Our Films Their Films*' Orient Blackswan Private Limited, 2012

Course Outcomes:

The student will be able to –

1. Understand the purpose and development of art in its historical context
2. Understand the development of cinema in its historical context
3. Analyze and interpret framework of cinema
4. Understand the development of language of cinema
5. Have information about the history of cinema
6. Know the experimentation in world cinema and influence of cinema over other art forms

Course Name: Violin

Course Code: HS1020

Credits: NA

Teaching Scheme: Lab: 02 Hours / Week

Section 1:

Introduction of violin, its parts, basic finger movements, Introduction of 4 strings, Introduction of scale and different positions, Introduction of basic sargam on all strings.

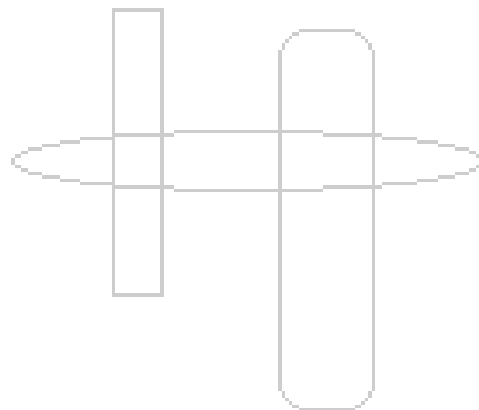
Section 2:

Advance finger movement, Sargam with Tabla, Introduction of raag Bhoop.

Course Outcomes:

The student will be able to –

1. Identify different parts of violin.
2. Identify different scales.
3. Play the sargam.
4. Skillfully manage the bow and fingers simultaneously.
5. Play along with tabla.
6. Perform raag Bhoop with alaap



Course Name: Folk Fitness

Course Code: HS1021

Credits: NA

Teaching Scheme: Lab: 02 Hours / Week

Section 1:

(12 Hours)

1. Various folk dances of India and functional movement
2. Meditation and warm up
3. Upper body
4. Lower body
5. Introduction of folk fitness, folk dances and basics of fitness management detailed description of different folkdances of India
6. Format of folk fitness, meditation and warm up
7. Science of folk fitness – anatomy upper body
8. Science of folk fitness – anatomy lower body

Section 2:

(12 Hours)

1. Cardiovascular and Cool Down
2. Behavioral Skills – Role Play and Routine Practice
3. PARQ, Assessment and Routine Practice
4. Master Class
5. Science of Folk Fitness – Cardiovascular and Cool Down
6. Behavioral Skills
7. PARQ (Physical Activity Readiness Questionnaire) form and assessment, Basics of Business Development
8. Master Class

Course Outcomes:

Learner will be able to,

1. Knowledge and understanding of
2. Human Anatomy
3. Science of Fitness Management
4. Concept of Indian FOLK Culture
5. How to conduct result oriented Group Exercise Routine for Adults.
6. Skills for developing and running a successful business as a Fitness Trainer

Course Name: Volleyball

Course Code: HS1022

Credits: NA

Teaching Scheme: Lab: 02 Hours / Week

Section 1:

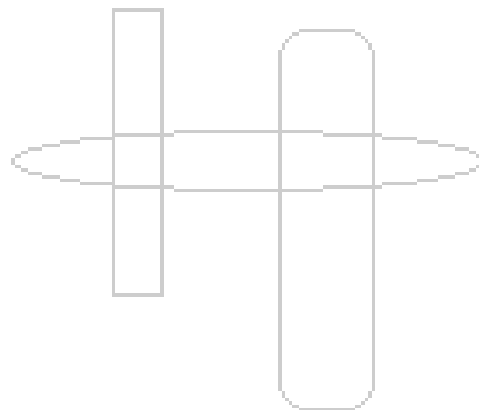
Introduction, History of Volleyball, Physical fitness- Jogging, running, stretching and specific exercises,

Basic fundamental skills of Volleyball, Serving, Underhand Serve, Overhand Serve , Serve Drills (Underhand and Overhand), Passing, Forearm Passing, Overhead Passing, Passing Drills (Forearm and Overhead)

Section 2:

Attacking/ Hitting , Standing Attack, Jumping Attack, Skill Progression Attacking/ Hitting, Blocking

Skill Progression Blocking, Basics of volleyball playing, Volleyball playing (game) rules, Matches, Tournaments, umpiring, etc.



Course Name: Synthesizer

Course Code: HS1023

Credits: NA

Teaching Scheme: 2hours / Week

Section 1:

(12 Hours)

Melodica (Pianica) - Basic

1. Basic Notation signs & Symbols
2. Scales & Chords
3. Lessons (classical Raags & Bollywood songs)

Section 2:

(12 Hours)

Melodica (Pianica) - Advance

1. Melody
2. Harmony
3. Accompany with chords
4. Lessons (Melody tunes and Western Music)

List of Practical :

1. Breathing techniques and expressions
2. Notations Writing
3. To play Melodica (Pianica) all Notations learned in music class.
4. Recognition of the Swara and Raags from the syllabus

Reference Books:

1. Syllabus of GANDHARVA MAHAVIDYALAYA
2. Notes designed for this Syllabus

Course Outcomes:

Learner will be able to,

1. Students will gain adequate knowledge of music
2. Students will be able to play instruments solemnly.
3. Students will be able to give a stage performance
4. Music knowledge will boost their running performance.

