Software Development Fundamentals – II
Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11CI211	**Semester:** Even 2024 **(specify Odd/Even)**		**Semester: II** **Session:** 2023-24 **Month From:** Jan to June
Course Name	Software Development Fundamentals – II			
Credits	4	**Contact Hours**	4 (3 Hrs. Theory, 1 Hr. Tutorial)	
Faculty (Names)	**Coordinator(s)**	Neetu Sardana (J62), Janardan Verma (J128)		
	Teacher(s) (Alphabetically)	J62 – Alka Singhal, Amitesh Sharma, Anil Kumar Mehto, Ankit Vidarthi, Ankita Jaiswal, Ashish Mishra, K. Rajalaxmi, Kirti Jain, Neetu Sardana, Prantik Biswas, Sonal, Mohit. J128- Akanksha Mehndiratta, Ambalika Sarkar, Himani Bansal, Himanshu Agrawal, Janardan Verma, Mukesh Saraswat, Rashmi Kushwah, Shailesh Kumar, Shariq Murtuza		

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Explain various object-oriented concepts like class and objects, constructors, abstraction, data hiding (access specifiers) etc.	Understand (Level 2)
CO2	Apply object-oriented concepts like inheritance, polymorphism and templates to various real-world problems.	Apply (Level 3)
CO3	Apply SQL commands to create tables and perform various operations like insert, delete, select on the tables.	Apply (Level 3)
CO4	Analyse the source code for possible outcomes, exceptions, and to debug the errors.	Analyse (Level 4)
CO5	Design and implement class diagram for varied real life problems using OOPs.	Create (Level 6)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Object Oriented Programming	Comparison of Procedural and Object-Oriented Approach, Characteristics of Object-Oriented Languages, Separation of behaviour and implementation	2
2.	OO Concepts using C++	Objects, Classes, Internal representations of Objects, Constructors, Destructors Function and Operator Overloading, Static and Friend Functions	8
3.	Inheritance using C++	Base Class, Derived class, Method Overriding, Private and Public Inheritance, Multiple Inheritance.	3
4.	Polymorphism using C++	Virtual Functions, Pure Virtual Functions, Abstract Classes, Dynamic Dispatch, Internal representations of method tables, RTTI	3
5.	UML/Relationship Implementation in C++	Models, Views and Model Elements, Class Diagram, Relationships of Association, Aggregation, Composition, and Inheritance, *etc.* and their implementing	8
6.	Exceptions, Templates, and STL in C++	Exceptions, Try, Catch and Throw, Re-throwing exceptions, Exception and Inheritance, Function Templates, Overloading Functions Template, Class Templates, Collection classes and iteration protocols (STL)	8
7.	Introduction to Database System	Fundamentals of Database and Database Management System, Introduction to Relational Database, Table, Attributes, Records, Introduction to SQL, Data types in SQL, Various operations on single table like create, insert, delete, update, alter, etc. using SQL, SQL queries on single table using select statement with or without where/ group by clause, etc.	10
Total number of Lectures			**42**

Project based learning: Each student in a group of 3-4 will have to develop a mini project based on object-oriented programming concepts. The students have to design the class diagram for any real-world application. The students have to implement the mini project using C++/Java language. Project development and its presentation will enhance the knowledge and employability of the students in IT sector.

Evaluation Criteria
Components Maximum Marks
T1 20
T2 20
End Semester Examination 35
TA 25 (Mini Project (10), Attendance (10), Tutorial Assignments (5))
Total **100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1	Herbert Schildt, C++: The Complete Reference, McGraw-Hill Osborne Media, 4th Edition, 2017
2	Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Pearson, 7th Edition, 2016
3	Stroustrup B., The C++ Programming Language, Addison Wesley, 4th Edition, 2013
4	Avi Silberschatz, Henry F. Korth, and S. Sudarshan, “Database System Concepts”, 6th edition, McGraw Hill, 2010.
5	Robert Lafore, Object Oriented Programming in C++, SAMS, 4th Edition, 2002
6	John Hubbard, Schaum's Outline of Programming with C++, McGraw-Hill, 2nd Edition, 2000

