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(CSE,CSE-DS,RC,CE,FT)

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
13	LLC	LLC01	Liberal Learning Course-I	-	-	-	-	100	100	-	-	2	1
			Total	**360**	**150**	**90**	**300**	**400**	**1300**	**13**	**1**	**14**	**21**

BSC-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: 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. **(8 Hrs)**

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

Module-3 Eigen values and Eigen vectors: Definition and properties of Eigen values and Eigen vectors, Cayley-Hemilton theorem, Inverse of matrix by Cayley-Hemilton theorem, Diagonalization of a matrix. **(8 Hrs)**

Module-4 Set Theory: 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 & Infimum.

(8 Hrs)

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

Textbooks/References:

1. Narayan & Mittal, A Textbook of Matrices, S. Chand Publishing, 9th Edition, 1997.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2018.
3. Chandrika Prasad & Reena Garg, Advanced Engineering Mathematics, Khanna Book Publishing 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-Hill Education (India) Private Limited, New Delhi, 5th edition, 2013.
9. Howard Anton and Chris Rorres ,Elementary Linear Algebra , John Wiley & sons, 10th edition, 2011.
10. S.S. Sastry, Advanced Engineering Mathematics, PHI, 4th Edition, 2009.
11. Serge Lang , Linear Algebra , Springer, 3rd edition, 2004

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BSC-102	Optics and Modern Physics	3L:0T:0P (3 Hrs)	3 Credits

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

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

Course Content:
Module I: Quantum Physics (10 Hours)
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 II: Wave Optics (10 Hours)
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 III: Theory of Semiconductors and Superconductors (10 Hours)
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 IV: Lasers (10 Hours)
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 V: (a) Fiber Optics (5 Hours)
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, and applications of optical fibers.
(b) Nuclear Physics ((5 Hours)
Basic properties of nuclear physics, The liquid drop model, Linear Accelerator (LINAC), Cyclotron,

Course Outcomes:

CO1: To explain 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, Understanding basic properties of nucleus and applies to LINIAC and cyclotron accelerators.

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 Science and Business Media.
10. O. Svelto, Principles of Lasers, Springer
11. Cohen, Nuclear physics, Mc Graw Hill Publications
12. Shatendra K. Sharma, Atomic and Nuclear Physics, Pearson
13. Ajay Ghatak and K. Thyagrajan, Introduction To Fiber Optics, Cambridge University Press (1 January 2017)

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Mechanical Engineering Department
B. Tech

ESC-ME 01	**Engineering Graphics & Visualization**	**2L : 0T (2 Hrs)**	**Credits: 02**

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 **(10 hrs)**

Introduction: Need & Classification of Engineering Drawings, Types of Engineering drawing.
Scales: Engineering scale- plain scale, diagonal scale, comparative scale, scale of chord.
Engineering Curves: Conic Curves, Cycloidal Curves, Special curve- Involute and spirals

Module2 **(08 hrs)**

Orthographic Projections: First angle and Third angle projection method, 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, inclined to one reference plane, inclined to both reference planes, traces of line.

Module3 **(12 hrs)**

Projection of Plane Surfaces: Projections of planes parallel to one of the reference planes, Projections of planes inclined to one reference plane and perpendicular to the other & Projections of oblique planes.
Projection of Solids: Classification of solid, Projections of Regular Solids covering, those inclined to both the Planes.

Module 4 **(10 hrs)**

Section of Solids: Sections, Sectional Views and true shape of Solids covering, Prism, Cylinder, Pyramid and Cone.
Development of Surfaces: Methods of developments, Development of lateral surfaces of Solids - Prism, Pyramid, Cylinder and Cone.

Module 5 **(08 hrs)**

Isometric Projections:
Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of Planes, Simple and compound Solids, Conversion of Isometric Views to Orthographic Views and Vice-versa.
Interpenetration of Solids: Principle and uses of Interpenetration of Solids, Interpenetration of geometrical solids.

Auto CAD: Introduction to Computer Aided Drawings its application & advantages. Command used in Auto CAD. Demonstrating knowledge of the theory of CAD software.

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Course Outcomes:

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

1. Illustrate about basics of dimensioning ,Lettering& representation of lines, different types of lines & use of different types of pencils in an Engineering Drawing
2. Make use of orthographic drawings of points, straight lines, and regular planes and solids.
3. Explain the projection of regular planes and solids.
4. Explain the section, development and penetration of solids & its application.
5. Make use of isometric projection & Auto CAD

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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- Hall India, 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).

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ESC-EC01	Basic Electronics	2L:0T:0P (22 Hrs)	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 I: (4 hrs.)