**If a people take anything from my music, it should be motivation to know that anything is possible as long as you keep working at it and don't back down*

Course Name: Melodica (Pianica)

Course Code: HS1024

Credits: NA

Teaching Scheme: 2hours / Week

Section 1:

(12 Hours)

Melodica (Pianica) - Basic

1. Basic Notation signs & Symbols
2. Scales & Chords
3. Lessons (classical Raags & Bollywood songs)

Section 2:

(12 Hours)

Melodica (Pianica) - Advance

1. Melody
2. Harmony
3. Accompany with chords
4. Lessons (Melody tunes and Western Music)

List of Practical :

1. Breathing techniques and expressions
2. Notations Writing
3. To play Melodica (Pianica) all Notations learned in music class.
4. Recognition of the Swara and Raags from the syllabus

Reference Books:

1. Syllabus of GANDHARVA MAHAVIDYALAYA
2. Notes designed for this Syllabus

Course Outcomes:

Learner will be able to,

1. Students will gain adequate knowledge of music
2. Students will be able to play instruments solemnly.
3. Students will be able to give a stage performance
4. Music knowledge will boost their running performance.

**If a people take anything from my music, it should be motivation to know that anything is possible as long as you keep working at it and don't back down*

Course Name: Trekking

Course Code: HS1025

Credits: NA

Teaching Scheme: 2hours / Week

Section 1:

(12 Hours)

Trekking - Basic

1. Introduction to Mountaineering,
2. Trekking: Mountain Manners, Trek Planning, Trekking Sites in India
3. Intro to Equipments, Techniques Trekking, First Aid
4. Treak 1: Sinhagad Fort / Lohagad Fort / Purandar Fort / Tikona Fort

Section 2:

(12 Hours)

1. Treak 2 with Jungle cooking
2. Photography and micro wildlife around the region.
3. End the day with campfire / Team building games.

List of Practicals:

1. Treak 1
2. Treak 2

Reference Books:

1. Trek The Sahyadris, Harish Kapadia, 5th Edition, Indus Publishing Company.

Course Outcomes:

Learner will be able to do,

1. organize hiking, trekking, camping, mountaineering and allied open air activities.
2. maintain archives, prepare and provide information and data regarding trekking activities
3. allow students to appreciate their environment and natural surroundings
4. provide opportunities for students to be independent, and exercise self-discipline.
5. develop team spirit and harness leadership skills.

Course Name: Aero Modeling

Course Code: HS1026

Credits: NA

Teaching Scheme: Lab: 02 Hours / Week

Section 1:

(12 Hours)

1. Introduction to Aeromodelling
2. Explore different categories of paper Planes
3. Materials in Aeromodelling “Balsa Wood / HD Form / Depron Foam, Coroplast Sheets / EPP form / Aircraft grade Ply Wood / Carbon and Glass Fiber”
4. Exploring “What Makes Planes Fly?” and Experimenting flying techniques.

Section 2:

(12 Hours)

1. Exploring “ Flight Control Surfaces”
2. Exploring “the Wings & its Importance.”
3. Actual model making “Getting your Hand dirty”
4. Building an airplane that fly, Construction of Chuck Glider from the Pre Cut, Sanding & Smoothing the Wings.

Reference Books:

1. e – books on Aeromodelling.
2. online resources

Course Outcomes:

Learner will be able to,

1. experience and explore the basic principles of flight,
2. use of hands on tools to make their own paper aerofoil, airplane, boom rang that actually fly,
3. logically reason why some airplanes fly better than other on the basis of design,
4. develop team spirit and harness leadership skills by working in team to design airplane that actually fly
5. trained in life to COPE UP WITH FAILURE while repairing damaged flying models

Course Name: Sanskrit Sambhashanam

Course Code: HS1027

Credits: NA

Teaching Scheme: Theory: 2 Hours / Week

Section 1:

Sanskrit as a language. (listening skills), Why Sanskrit? Introduction to Technical aspects, Methods of using Sanskrit as a Knowledge bank, Sentence construction, Usage, Numbers, Varnas, Rules of writing, Complex sentences, Shastra, concept, Why to speak in Sanskrit?, A language to be experienced.(Vibrations, Mantra), Shabda, Dhatu, Nama, Avyaya, Visheshana.