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11EC111	**Semester:** Even	**Semester:** II **Session:** 2023 -24 **Month from:** Jan-June
Course Name	**Electrical Science -1**		
Credits	4	**Contact Hours**	3-1-0

Faculty (Names)	**Coordinator(s)**	Ashish Gupta, Monika
	Teacher(s) (Alphabetically)	B Suresh, Jitendra Mohan, Garima Kapur, Vinay Anand Tikkiwal, Satyendra Kumar, Nitin Mucchal, Rachna Singh, Vivek Dwiwedi, Vijay Khare, Atul Kumar Srivastava, Neetu Joshi, Ritesh Sharma, Shivaji Tyagi

COURSE OUTCOMES		**COGNITIVE LEVELS**
C113.1	Recall the concepts of various parameters for different circuit elements. Also define Kirchhoff's laws to analyze different DC circuits and networks.	Remembering Level (C1)
C113.2	Explain the concept of series and parallel RLC resonance. Also describe the construction and working of different instruments, measurement equipment and single phase transformer.	Understanding Level (C2)
C113.3	Apply different reduction schemes and network theorems to analyze complex DC networks.	Applying Level (C3)
C113.4	Demonstrate the physical model for given Sinusoidal AC signal and construct the phasor diagrams. Also analyze the AC circuits and networks by applying different techniques and network theorems.	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Basic Concepts	Voltage, Current, Power and Energy analysis for Circuit elements (R, L, C), Independent and Dependent Sources, Kirchhoff's Laws, Voltage Divider rule, Current Divider rule.	5
2.	DC Circuit Analysis	Star-Delta Transformation, Source transformation, Mesh and Supermesh Analysis, Nodal and super nodal Analysis	6
3.	Network Theorems	Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem.	6
4.	Sinusoidal Steady State Analysis	Physical Model for a Sinusoid, Average Value, Effective Value, Phasor presentation, Addition of Phasor using Complex Numbers, Concepts of impedance and admittance.	6
5.	AC Network Analysis and Theorems	Mesh and Nodal analysis, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem.	5
6.	Resonant Circuits	Series and Parallel resonance, frequency response of Series and Parallel resonance, Q-Factor, Bandwidth.	3

7.	Electrical Instruments	Essentials of an Instrument, Permanent Magnet Moving Coil (PMMC) Instruments, voltmeter, ammeter, Ohmmeter, Meter Sensitivity (Ohms-Per-Volt Rating); Loading Effect; Multimeter; Cathode Ray Oscilloscope: Construction, Working and Applications. Function Generators	6
8.	Single Phase Transformer	Principle of operation, construction, e.m.f. equation, equivalent circuit, power losses, efficiency (simple numerical problems), introduction to auto transformer.	5

Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, quiz, attendance)
Total	**100**

Project based learning component: Students will learn fundamental concepts, working and applications of voltmeter, ammeter, Ohmmeter, Cathode Ray Oscilloscope that develop aptitude among students to design minor and major projects. They will also develop knowledge about step-up and step-down transformers which can be further used to design advanced circuits in communication and robotics. It will also help develop concepts about instrumentation in electrical/electronics/biotech/communication based industries.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

Text Book

1	Robert L. Boylestad, Louis Nashelsky, " Electronic Devices and Circuit Theory ", 11thed, Prentice Hall ofIndia, 2014.
2	D.C. Kulshreshtha, Basic Electrical Engineering,Revised 1st ed, Tata Mc Graw Hill, 2017 .

Reference Book

1	R.C. Dorf and James A. Svoboda, "Introduction to Electric Circuits"**,** 9th ed, John Wiley & Sons, 2013.
2	Charles K. Alexander (Author), MatthewN.O Sadiku, " Fundamentals of Electric Circuits", 6th ed, Tata Mc Graw Hill, 2019.

Mathematics-2 (15B11MA211)

Convergence of sequences and series, second order linear differential equations, solution in series, Bessel and Legendre functions, partial differential equations, one dimensional wave and heat conduction equations, functions of a complex variable, analytic functions, Cauchy-Riemann equations, conformal mapping, poles and singularities, complex integration, Taylor's and Laurent's series, Cauchy residue theorem and applications, bilinear transformation.

Course Description

Course Code	15B11MA211	**Semester** Even	**Semester** II **Session** 2023-24 **Month from** Jan - May 2024
Course Name	Mathematics 2		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Yogesh Gupta, Dr. Mohd. Sarfaraz	
	Teacher(s) (Alphabetically)	Prof. Bhagwati Prasad Chamola, Prof. Lokendra Kumar, Dr. PatoKumari, Dr. Anuj Bhardwaj, Dr. Himanshu Agarwal, Dr. Richa Sharma, Dr. Neha Singhal, Dr. Nisha Shukla, Dr. Manish Bansal, Dr. Shruti, Dr. Ram Surat Chauhan, Dr. AradhanaNarang, Dr. AmitaBhagat, Dr. Neha Ahlawat, Dr. Mohd. Sarfaraz	

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C106.1	explainclassification of partial differential equations and basics of calculus of functions of complexvariable.	Understanding (C2)
C106.2	make use of methods for ordinary and partial differential equations, series solution, special functions, Fourier seriesin solving related problems.	Applying (C3)
C106.3	apply various theorems and methods for complex integration and series expansionof complex functions.	Applying (C3)
C106.4	examine the convergence of infinite series.	Analyzing (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Second Order Linear Differential Equations	Linear Differential Equations of Second Order with constant coefficients and with variable coefficients, Change of Variable, Variation of Parameters.	5
2.	Convergence of Series	Convergence of series, Tests of convergence, Alternating Series, Absolute & Conditional Convergence, Uniform Convergence.	7
3.	Series Solution and Special Functions	Series Solutions, Bessel Function, Recurrence Relations and Orthogonality. Legendre functions, Recurrence relations and Orthogonality.	7
4.	Fourier Series and Partial Differential Equations	Fourier Series. Classification and Solution of PDE, Equation of vibrating string, Solution of one dimensional wave & heat equations.	5

5.	Complex Variables	Limit, Continuity and Differentiability of Functions of Complex Variables, Analytic Functions, Cauchy's Riemann Equations.	3
6.	Complex Integration	Cauchy Integral Theorem, Cauchy Integral Formula and Applications.	4
7.	Series Expansion	Taylor and Laurent Series Expansion, Poles and Singularities.	4
8.	Contour Integration	Residues, Cauchy's residue theorem and its applications.	5
9.	Conformal Mapping	Bilinear transformation	2
Total number of Lectures			**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, Tutorials)
Total	**100**

Project based learning: Each student in a group of 3-5 will make use of methods for ordinary and partial differential equations, series solution, special functions, Fourier series in solving related real life problems.

Recommended Reading material:

1.	**Jain, R. K. &Iyenger, S. R. K.,** Advanced Engineering Mathematics, 5th Ed., Narosa Publishing House, New Delhi, 2016.
2.	**Brown, J.W. & Churchill, R.V.,** Complex Variables and Applications, 6th Ed., McGrawHill, 1996.
3.	**Prasad, C.,** (a) Mathematics for Engineers (b) Advanced Mathematics for Engineers, Prasad Mudranalaya, 1982.
4.	**Kreysizg, E.,** Advanced Engineering Mathematics, 10th Edition, John Willey & Sons, Inc., 2015.
5.	**Simmons, G. F.,** Differential Equations with Applications and Historical Notes, 2nd Ed. McGraw Hill, 1991.
6.	**Spiegel, M.R.,** Complex Variables, Schaum's outline series, Mac Graw-Hill, 2009.
7.	**Grewal, B. S.,** Higher Engineering Mathematics, 44th Edition, Khanna Publisher, 2018.

Detailed Syllabus
Lecture-wise Breakup

Course Code	**15B11PH211**	**Semester: Even**	**Semester: II Session:2023-24** **Month from: January to June**
Course Name	**PHYSICS-2**		
Credits	**4**	**Contact Hours**	**3+1**

Faculty (Names)	**Coordinator(s)**	**Prof.R. K. Dwivedi, Dr. Anuj Kumar**
	Teacher(s)	Prof. R. K. Dwivedi, Prof. S K Awasthi, Prof. Navendu Goswami Dr. Anshu D Varshney, Dr. Anuj Kumar, Dr. Sandeep Chhoker Dr. B C Joshi, Dr. Alok P S Chauhan, Dr. Dinesh Tripathi Dr. Manoj Tripathi, Dr.Guruprasad Kadam, Dr. Sandeep Mishra Dr.VaibhavRawoot, Dr. Ravi Gupta, Dr. Indrani Chakraborty Dr. Sudip Kumar Haldar, Dr. UrbashiSatpathi

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Recall the basic concepts relating to electromagnetic theory, lasers, fiber optics and solid state physics.	Remembering (C1)
CO2	Illustrate the various physical phenomena with interpretation based on the mathematical expressions involved.	Understanding (C2)
CO3	Apply the basic principles in solving a variety of problems related to lasers, electromagnet theory, fiber and solid state physics.	Applying (C3)
CO4	Analyze and examine the solution of the problems using physical and mathematical concepts involved in the course.	Analyzing (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	**Electromagnetism**	Introduction of electromagnetism, Basic idea of Cartesian, Spherical polar and cylindrical coordinate systems, Basics of fields, Gradient, Divergence and Curl, Coulomb's law, Electric Flux & Gauss's law , Applications of Gauss law for Spherical and Cylindrical symmetries (all important cases), Electric field due to charged conductor, Force per unit area on the surface of the charged conductor, Laplace and Poisson's equations and their applications to solve electrostatic problems in Cartesian and cylindrical systems, Treatment of electrostatic problems using Laplace and Poisson's equations in spherical coordinate system, Maxwell's correction to Ampere's law, Displacement current, Maxwell's equations in free space and dielectric media (both differential and integral forms) Poynting's theorem (derivation) and Poynting vector, Electromagnetic waves in free space (equations and solutions) and Transverse nature of EM waves, Energy and momentum in EM waves, Radiation pressure, Propagation of EM waves through boundary, Boundary Conditions across the medium ,Reflection and Transmission of EM waves at normal incidence, Reflection and Transmission at oblique incidence-Laws of Reflection and Refraction , Oblique incidence-p polarization, Fresnel's equations, Total internal Reflection and Brewster's Law for EM waves	**17**

2.	**Lasers, Optical Fiber and their applications**	Introduction to Laser, spontaneous and stimulated emission, population inversion, Einstein A and B coefficients, Principles and working of lasers, Three level Laser Scheme, Ruby laser, Applications of lasers , Concept of optical fiber and Principle of Total Internal Reflection in optical fiber, Numerical aperture and Single, multistep & graded index fiber, Attenuation coefficient, Transmission losses in optical fiber, Applications of an optical fiber: Endoscopy and sensing applications (discussion of one specific example) of an optical fiber.	**08**
3.	**Solid State Physics**	Basic ideas of Bonding, Ionic bonding, covalent bonding and Metallic Bonding, Inter-atomic coulomb forces in ionic crystals and Determination of equilibrium separation, Minimum Potential energy and determination of Madelung constant 'α 'for NaCl crystal in 1D , Lattice points and space lattice, Basis and crystal structure, Unit cell and Primitive cell, Seven crystal systems and Fourteen, Bravais space lattice, Coordination number, nearest neighbor distance, atomic radius and packing factor in crystal structure, Calculation of lattice constant, Lattice planes and Miller indices,Separation between lattice planes, Derivation and examples, X-ray diffraction, Bragg's law of X- ray diffraction, Electrical properties of metals: Classical free electron theory of conduction in metals , Quantum mechanical treatment: Quantum theory of electronic conduction in metals , Kronig Penney Model: Periodic Potential and Allowed Energies, Emergence of Bands through Kronig Penney Model and Band Theory of Solids, Distinction between metals, Semiconductors and insulators, intrinsic and extrinsic semiconductors,Effective Mass: Concept and Significance, Brillouin zone: Relation with Lattice Structures, Types of Brillouin zones, Energy and Momentum ,Brillouin zone: Origin of Forbidden Bands	**15**
		Total number of Lectures	**40**

Evaluation Criteria

Components	**Maximum Marks**
Test-1	**20**
Test-2	**20**
End Term Examination	**35**
TA	**25**
(a) Quizzes /class tests (06 M),	
(b) Attendance (05 M)	
(c) Internal Assessment (04)	
(d) Assignments in PBL mode (10 M)	
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	D. J. Griffiths, Introduction to Electrodynamics, Prentice-Hall India.
2.	Jerrold Franklin, Classical Electromagnetism, Pearson India.
3.	G. Keiser, Optical Fiber Communications, Tata Mc Graw Hill Education.
4.	A. Beiser, Concepts of Modern Physics, Mc Graw Hill International.
5.	S. O. Pillai, Solid State physics, New Age International (P) Limited.
6.	B. G. Streetman and S. Banerjee, Solid State Electronic Devices, Prentice-Hall India.

PBL Assignment Physics-2: Project report with a working model of project (preferred). Maximum of 3 students can work on one topic which will be identified (e.g. Earth as big capacitor, Satellite positioning using geographical coordinates, LASER scanners etc.) during the semester. Report should include introduction, definition, mathematics, principle, working, figures, applications etc.

Course Description

Course Code	15B17EC171	**Semester -:** Even (specify Odd/Even)	**Semester** II **Session:** 2024 **Month- :** January 2024 – June 2024
Course Name	Electrical Science Lab-1		
Credits	1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Vijay Khare, Vinay A. Tikkiwal
	Teacher(s)	Vijay khare Rachna Singh, Atul KumarSrivastava, Monika, Vivek Dwivedi,Nitin Muchhal,Nisha Venkatesh,Samriti Kalia, Ritu Raj,Ankur Bhardwaj,Bhawna Gupta,Smriti Bhatnagar, Yogesh Kumar, Abhay Kumar, Jitendra Mohan, Satyendra Kumar, Ashish Gupta, Abhishek Kashyap, B. Suresh, Vinay A. Tikkiwal, Ravi Prakash

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Recall the concepts of various active, passive components and instruments such as multimeter, bread board. regulated DC Power supply	Remembering (C1)
CO2	Illustrate the knowledge of electrical circuit and network topologies such as branch, node, loop, mesh and star delta transformation	Understanding (C2)
CO3	Apply the various reduction techniques in the electrical circuit using different network theorems.	Applying (C3)
CO4	Analyze series and parallel AC circuits and single-phase transformer.	Analyzing (C4)

Module No.	**Title of the Module**	**List of Experiments**	**COs**
1.	Introduction of active and passive components	Introduction to various components (Resistor, Capacitor, inductor, and IC) and instruments. Multimeter, Bread board, Regulated D.C. power supply.	CO1
2.	Analysis and verifications of Mesh and Node	Verification of KVL and KCL using a given circuit.	CO2
3.	Analysis of Superposition Theorem	Verification of Superposition Theorem.	CO3
4.	Analysis and verification of Thevenin's Theorem	Verification of Thevenin's Theorm.	CO3
5.	Analysis and verification of Maximum Power Transfer Theorem	Verification of Maximum Power Transfer Theorem.	CO3

6	Analysis and verification of Verification of Reciprocity Theorem	Verification of Reciprocity Theorem	CO3
7.	Analysis and Verification of AC Signal in term of RMS and PP Value	Measurements of Root-Mean-Square (RMS), Peak, and Peak-to-Peak Values of sinusoidal signal with Oscilloscope	CO4
8	Analysis and Verification of of Star-Delta Theorem	Verification of Star-Delta conversion	CO4
9.	Analysis of Series Resonance Circuit	Analysis of frequency response of series RLC circuit and determine resonance frequency.	CO4
10	Analysis of Parallel Resonance Circuit	Analysis of frequency response of Parallel RLC circuit and determine resonance frequency.	CO4
11.	Analysis of open Circuit Test	Open Circuit Test in Single Phase Transformer using Vlab.	CO4
12.	analysis of Short Circuit test	Short Circuit Test in Single Phase Transformer using Vlab.	CO4

Evaluation Criteria

Components	**Maximum Marks**
Viva1	20
Viva2	20
Report file, Attendance, and D2D	60 (15+15+30)
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Nilsson Riedel, Electric Circuits," Pearson, 11th Edition, 2019
2.	Abhijit Chakrabarti, "Circuit Theory Analysis and Synthesis," Dhanpat Rai & Co.; 7th Edition, 2018
3.	U. S. Bkashi A.U. Bakshi S. Ilaiyaraja,, "Circuit Theory Technical Publications; 3rd Edition, 2019
4.	Roman Malaric, "Instrumention and Measurement in Electrical Engineering, "Universal Publisher, 3rd Edition, 2011.
5.	DP Kothar and I J Nagrath, "Electric Machine," TMH; 4 th Edition, 2010
6	Virtual lab https://ems-iitr.vlabs.ac.in/exp/circuit-parameters-oc-test/theory.html

Detailed Syllabus
Lab-wise Breakup

Course Code	15B17PH271	**Semester:** Even Semester	**Semester:** II **Session** 2023-2024 **Month: from** Jan-July
Course Name	Physics Lab-2		
Credits	1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Dr. Urbashi Satpathi and Dr. R.K. Gopal
	Teacher(s) (Alphabetically)	Amit Verma, Anuj Kumar, Ashish Bhatnagar, Anshu Varshney, B.C. Joshi, Dinesh Tripathi, Guru Prasad Kadam, Indrani Chakraborty, Manoj Kumar, Manoj Tripathi, Navendu Goswami, Papia Chowdhary, Prashant Chauhan, R.K. Gopal, R. K. Diwedi, Ravi Gupta, Sandeep Chhoker, S. P. Purohit, Sandeep Mishra, Sudip Haldar, Suneet Kumar Awasthi, Urbashi Satpathi, Vikas Malik, Vaibhav Rawoot

COURSE OUTCOMES		**COGNITIVE LEVELS**
C171.1	Recall laser, fibre optics, semiconductor and solid state physics principles behind the experiments.	Remembering (C1)
C171.2	Explain the experimental setup and the principles involved behind the experiments performed.	Understanding (C2)
C171.3	Plan the experiment and set the apparatus and take measurements.	Applying (C3)
C171.4	Analyze the data obtained and calculate the error.	Analyzing (C4)
C171.5	Interpret and justify the results.	Evaluating (C5)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Semiconductor Physics	**1(a).** To determine the band gap in a semiconductor using its p-n junction diode. **1(b).** To draw the I-V characteristic of Solar cell and find maximum power and fill factor. **2(a).** To measure resistivity of semiconductor at different temperatures by Four Probe Method. **2(b).** To determine Band Gap of the semiconductor. **3.**To study the Hall effect in semiconductor and to determine its allied coefficients.	1-5
2.	Solid State Physics	**4.** To study the Magnetostriction in metallic rod with the help of Michelson interferometer arrangement. **5.** To find the susceptibility of a paramagnetic substance ($FeCl_3$) in the form of liquid or a solution. **6.**Study of dielectric (constant) behavior and determination of Curie's temperature of ferroelectric ceramics.	1-5
3.	Modern Physics	**7.**To study the magneto resistance of given semiconductor material. **8(a).** To determine the value of specific charge (e/m) of an electron by Magnetron method. **8(b).** To determine the velocity of ultrasonic wave in the medium of liquid using ultrasonic interferometer and to	1-5

		determine the compressibility of the given liquid. **9(a).** To determine Planck‟s Constant using LEDs of known wavelength. **9(b).** To study the photovoltaic cell and hence verify the inverse square law.	
4.	Optical Fiber	**10(a).** To determine the numerical aperture of a given multimode optical fiber. **10(b).** To measure the power loss at a splice between two multimode fibers and tostudy the variation of splice loss with Longitudinal and Transverse misalignments of thegiven fibers.	1-5

Evaluation Criteria

Components	**Maximum Marks**
Mid Term Viva (V1) :	20
End Term Viva (V2) :	20
D2D	: 60 = 30 (Day to day viva) + 10 (PBL) + 10 (attendance) + 10 (Lab Record)
Total	**: 100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Dey and Dutta, Practical Physics
2.	Lab Manuals

Project based learning: Each student in a group of 3-4 or individually will develop a mini project with the help of various concepts of semiconductor physics, solid state physics, and optical fiber. Individually or in a team they will learn how to apply the concepts for problem solving in a meaningful way.