Number Systems:

Decimal, Binary, Hexadecimal, Octal Numbers: Conversion of Numbers to another number system, Complement of Binary Numbers, Codes: ASCII, EBCDIC, Internal Codes, Gray Code, BCD, Excess-3 code. Logic gates and binary operations.

Module II: (5 hrs.)

Boolean Algebra & Logic Gates:

Boolean algebra, Implementations of Logic Functions using gates, NAND and NOR Implementation. De Morgan's theorem, Principle of Duality, Canonical and standard forms, Minimization of Boolean functions, Sum of Products (SOP), Product of Sums (POS), Karnaugh map Minimization and its applications.

Module III: (5 hrs.)

Basic Electronics Component

Review of Diodes, Characteristics of Diode, Zener diode, Rectifiers: Half-wave Rectifier, Full-wave and Bridge Rectifier, Transistors (BJT), working principle, characteristics, Transistor as an amplifier, Introduction of JFET, MOSFET, CMOS logic, Basic Logic Gates using CMOS.

Module IV: (4 hrs.)

Communication Systems:

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

Module V: (4 hrs.)

Selection, Specification & Types of Electronics Equipments:

Mobile, Battery, UPS, Various Chargers, PC & Laptop, E-Vehicles, Printer, Smart Watches, Pacemakers, B.P. Machines, Pulse meter, Temperature guns, Walkie Talkie.

Course Outcomes:

Students earning credits will develop ability to:

1. Appreciate the significance of electronics in different applications and understand the applications of number system and Logic Gates.
2. Illustrate basic postulates of Boolean algebra. To design Boolean functions by applying the methods for simplifying Boolean expressions.
3. Understand the basic principle and application of Basic Electronics component.
4. Understand the functioning of a communication system and different modulation technologies.
5. Understand the functioning of different types of Electronics Equipments.

Textbooks/References:

1. Leach, Malvino, Saha, "Digital Principles and Applications (SIE)", 8th edition, McGraw Hill Education, 2014.
2. Dr. R S Sedha, Textbook of Applied Electronics, S. Chand Publishing, 2008,
3. S. Salivahanan, S. Arivazhagan Digital Circuits and Design, Oxford University Press.
4. Principles of Electronics [LPSPE] By VK Mehta | Rohit Mehta
5. M. Morris Mano, "Digital Logic and Computer Design", 1st edition, Pearson India Education, 2012.
6. Singh & Sapre, "Communication Systems", 2nd edition, TMH, 2008.
7. B. P. Lathi, "Modern Analog and Digital Communication Systems", 3rd edition, Oxford University Press, 2007.
8. H.S. Kalsi, "Electronics Instrumentation", 2nd edition, TMH, 2004.

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DepartmentofComputerScienceandEngineering

ESC-CS01	Programming for Problem Solving	2L :0T :0P(2hrs.)	2 Credits

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

Course Content:

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

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, Multi-Dimensional 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 (8 hrs.)

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:

1. Understand the fundamentalprogramming concepts of C language.
2. Implement c programs using functions and arrays.
3. Implementuser defined data types like Pointer and Strings.
4. Demonstrate the ability to write C programs using structures, unions and Enum.
5. Understand the basics of file handling mechanism.

Textbooks / References:

1. Kerninghanand 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

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LC-BSC-102	**Optics and Modern Physics**	**0L:0T:1P (2 Hrs)**	**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 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.

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Mechanical Engineering Department

B. Tech

ESC ME 01(P)	**Engineering Graphics Lab**	**2P (2 Hrs)**	**Credits: 01**

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:

1. Construct neat drawings of scale & Curve and understand the use of scale.
2. Construct orthographic drawings and prepare drawing of points, straight lines.
3. Construct neat drawings of projection of regular planes and solids.
4. Construct drawing of section, development and penetration of solids.
5. Construct neat isometric drawings of regular planes and solids and hands on practice on Auto 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

ESC-CS01(P)	Programming for Problem Solving	0L :0T :2P(2hrs.)	1 Credit

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

Course Content:

Input/Output, Control statements and Jump Statements.

Function Declaration and definition, Function with Arguments, Function with Returning Values, Recursion. Arrays: Declaring and Initializing, 1- D array, Multi-Dimensional Arrays.

Pointer, Pointer to an array, 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, Dynamic memory allocation. Declaring and Initializing Strings, Operations on Strings, Array of Strings.

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

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:

1. Implement the fundamental programming concepts of C language.
2. Implement C programs using functions and arrays.
3. Implement C programs using Pointer and Strings.
4. Demonstrate the ability to write C programs using structures, unions and Enum.
5. Implement the basics of file handling mechanism.