Section 2:

Text, reading and explaining in simple Sanskrit, Paragraph writing, Presentation, Comprehension, Tenses and Moods. (Iakaraha 6), Sandhihi (concept), Samasa (Concept), Pratyayavichar.(concept)

Text Books:

1. Dhaturupachandrika
2. Rachananuvaadakaumudi

Course Outcomes :

The Student will be able to:

1. Understand and experience the importance of Sanskrit in Research and Development.
2. Make small sentences and express themselves in Sanskrit.
3. Can read simple text.
4. Understand some grammatical concepts and use them.
5. Try to read some part of ancient text to choose some project.
6. Know simple Sanskrit, they get confidence for further study.

Course Name: Professional Development 1

Course Code: ES1011

Credits: Audit

Teaching Scheme: Theory: 2 Hours / Week

Section 1: Campus Awareness

- Institute information- Overall orientation, tour to college campus, Guidance to students about future.
- Branch wise Opportunities -Exposure to the department level activities, scope of the department
- Rules, dress code & Ethics-Rules to be followed on college campus, Dress code to be followed by students
- SWOC Analysis- Doing SWOC of organization, a well known personality or friend.
- Importance of mandatory documents. Indian students must possess Aadhar, Passport, Driving License, Voter Id, Credit/ debit card, International students must have valid passport & visa approval, driving license, address proof.
- Life Skills- Appreciating skills like negotiation, time management, positive thinking, recognizing diversity, networking etc. Contribution towards society, social initiatives.
- Effective utilization of winter & summer vacation.

Section2: Self Awareness

- SWOC Analysis-Self Analysis, Doing SWOC for self (Strengths, Weakness', Opportunities, Challenges)
- Career opportunities- Finding the future career opportunities, Guidance by expert, Finding own long term short term and medium term goals.
- Importance of English and foreign languages. Formal mechanisms of Language proficiency certifications like TOFEL, IELTS, PET, JLPT, TestDaF, DSH, TCF etc.
- Career planning, making choices of career - Filling up career choices form.
- Project, Innovation & Research - comparison. Writing SOPs. Importance of peer review & publications, protecting intellectual property - trademark, copyright & patents.

Submissions : Submissions to be accepted as scanned soft copy. Checklist to be prepared as follows

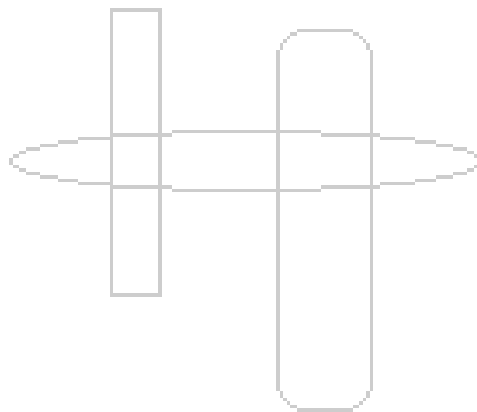
Student Roll No	GRN	Name	Aadhar card / (India & abroad Address proof for international students)	Passport	Driving License	Credit/ debit card	Voter ID	English or foreign language proficiency proof	Aptitude assessment proof (Must)	SOP of one research statement (Must)	Career planning form submission (Must)	SWOC Self - Analysis (Must)	Grade P / NP
			1	2	3	4	5	6	7	8	9	10	*
1	18003	Abode f	Y	Y	Y	N	N	Y	Y	Y	Y	Y	

Note: *More than 7 Y ' s mandatory for Pass grade

Course Outcomes:

The student will be able to –

1. Find opportunities available in his domain
2. Be ready to explore opportunities
3. Analyze strengths, weakness, opportunities and challenges



Course Name: Induction Training

Course Code: HS1028

Credits: Audit

Teaching Scheme: Theory: 2 Hours / Week

Section 1 :

- Physical activity
- Creative Arts
- Universal Human Values
- Literary

Section 2

- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

Text Books:

1. *Erich Bharucha;Textbook of Environmental Studies for Undergraduate Courses, Second Edition, UGC Publications.*
2. *Mackenzie L. Davis and David A. Cornwell.2010. Introduction to Environmental Engineering, 4e. Tata McGraw-Hill Education Private Limited New Delhi.*
3. *J. Tyler Jr. Miller and Spoolman, Environmental Science with Mindtap, 14th Edition, Cengage Learning, 2014.*

Reference Books:

1. *Gilbert M. Masters.2007. Introduction to Environmental Engineering and Science, 2e. Pearson Education. Dorling Kindersley (India) Pvt. Ltd. Delhi.*
2. *J. Glynn Henry and Gary W. Heinke.2004. Environmental Science and Engineering, 2e. Pearson Education (Singapore) Pte. Ltd.*

Course Outcomes:

The student will be able to –

1. Recognize renewable and non-renewable resources and associated problems and plan different activities to create awareness among the people and hence to conserve resources by minimizing degradation of environment.
2. Understand different types of ecosystems and their importance in balancing the nature.
3. Understand concept of biodiversity at national and global level and need to preserve it.
4. Understand different types of pollutions and hence to find the remedial measures to minimize ill effects.
5. Recognize various disaster and solid waste management techniques.
6. Understand and appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems