IPS Academy, Institute of Engineering & Science, Indore

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Bachelor of Technology (B. Tech.)

First Year First Semester, Group-A (Fire Technology & Safety Engineering)

S. No.	Course Type	Course Code	Course Title	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem.	Mid Sem. Exam.	Quiz/ Assign -ment	End Semester	Term work / Lab Work & Sessional		L	T	P	
1	BSC	MA01	Linear Algebra	60	25	15	-	-	100	2	1	-	3
2	BSC	PY01	Optics & Modern Physics	60	25	15	-	-	100	3	-	-	3
3	ESC	ME01	Engineering Graphics & Visualization	60	25	15	-	-	100	2	-	-	2
4	ESC	CE01	Basic Civil Engineering	60	25	15	-	-	100	2	-	-	2
5	ESC	EC01	Basic Electronics Engineering	60	25	15	-	-	100	2	-	-	2
6	ESC	CS01	Programming for Problem Solving	60	25	15	-	-	100	2	-	-	2
7	BSC	PY01(P)	Optics and Modern Physics Lab	-	-	-	60	40	100	-	-	2	1
8	ESC	ME01(P)	Engineering Graphics Lab	-	-	-	60	40	100	-	-	2	1
9	ESC	CE01(P)	Basic Civil Engineering Lab	-	-	-	60	40	100	-	-	2	1
10	ESC	CS01(P)	Programming for Problem Solving Lab	-	-	-	60	40	100	-	-	2	1
11	SBC	EC01(P)	Electronics and Computer Workshop	-	-	-	60	40	100	-	-	2	1
12	HSMC	HS01	Design Thinking	-	-	-	-	100	100	-	-	2	1
			Total	360	150	90	300	300	1200	13	1	12	20

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MA01	Linear Algebra	2L:1T:0P	3 Credits

Course Objective: Mathematics is the basic necessity for the foundation of engineering and technology. The main objective of this course is to teach mathematical methods, develop mathematical skills and increase students thinking power.

Module 1: Matrices **(8 Hrs)**

Definition, Elementary concepts of matrices, Types of matrices: Symmetric, Skew-symmetric and orthogonal matrices, Determinants, Elementary operations, Rank and nullity of a matrix, Echelon form, Normal form.

Module 2: Simultaneous Linear Equations **(8 Hrs)**

Solution of simultaneous linear equation and consistency of equations, Homogeneous and non-homogeneous system of linear equations, Augmented matrices, Elementary transformation methods: Gauss elimination, Gauss-Jordan elimination, Crout's triangularization method, Solution by Cramer's Rule.

Module 3: Eigen values and Eigen vectors **(8 Hrs)**

Definition and properties of Eigen values and Eigen vectors, Cayley-Hemilton theorem, Inverse of matrix by Cayley-Hemilton theorem, Diagonalization of a matrix.

Module 4: Set Theory **(8 Hrs**

Definition of sets, Types of set : Countable and uncountable sets, Power set, Operation on sets: Union, Intersection, Cartesian product, Venn diagrams, Ordered pairs, Relation, Equivalence relations, Function, Partially ordered sets, Supremum & I

Module 5: Vector Space **(8 Hrs)**

Introduction, General properties of vector spaces, Vector subspaces, Algebra of subspaces, Linear combination of vectors, Finite dimensional vector spaces, Linearly dependent and linearly independent vectors, Basis of a vector space.

Course Outcomes :

CO1: Recall and generalize basic concepts of matrices and apply to engineering problems.

CO2: Explain the concept of simultaneous linear equation and apply to engineering problems.

CO3: Explain and apply the basic concepts of eigen values and eigen vectors in engineering problems.

CO4: Explain and apply the fundamentals of set theory in engineering problems.

CO5: Explain and apply the basic concepts of vector space in engineering problems.

Textbooks/References:

1. Narayan & Mittal A textbook of Matrices, S Chand Publiahing , 9 th edition 1997.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2018.
3. Chandrika Prasad & Reena Garg, Advanced Engineering Mathematics, Khanna BookPublishing Co. (P) Ltd., Delhi, 2018.
4. T. Veerarajan, Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2017.
5. B. V. Ramanna, Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 2017.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2020.
7. David Poole, Linear Algebra: A Modern Introduction, 2014.
8. Seymour Lipschutz & Marc Lipson ,Schaum's outlines of Linear Algebra , McGraw-HillEducation (India) Private Limited, New Delhi, 5th edition, 2013.
9. Howard Anton and Chris Rorres ,Elementary Linear Algebra , John Wiley & sons, 10thedition, 2011.
10. S.S. Sastry, Advanced Engineering Mathematics, PHI, 4th Edition, 2009.
11. Serge Lang , Linear Algebra , Springer, 3rd edition, 2004.

PY01	Optics and Modern Physics	3L:0T:0P	3 Credits

Pre-requisites: Mathematics course with integral and differential calculus.

Course Objectives: To impart knowledge in basic concepts of physics relevant to technologicalapplications, and apply laws of physics to real world problems.

Course Content:

Module 1: Quantum Physics **(10 Hrs)**

Basics of units and dimension, Dimensional analysis, Systems of units, Introduction to Quantum mechanics, Dual nature of matter, Compton effect, Properties of wave function, phase and group velocities, Heisenberg's uncertainty principle with its elementary proof and applications, Derive energy and momentum operators, Time dependent and independent Schrodinger equation, Particle in one dimensional box.

Module 2: Wave Optics **(10 Hrs)**

Interference of light, Young's double slit experiment, Newton's rings, Fraunhoffer diffraction from single slit and N-Slit diffraction grating, Concept of Polarization, Brewster's law, Double refraction, Nicol prism, uses of Polaroid.

Module 3: Theory of Semiconductors and Superconductors **(10 Hrs)**

Band theory of solids, density of states, Fermi Dirac distribution function, Fermi level in intrinsic and extrinsic semiconductor, construction and working of Zener diode and Solar Cell, Hall Effect, Introduction to superconductivity, persistent currents, Meissner effect, Type-I and Type-II superconductors

Module 4: Lasers **(10 Hrs)**

Properties of laser beams, Einstein's theory of matter radiation interaction and A and B coefficients, explain conditions to achieve lasing action, basic parts of a laser, different types of lasers, gas laser (He-Ne and CO_2), solid state laser (Ruby, Neodymium), applications of lasers.

Module 5: Fiber Optics **(10 Hrs)**

Introduction to optical fibers, calculation of acceptance angle, acceptance cone, numerical aperture, V-number, No. of Modes and attenuation in optical fibers, explain types of optical fibers, losses in fiber, Fiber optics communication system, applications of optical fibers.

Course Outcomes :

CO1: To **e**xplain fundamentals of units and quantum mechanics, and apply to phase velocity, group velocity, and particle in one dimensional box.

CO2: To analyze the intensity variation of light due to polarization, interference and diffraction, and derive intensity expression in single slit, N-slit diffraction grating.Calculate radius of curvature of lens in using Newton's ring experiment.

CO3: To explain theory of semiconductors and superconductors and apply to Solar cells, Zener diode, Hall Effect and Meissner effect.

CO4: To drive relation between Einstein's A's and B's coefficients, and explain working principle of different types of lasers.

CO5: To state the principle of optical fiber and calculate acceptance angle, numerical aperture,V-number, No. of modes, apply to fiber optic communication system.

Textbooks/ References

1. Gaur and Gupta, Engineering Physics, Dhanpat Rai Publications.
2. H. K. Malik and A. K. Singh, Engineering Physics, Mc Graw Hill Education.
3. Dr. S. L. Gupta and Sanjeev Gupta, Engineering Physics, Dhanpat Rai Publications
4. Navneet Gupta, Engineering Physics, Dhanpat Rai Publications
5. Dr. R. Dogra, Engineering Physics, Katson Books
6. C. Kittel , Introduction to solid state physics, Wiley
7. Beiser, Concepts of Modern Physics, TMH
8. R. P. Goyal, Unified Physics, Shivlal agarwala & Co.
9. K. Thyagarajan, Ajoy Ghatak, Lasers: Fundamentals and Applications, Springer Scienceand Business Media.
10. O. Svelto, Principles of Lasers, Springer.

ME01	Engineering Graphics & Visualization	2L :0T:0P	2 Credits

Pre requisite(s): Nil

Course Objective's:

- To know about Basics of Engineering Drawing.
- To know about different types of projection & to know projection of points, straight lines.
- To know about projection of plane & solids.
- To know section & development of lateral surface of different solids.
- To know about isometric projection. To learn Auto CAD

Course Content:

Module 1: Introduction (10 Hrs)

Need & Classification of Engineering Drawings

Scales: Engineering scale- plain scale, diagonal scale, comparative scale, scale of chord. **Engineering Curves**: Conic sections-ellipse, parabola and hyperbola. Special curve- Cycloid, Involute and spirals.

Module 2: Orthographic Projections (8 Hrs)

Drawing orthographic projections from pictorial projections by using first angle projection method.

Projection of Point: Including points in all four quadrants.

Projection of Lines: Line parallel to reference plane, perpendicular to reference plane, inclinedto one reference plane, inclined to both reference planes, traces of line.

Module 3: Projection of Plane Surfaces (12 Hrs)

Projections of planes parallel to one of the reference planes, Projections of planes inclined to one reference plane and perpendicular to the other & Projectionsof oblique planes.

Projection of Solids: Classification of solid, projections of solids in simple and complex positions of the axis.

Module 4: Section of Solids (10 Hrs)

Sectional views and true shape of the section.

Development of Surfaces: Methods of developments, development of various solids.

Interpenetration of Solids: Interpenetration of geometrical solids (two cylinders**).**

Module 5: Isometric Projections (8 Hrs)

Isometric view, Isometric scale to draw Isometric projection, construction of isometric view from given orthographic views and to construct Isometric view of a Pyramid, Cone, Cylinder & Prism.

Auto CAD: Introduction to Computer Aided Drawings its application & advantages. Commandused in Auto CAD.

Course Outcomes:

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

CO1: Read and write the language of Engineering Graphics to study its basic theory.

CO2: Prepare neat orthographic drawings of points, straight lines, and regular planes and solids.

CO3: Prepare neat drawings of projection of regular planes and solids.

CO4: Understand application of section, development and penetration of solids.

CO5: To be able to plan and prepare neat isometric drawings of regular planes and solids and hands on practice on Auto CAD.

List of Text Book:

1. Bhatt N D, Engineering Drawing, Charoter Publishing House, Anand, Gujrat ,53rd Edition. 2014
2. Agrawal B, and Agrawal C M, Engineering Drawing, Tata McGraw-Hill Publishing Company Limited. 3rd Edition, 2019
3. Dhawan R.K. Engineering Drawing, S. Chand Publication.2012

List of References Book:

1. French T E, Vierck C J, Foster R J, Engineering. Drawing and Graphic Technology Mc Graw-Hill International, Singapore, 4th Ed., McGraw Hill,1984
2. Luzadder W J, Duff J M, Fundamentals of Engineering Drawing, Prentice- HallIndia, New Delhi. Eleventh Edition, 1983.
3. Dhananjay A Jolhe, Engineering drawing, Tata McGraw Hill. 2017
4. Shah M B and Rana B C , Engineering Drawing, Pearson Education, New Delhi.2nd Edition, 2019

CE01	Basic Civil Engineering	2L:0T:0P	2 Credits

Course Objectives: Students will able to understand the basic properties of construction materials and keyconcept of surveying. Course Content:

Module 1: Overview of Civil Engineering (10 Hrs)
Types of infrastructures, Effect of infrastructure facilities on economy and environment, Role of Civil Engineers in the infrastructural Development Introduction to sub-domains of Civil Engineering.

Module 2: Introduction to construction materials & techniques (10 Hrs)
Properties and classification, of common building materials – Stones, Bricks, Sand, Limes, Cement,Mortar, Concrete, Steel.

Module 3: Elements of Building Construction (10 Hrs)
Beam, Column, Slab, Foundations conventional spread footings, RCC footings, brick masonry walls, plastering and pointing, floors, roofs, Doors, windows, lintels, staircases – types and their suitability.

Module 4: Basic Concepts of surveying (10 Hrs)
Linear measurements: Chain and Tape Surveying, Errors, Obstacles, Booking and Plotting, Calculation of Areas.
Angular Measurements: Bearing, Prismatic Compass, Local Attraction, traverse open and closed, plottingof traverse, accuracy and precision**.**

Module 5: Levelling (10 Hrs)
Introduction, definitions, Levelling instruments, classification of levelling, Booking and Reducing Levels& Methods.

Course Outcomes :

CO1: To understand the basic concept of infrastructure and its development in civil engineering

CO2: To gather the basic knowledge of building materials.
CO3: To understand the building components used in civil engineering.
CO4: To develop the knowledge of land survey with the help of traditional and moderntechniques and instrument.
CO5: To analysis the basic concept of leveling and its methods.

References/Books/Codes

1. Ramamrutham, S., and R. Narayan. *Strength of materials*. Dhanpat Rai Pub Company, 2008..

2. Shesha Prakash and Mogaveer; *Elements of Civil Engg & Engg. Mechanics*; PHI, 2012

3. Duggal, S. K. Surveying. Vol. 1. Tata McGraw-Hill Education, 2013..

4. Rangwala S. C. Building Construction Charotar publications House, Anand, 2010

5. Singh, Gurcharan. Building Construction and Materials. Rajsons Publications Pvt. Ltd., 2019.

6. Standard I.(875).(Part 1). "Code of practice for design loads for buildings and structures." (1987).

EC01	Basic Electronics Engineering	2L:0T:0P	2 Credits

Course Objective: This course provides the student with the fundamental skills to understand the basic of electronics components like logic gates, and electronic measurement devices etc. It will build mathematical and numerical background for design of electronic circuits. Students equipped with the knowledge and training provided in the course will be able to participate in design, development and operation in the different area of electronics system.

Module 1: Number Systems (4 Hrs.)

Decimal Number System, Binary Number System, Converting Decimal to Binary, Hexadecimal Number System: Converting Binary to Hexadecimal, Hexadecimal to Binary, Converting Hexadecimal to Decimal, Converting Decimal to Hexadecimal, Octal Numbers: Binary to Octal Conversion. Complement of Binary Numbers.

Module 2: Boolean Algebra & Logic Gates (4Hrs)

Boolean algebra, Logic gates, NOT Gate, AND Gate, OR Gate, XOR Gate, NAND Gate, NOR Gate, X-NOR Gate. NAND and NOR Implementation. De Morgan's theorem, Minimization using K-Map.

Module 3: Selection, Specification & Types of Electronics Equipments (4Hrs.)

Mobile, RAM, ROM, Battery, UPS, Various Chargers, PC & Laptop, E-Vehicles, Printer, Router, Hub, Switch, Keyboard, LED, LCD Monitors, Screen types, Smart Watches, Pacemakers, B.P. Machines, Pulse meter, Temperature guns, Walkie Talkie.

Module 4: Communication Systems (4Hrs.)

Introduction, Elements of Communication Systems, Modulation: Amplitude Modulation, Spectrum Power, AM Detection (Demodulation), Frequency and Phase Modulation, Amplitude and Frequency Modulation: A comparison, Introduction to Digital Communication.

Module 5: Transducers (4 Hrs)

Half wave & Full wave Rectifier, Zener diode, Introduction to Transducers, Working of Transducers, their specifications, types and its applications.

Course Outcomes:

Students earning credits will develop ability to:

CO1: Appreciate the significance of electronics in different applications and understand the applications of number system.

CO2: Compile the different building blocks in digital electronics using logic gates and implement simple logic function using basic universal gates.

CO3: Understand the functioning of different types of Electronics Equipments.

CO4: Understand the functioning of a communication system and different modulation technologies.

CO5: Understand the basic principle and application of different types of Transducers.

Textbooks/References:

1. "Digital Principles and Applications (SIE)", 8th edition, McGraw Hill Education, 2014
2. Singh & Sapre, "Communication Systems", 2nd edition, TMH, 2008.
3. B. P. Lathi, "Modern Analog and Digital Communication Systems", 3rd edition, Oxford University Press, 2007.
4. H.S. Kalsi, "Electronics Instrumentation", 2nd edition, TMH, 2004.
5. Millman & Halkias, "Electronic Devices and Circuits", 4th edition, TMH, 2015.

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CS01(A)	Programming for Problem Solving	2L :0T :0P	2 Credits

Course Objective: To understand the programming concepts and build the logics according to givenproblems.

Course Content:

Module 1: Basics of C programming (11Hrs.)

History of C Language, Applications of C language, A Structure of C program. Data types, The C Character Set, Variables, Keywords, Constants, C Instructions, ,Operators, Precedence and Associativity of Operators, Storage Classes in C ,Introduction to Input/Output, Control statements and Jump Statements.

Module 2: Functions and Arrays (10 Hrs.)

Introduction to Functions, Function Declaration and definition, Function with Arguments, Function with Returning Values, Recursion. Arrays: Declaring and Initializing, 1- D array, MultiDimensional Arrays.

Module 3: Pointers and String (12 Hrs.)

Pointers, Pointer variables, Pointer operators ,Pointer Expressions ,Pointer and arrays, Call by Value and Call by Reference, Passing Array to Functions, Passing strings to functions, Array of pointers, Pointer to an array, Pointers to Functions and its uses, dynamic memory allocation. Strings: Declaring and Initializing Strings, Operations on Strings, Array of Strings.

Module 4: Aggregate Data Types (8Hrs.)

Structures-Declaring and Initializing, Passing Structures to functions, Array of Structure, Array within Structures, pointers and structures, ,Uses of Structures. Unions, enum.

Module 5: Files, Preprocessor Directives and Advance Topics (9 Hrs.)

Files - File modes, File functions, and File operations, Text and Binary files, Command Line arguments. C Preprocessor directives, Creating and implementing user defined header files.

Course Outcome:

CO1: Recognize programming concepts.
CO2: To decompose a problem into functions and Using Array.
CO3: Use pointers and memory allocation to write C programs.
CO4: Implement Structures and Unions for data organization.
CO5: Use files to perform read and write operations..

Textbooks / References:

1. Kerninghan & Ritchie "The C programming language" 2nd Ed., PHI,
2. Schildt "C: The Complete reference" 4th Ed. TMH.
3. Kanetkar Y. "Let us C", BPB Publications, 2004
4. Kanetkar Y.: "Pointers in C" , BPB Publications, 2007
5. Stephen Parata "C Primer Plus" 5th Ed., Sams, 2004
6. Paul Deitel and Harvey Deitel "C How to Program ", 6th Ed., Pearson, 2010

PY01(P)	**Optics and Modern Physics Lab**	**0L:0T:2P**	**1 Credits**

List of Experiment

1. To determine wavelength of given laser light source.
2. To determine the radius of curvature of given plano convex lens with the help of a plane Newton's ring experiment.
3. To determine the wavelength of main spectral lines of given mercury light with help of a transmission grating.
4. To determine refractive index and dispersive power of the material of given prism using spectrometer.
5. To plot forward and reverse characteristics curve of P-N junction diode.
6. To determine the divergence of He-Ne Laser.
7. To find numerical aperture of a given optic fibre and hence to find its acceptance angle.
8. To verify Brewster's law using polarizer.
9. To determine the Hall voltage and charge carrier density, in semiconductor using Hall effect experiment.
10. To plot forward and reverse characteristics curve of Zener diode.

Course Outcomes :

CO1: To **e**xplain fundamentals of units and quantum mechanics, and apply to phase velocity, group velocity, and particle in one dimensional box.

CO2: To analyze the intensity variation of light due to polarization, interference and diffraction, and derive intensity expression in single slit, N-slit diffraction grating. Calculate radius of curvature of lens in using Newton's ring experiment.

CO3: To explain theory of semiconductors and superconductors and apply to Solar cells, Zener diode, Hall Effect and Meissner effect.

CO4: To drive relation between Einstein's A's and B's coefficients, and explain workingprinciple of different types of lasers.

CO5: To state the principle of optical fiber and calculate acceptance angle, numerical aperture,V-number, No. of modes, apply to fiber optic communication system.

ME01(P)	**Engineering Graphics & Visualization Lab**	**0L:0T:2P**	**1 Credit**

List of Practical:

Students must prepare sketch book and drawing sheets on the following topics.

1.Plane scale and diagonal scale

2.Engineering curves

3.Projection of line

4.Projection of plane

5.Projection of solid

6.Section of solid

7.Development of surfaces

8.Intersection of solids.

9.Orthographic projection

10. Isometric projection

Course Outcomes:

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

CO1: Prepare neat drawings of scale & Curve and understand the use of scale.

CO2: Understand application of orthographic drawings and prepare drawing of points, straightlines.

CO3: Prepare neat drawings of projection of regular planes and solids.

CO4: Understand application of section, development and penetration of solids.

CO5: Prepare neat isometric drawings of regular planes and solids and hands on practice onAuto CAD.

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CE01(P)	Basic Civil Engineering Lab	0L:0T:2P	1Credit

List of Experiment:

1. To determine the Accuracy of Dimensions of Bricks.
2. To determine the Compressive Strength of Bricks.
3. To determine the Consistency of Cement Sample.
4. To perform chain survey and located offsets.
5. To determine bearings of lines of given quadrilateral.

Course Outcomes :

CO1: To understand the basic concept and qualities of building materials.

CO2: To gather the basic knowledge of building materials.

CO3: To understand the building test used in civil engineering.

CO4: To develop the knowledge of land survey with the help of traditional and moderntechniques and instrument.

CO5: To analysis the basic concept of leveling and its methods through various instruments.

References/Books/Codes

1. Rangwala S. C. Building Construction Charotar publications House, Anand, 2010

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CS01(A)(P)	Programming for Problem Solving Lab	0L : 0T : 2P	1 Credit

List of Experiments:

Write a C program:

1. To display "Hello Computer" on the screen.
2. To display Your Name, Address and City in different lines.
3. To print the multiply value of two accepted numbers.
4. To convert centigrade into Fahrenheit. Formula: C= (F-32)/1.8.
5. For calculator designing using switch /case loop?
6. To find the area and volume of sphere. Formulas are: Area = 4*PI*R*R, Volume =4/3*PI*R*R*R.
7. To read in a three digit number produce following output (assuming that the input is 347) 3 hundreds 4 tens 7 units
8. To find the maximum from given three nos.
9. To find that the accepted no is Negative, Positive or Zero.
10. To find the sum of first 100 natural nos.
11. To display first 100 prime numbers
12. To find factorial of accepted numbers.
13. To find the sum of digits of accepted no
14. To find out whether the character presses through the keyboard is a digit or not (usingconditional operator).
15. To find minimum, maximum, sum and average of the given one dimensional array.
16. To swap variable values of i and j.
17. Function for the following task

Find value of a given Fibonacci term

Swapping the values of two variable Minimum/maximum value from the given input

18. To add two numbers using pointers
19. To create a file and write contents, save and close the file.
20. To read file contents and display on console.

Course Outcome:

1. Use basic computer concepts to write a C program.
2. Recognize programming concepts.
3. Use Operators, Expressions and Control Structures.
4. To Decompose a problem into functions and Using Array.
5. Use Strings and Pointers to write C programs.

Textbooks / References:

1. Kerninghan & Ritchie "The C programming language" 2nd Ed., PHI,

EC01(P)	Electronics and Computer Workshop	0L:0T:2P	1 Credit

Course Objective: The course objectives are to identify different electronic components, devices, making circuit on bread board and PCB using simple ICs and components and testing, to assemble Desktop and creating a LAN network for PCs.

(PartA) Electronics

Module 1: **(4 Hrs.)**

Identification of various electrical passive components such as R, C, L, transformers, relays, switches, bread board, universal printed circuit board. Series and parallel connection of the resistances and its implementation on breadboard. General Electrical wiring & Specifications, Phase, Neutral, earthing, ground, wire color code, 2 Plug/3plug pin connection, switches, socket, MCB, regulator connection, 2 way switch connections, serial and parallel connections, precautions related to electrical equipments.

Module 2: **(4 Hrs.)**

Exposure to usual electronic equipment/instruments such as Multi-meter, digital clamp meter, Oscilloscope; CRO, DSO, Function generator, IC tester and Power supply, Information about their front panels, Demonstrations on their working, Hands-on for measurement of componentvalues and DC voltage using multi- meter.

Module 3: **(4 Hrs.)**

Circuit building practice on standard breadboard using digital ICs like Op-amp (IC 741), IC555 etc., acquaintance with ratings, specifications using data-sheets. Electronic circuit design in a team of 3-4 students, designing of single sided PCB, PCB fabrication process, component mounting and soldering.