Detailed Syllabus
Lab-wise Breakup

Course Code	18B15GE111	**Semester :**Even **(specify Odd/Even)**	**Semester:** 2**; Session** 2023-2024 **Month from:** January - June
Course Name	Engineering Drawing and Design		
Credits	1.5	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Mr. Shwetabh Singh, Mr. Rahul Kumar
	Teacher(s) (Alphabetically)	Mr. Chandan Kumar, Ms. Madhu Jhariya, Dr. Niraj Kumar, Mr. Nitesh Kumar, Dr. Prabhakar Jha, Mr. Rahul Kumar, Dr. Satyanarayan Patel, Mr. Shwetabh Singh

COURSE OUTCOMES		**COGNITIVE LEVELS**
C178.1	Recall various instruments used in engineering drawing and the significance of BIS and ISO code of practice.	Remembering Level (C1)
C178.2	Illustrate the concepts of geometrical constructions and curves used in engineering practice.	Understanding Level (C2)
C178.3	Apply methods of projection to draw Orthographic projection of objects.	Applying Level (C3)
C178.4	Analyze the geometry of an object using Isometric and Sectional view.	Analyzing Level (C4)
C178.5	Evaluate the technical model within computer-aided design software employing the principles of engineering drawing.	Evaluating Level (C5)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Introduction to Engineering Drawing	• Principles of engineering graphics and their significance, usage of drawing instruments. • Technical vertical capital letters which includes English alphabets and numeric.	C178.1
2.	Engineering Curves	• Constructing a pentagon and hexagon; engineering curves: Parabola, Ellipse, Hyperbola, Cycloids and Involutes.	C178.2
3.	Orthographic Projections	• **Projection of points:** Point on VP, HP, in space. • **Projection of straight lines:** Lines inclined or parallel to any one of the planes; lines inclined to both HP and VP with traces. • **Projection of planes:** Plane on VP, HP, inclined to any one of the planes; plane inclined to both HP and VP.	C178.3
4.	Projections of Regular Solids	• Projections of solids in simple positions inclined to one/both the planes.	C178.3
5.	Sections and Sectional Views of Right Angular Solids	• **Sections of solids:** Section of standard solids and true shape section of standard machine elements for the section planes perpendicular to one plane and parallel or inclined to the other plane.	C178.3

6.	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.	C178.4
7.	Overview of Computer Graphics	● Demonstrating knowledge of the theory of CAD software; Dialog boxes and windows; Shortcut menus; the Command Line; the Status Bar; Isometric Views of lines, Planes, Simple and compound Solids.	C178.5
8.	Customization & CAD Drawing	● CAD Drawing along with customization tools, Annotations, layering & other functions. Orthographic Projections; Model Viewing; Coordinate Systems; Multi-view Projection; Surface Modeling; Solid Modeling.	C178.5
9.	Demonstration of a simple team design project	● Technical 2D/3D orthographic and Isometric projections; Demonstration of a simple team design project.	C178.5

Evaluation CriteriaComponents	**Maximum Marks**
Mid Viva	20
End Viva	20
TA	60
Total	**100**

Project based learning: Auto-CAD is a computer-aided software used for creating 2D/3D models of different machine & structures along with all their components to visualize and analyze the feasibility of the same well before the actual manufacturing/construction. The laboratory mainly focused on engaging the students by replicating 2D and 3D models of common engineering equipment and instrumentation diagrams that enhances student's perception of their graphic expression skills.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

1.	Bhatt N.D., Panchal V.M. & Ingle P.R., Engineering Drawing, Charotar Publishing House, 2014.
2.	Shah, M.B. & Rana B.C., Engineering Drawing and Computer Graphics, Pearson Education, 2008.
3.	George Omura, Mastering AutoCAD 2021 and AutoCAD LT 2021, Sybex, 2020.
4.	Alan J. Kalameja, AutoCAD 2010 Tutor for Engineering Graphics, Autodesk Press, 2009.