List of Experiments:

1. Write a C program to calculate the grade of the student according to the specified marks using if-else statement. (CO1)
2. Write a C program to print table for the given number using while, do while and for loop (CO1)
3. Write a C program to make a quiz (MCQ) using switch case statement. (CO1)
4. Write a C program to implement break, goto and continue. (CO1)
5. Write a C program to print the right half Pyramid. (CO1)
6. Write a C program to perform basic athematic operation (addition, subtraction, multiplication, division and average). (CO2)
7. Write a C program to swap the values of the two variables by using Call by value and Call by reference. (CO2)
8. Write a C program to print Fibonacci Series up to n terms. (CO2)
9. Write a C program to find the average of n numbers using arrays. (CO2)
10. Write a C program to find the sum of two matrices of order 2*2. (CO2)
11. Write a C program to implement Array of pointers. (CO3)
12. Write a C program to implement Pointer to an array. (CO3)
13. Write a C program to implement Pointers to Functions. (CO3)
14. Write a C program to implement any 5 string functions. (CO3)
15. Write a C program to implement dynamic memory allocation functions (malloc(), calloc(), realloc(), free()). (CO3)
16. Write a C program to stores information of 5 employees and prints it using 'array of structures'. (CO4)
17. Write a C program to demonstrate the use of Enum. (CO4)
18. Write a C program to access members of union using pointers. (CO4)
19. Write a C program to create a file and write contents, save and close the file. (CO5)
20. Write a C program to read file contents and display on console. (CO5)
21. Write a C program to use command line arguments. (CO5)

CONTENTS

Electronics & Computer Workshop
(SBC EC01(P))

List of Experiments

IPS Academy, Institute of Engineering & Science

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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.

LLC01	**Liberal Learning Course-I**	**0L:0T:2P**	**1 Credit**

Field work: 08 Hrs; Other than field work: 16 Hrs

Course Objective: To instill interest and concern among the students about the dynamics of ruralsociety, to develop community based learning, help the students to identify and respond to community needs, Give insights of broader social issues and its impact on rural communities, inculcate value and multiple perspectives of problem solving and foster students' intellectual capabilities. Apply critical thinking skills in problem solving with social work values and ethics, ondiverse human issues for rural solution engineering.

Content:

1. Studying the community set up in detail and developing an in-depth understanding of the field and reporting their study in the form of special report.
2. Practicing social case works with a minimum of 2 individuals; identify the problem, study, assess and develop intervention strategies for all the cases and execute the plan of intervention.
3. Working with the community by involving them on one or two issues/problems by confronting the concerned community.
4. Making a minor research study on any specific problem and submitting the report as part offield work.
5. Taking part in the programmes, seminars, workshops, etc. related to community work for theenrichment of knowledge. (With the prior permission of the Faculty supervisor).

Methodology of Field Work

The following are some important modes of learning in field work:

1. Observation
2. Informal interactions with community
3. Participatory Rural Appraisal and Participatory Learning Appraisal Methods
4. Case Discussions/Conferences
5. Sharing of experiences both among the team members and the teams
6. Additional field work if necessary

Course Outcomes:

CO1: Develop skills to understand the social, economic, political and cultural framework of therural society.

CO2: Develop skills to address the challenges with suitable responses for the identified ruralissues.

CO3: Develop skills to engage in the management of the rural community.

CO4: To provide the technical solution of the problems identified in the villages related to Health,Education, Agriculture, Water and Sanitation.

CO5: To conduct social research to evaluate the social world interventions, as well as to evaluateagency and community practice for the progress of village.

IPS Academy

INSTITUTE OF ENGINEERING & SCIENCE

(A UGC Autonomous Institute affiliated to RGPV)

LLC01	Liberal Learning Course-I	0L:0T:2P	1 Credit

Liberal Learning Course is categorize in to two major category and student can choose any one category to obtain the credit in Liberal Learning Course-I.

CATEGORY I NATIONAL SERVICE SCHEME (NSS)

Course Objectives: The objectives of the National Service Scheme (NSS) are summarized below:

- Understand the community in which NSS volunteer works.
- Understand themselves in relation to their community.
- Identify the needs and problems of the community and involve NSS volunteers in problem solving process.
- Develop a sense of social and civic responsibility among NSS volunteers
- Utilize NSS volunteer's knowledge in finding practical solution to individual and community problems.
- Develop competence required for group living and sharing of responsibilities.
- Gain skills in mobilizing community participation.
- Acquire leadership qualities and democratic attitude.
- Develop capacity to meet emergencies and natural disasters and
- Practice national integration and social harmony.

Content:

REGULAR NSS ACTIVITIES: NSS unit of institute is categorized in five major domains as Education, Health and Nutrition, Hygiene, Safety and Environment for its regular activities in accordance with NSS academic calendar of institute. Students undertake various programmes in the adopted villages, institute campuses and urban slums during weekends or after institute hours. Each and every student has to engage himself/herself for 120 hrs for these activities for obtaining credits under liberal learning category I in first year.

ORIENTATION OF NSS VOLUNTEERS: To get the NSS volunteers acquainted with the basics of NSS programmes, multiple sessions in first year induction program is allocated every year for their orientation through lectures, discussions, field visits and audio-visuals etc.

CAMPUS WORK: The NSS volunteers are involved in the projects undertaken for the benefit of the institution and students concerned. Such projects cover development of play grounds, laying of gardens, tree plantation in the premises, awareness programmes on drug-abuse, AIDS, population education etc. The NSS volunteers works on campus projects for showing actual engagement hrs for fulfill the engagement criteria.

The major portion of engagement is allocated for community service on the projects in adopted villages (**Tihi Gram under sub-division Dr. Ambedkar Nagar**) in Indore district in the Indian state of Madhya Pradesh independently or in collaboration with others in this field, as detailed below:

(a) Institutional work: The students may be placed with selected voluntary organizations working for the welfare of women, children, aged and disabled outside the campus.

(b) Rural Project: The rural projects generally include the working of NSS volunteers in adopted villages for eradication of illiteracy, water shed management and wasteland development, agricultural operations, health, nutrition, hygiene, sanitation, mother and child care, family life education, gender justice, development of rural cooperatives, savings drives, construction of rural roads, campaign against social evils etc.

(c) Urban Projects: In addition to rural projects other include adult education, welfare of slum dwellers, training in civil defence, traffic control, setting up first-aid posts, work in hospitals, orphanages, destitute home, environment, population education, drug, AIDS awareness, and income generation projects etc. Institute NSS unit having appropriate activities/modules for the community in these mentioned areas.

(d) National Days and Celebrations: The engagements hrs also includes the celebration of National days. The purpose of such a provision is to celebrate such occasions in a befitting manner. List of important days and weeks to be celebrated are listed in NSS unit academic calendar.

Course Outcomes:

- To identify the needs and problems of the community and involve learner in problem solving process.
- To utilize learner knowledge in finding practical solutions to individual and community problems.
- To acquire leadership qualities and democratic attitude.
- To practice national integration and social harmony.
- To develop capacity to meet emergencies and natural disasters.

CATEGORY II NATIONAL CADET CORPS (NCC)

Course Objectives:

The 'Aims' of the NCC laid out in 1988 have stood the test of time and continue to meet the requirements expected of it in the current socio–economic scenario of the country. The NCC aims at developing character, comradeship, discipline, a secular outlook, the spirit of adventure and ideals of selfless service amongst young citizens. Further, it aims at creating a pool of organized, trained and motivated youth with leadership qualities in all walks of life, who will serve the Nation regardless of which career they choose. Needless to say, the NCC also provides an environment conducive to motivating young Indians to join the armed forces.

Content: The course content and exam to obtain the **NCC "C"** certificate is same as laid out in NCC manual.

The selection process for 9 MP NCC Battalion at IPS Academy Institute of Engineering & Science involves three phases of selection which are summarized below:

PHASE I PHYSICAL ENDURANCE TEST: As per directives of commanding Officer 9 MP NCC Battalion Announcement of NCC Cadets Vacancy in senior wing of Institute's 9 MP NCC Battalion is done through a general notice for all UG 1^{yr} year students from head of the institution. The first 60 NCC aspirants from the observed roll list based on the physical and medical fitness of individual under physical endurance test is prepared and candidates will qualify for the phase II.

PHASE II WRITTEN TEST: A written test is conducted based on military history, English grammar, general knowledge and current affairs with 50 MCQs for the shortlisted candidates in phase I.

PHASE III PERSONAL INTERVIEW: Finally 17 cadets (12 Male+ 05 Female) will be shortlisted for online registration on behalf of Institute at NCC official portal in personal interview conducted by the Commandant Officer of 9 MP NCC Battalion.

Course Outcomes:

- To develop character, camaraderie, discipline, secular outlook, spirit of adventure, sportsman spirit and ideals of selfless service amongst cadets by working in teams, honing qualities such as self-discipline, self-confidence, self-reliance and dignity of labour in the cadets.
- To provide a conducive environment to motivate young Indians to choose the Armed Forces as a career.
- To create a pool of organized, trained and motivated youth with leadership qualities in all walks of life, who will serve the Nation regard less of which career they choose.