(Part B) Computer

Module 1: **(4 Hrs.)**

Name and identify various PC hardware components: USB Mouse, PS/2 Mouse, Keyboard, LCD/LED Monitor, VGA, HDMI, CAT5, CAT6, fiber cable, Hard disk (HDD, SSD), RAM, CMOS battery, Laptop/Mobile Battery, SMPS, cache, ROM, BIOS

Module 2: **(4 Hrs.)**

Introduction to various important software: Windows, Ubuntu, Microsoft Office; Firefox, Google Chrome, Edge; Understand the broad structure and functioning of the Internet; General introduction to Website and web server, malware, virus. Understand basic networking commands, applications and services: SSH, TELNET, FTP, ping, http, https, and various search services (google, startpage, aggregator search services).

Module 3: **(4 Hrs.)**

Assemble a Desktop PC from its components, Installation of Windows, display settings,

Introduction to: LAN, DNS, Proxy, Router, Hub, Switch, Server, Client, LAN Network creation, enabling and disabling of firewall. General Specification of electronics equipments.

Module 4: **(4 Hrs.)**

Information and Communications Technology (ICT): Online Teaching and Learning platform; MS team, Google Meet, Zoom, Webex their applications, Video from ppt, MOOC platform: NPTEL, EDX, Coursera, Swayam, etc.

Example of projects:

- Designing of power supply for 9/5 V.
- IC 555 based timer and square wave generator
- OP-amp IC 741 based analog computer(adder/subtractor/integrator/differentiator)
- PC Assembling and dissembling.
- Installation of operating system.
- Establishment of LAN.

Course Outcomes:

Students earning credits will develop ability to:

CO1: Identify various electronic components and use of electronic devices and instruments.

CO2: Design and test simple electronic circuit on PCB.

CO3: Know hardware components of computer systems, various software and hardware terms and their uses.

CO4: Learn the setup of a working desktop and creating a LAN network for PCs.

CO5: Learn about ICT enable tools for Teaching and Learning.

Textbooks/References:

1.S. Salivahanan and N. Suresh Kumar, Electronic Devices and Circuits: second edition, Tata McGraw Hills, 2011.

2.Behrouz A. Forouzan, data Communications and Networking (SIE) | 4th Edition, McGraw HillEducation.

3.www.mooc.org.

4.https://en.wikipedia.org/wiki/List_of_MOOC_providers.

5.https://teambuilding.com/blog/virtual-meeting-platforms.

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HS01	Design Thinking	0L:0T:02P	1 Credit

Pre requisite(s): Nil
Course Objectives: The objectives of this course are to

1. To impart knowledge on design thinking process for understanding complex designs.
2. To analyze design thinking issues and apply the tools and techniques of design.
3. To inculcate attitude to solve societal problems using design thinking tools.

Module 1 : Introduction to Design Thinking
Design Thinking Process: Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking.

Module 2: Design Thinking Methodology
The 5 Stages of the Design Thinking Process- Empathise, Define (the problem), Ideate, Prototype, and Test.

Module 3: Ideation & Empathize
Ideation tools & exercises, Sample Design Challenge, Introduction to the Design Challenge Themes Empathize-Understand customers, Empathy Maps, Empathise-Step into customers shoes Customer Journey Maps.

Module 4: Prototyping
What is a prototype, Prototyping as a mindset, prototype examples, prototyping for products;

Module 5: Testing Prototypes
Prototyping for digital products: What's unique for digital products, Preparation; Prototyping for physical products: What's unique for physical products, Preparation; Testing prototypes with users.

Course Outcomes: After completion of the course the student will be able to
CO1: Analyze design thinking concepts and principles.
CO2: Understand design thinking methodology.
CO3: Create empathy maps to visualize user attitudes and behavior for gaining insights of customers.
CO4: Build prototypes for complex problems using gathered user requirements.
CO5: Teat prototypes for complex problems and gathered information.

Text Books:
1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "Introduction to Design Thinking",Tata Mc Graw Hill, First Edition,2019.

2. Kathryn McElroy, "Prototyping for Designers: Developing the best Digital and Physical Products", O'Reilly,2017.

Reference Books:

1. Michael G. Luchs, Scott Swan , Abbie Griffin,"Design Thinking – New Product Essentials from PDMA", Wiley, 2015.

2. Vijay Kumar, "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization", 2012.