Detailed Syllabus
Lecture-wise Breakup

Course Code	24B16HS111	**Semester: Even**	**Semester: II Session: 2023-24** **Month: January-June**
Course Name	LIFE SKILLS & PROFESSIONAL COMMUNICATION LAB		
Credits	0	**Contact Hours**	0-0-2

Faculty (Names)	**Coordinator(s)**	Dr Badri Bajaj & Dr Nilu Choudhary
	Teacher(s) (Alphabetically)	Dr Amandeep Kaur, Dr Anshu Banwari, Dr Aviral Mishra, Dr Badri Bajaj, Dr Danish Siddiqui, Dr Ekta Singh, Dr Harleen Kaur, Dr Ila Joshi, Dr Kanupriya Mishra, Dr Monali Bhattacharya, Dr Namreeta Kumari, Dr Neha Singh, Dr Nibha Sinha, Dr Nilu Choudhary, Dr Vandana Sehgal, Dr Yogita Naruka

CO Code	**COURSE OUTCOMES**	**COGNITIVE LEVELS**
CO1	Understand the role of Life Skills and Professional Communication for shaping a better future	Understand (C2)
CO2	Identify one's strengths and frame professional goals.	Apply(C3)
CO3	Analyze different organizational situations and apply appropriate skills for personal and professional excellence	Analyze(C4)
CO4	Evaluate ethical implications of decisions taken in case of ethical dilemma	Evaluate (C5)

Module No.	**Title of the Module**	**List of Activities**	**CO**
1.	Introduction and Overview of Life Skills and Professional Communication for lifelong success	1. Pair and Introduce yourself 2. Elevator Pitch 3. Johari Window	**CO1**
2.	Intrapersonal Communication: Self-exploration, Setting Personal, Professional Goals with Holistic Perspectives	4. Discover your personality 5. SWOC Analysis and Smart Goals	**CO2**

3.	Interpersonal Communication : Extending Intrapersonal influence for enhancing social competence to achieve win-win approach	6. Role Play 7. Role Play (Lab Test 1 Evaluation)	**CO3**
4.	Workplace communication: Enhancing Creative and Critical thinking abilities and Learning to effectively communicate in a professional manner	8. How to be Assertive? 9. Creativity Vs Critical Thinking 10. Resume Writing 11. Topical Group Discussion 12. Case Study Group Discussion (Lab Test 2 Evaluation)	**CO3**
5.	Professional Ethics : Enhancing Ethical Awareness and evaluate ethical implications	13. Case Studies on ethical dilemma 14.Complete the situation	**CO4**

Evaluation Criteria	
Components	**Maximum Marks**
Lab test 1	**20**
Lab Test 2	**20**
D2D	**60**
Total	**100**

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	Wadkar Alka, Life Skills for Success, Sage Publication Pvt Ltd, 2019
2.	Kumar Sanjay, Lata Pushp, Communication Skills, Oxford University Press,1st, Ed., 2011
3.	Bovee, Courtland, Thill, John, Business communication Essentials: A Skills-Based Approach to Vital Business English, Pearson India, 4th Ed., 2020
4.	Bell, Arthur H, Smith, Dayle M, Islam Baharul M K, Business Communication (An Indian Adaption), Wiley India, 3rd Ed., 2022
5.	Fernando, A.C, Business Ethics: An Indian Perspective, Pearson Education, 2009
6.	Kamatchi, P, Business Ethics : Foundation for Corporate Social Responsibility and Governance, Wiley, 2019

Software Development Lab - II

Detailed Syllabus
Lab-wise Breakup

Course Code	15B17CI271	**Semester:** Even	**Semester: II Session: 2023-24** **Month from:** Jan to June
Course Name	Software Development Lab - II		
Credits	1	**Contact Hours**	2 hrs

Faculty (Names)	**Coordinator(s)**	(J62) Ashish Mishra (J128) Akanksha Mehndiratta
	Teacher(s) (Alphabetically)	(J62) Amanpreet Kaur,Ankita Wadhwa,Anuja Arora, Archana Purwar, Arpita Jadav Bhatt, Ashish Mishra, Ashish Singh Parihar, Bhawna Saxena, Chancal,Deepti Singh, Dhanalekshmi G, Gazala Yasmin, Hema N, K Rajalakshmi, Kapil Madan, Megha Rathi, Mradula Sharma, Niyati Agarwal, Parul Agrawal, Prashant Kaushik,Raghu Vamsi, Sandeep Kumar Singh, Sangeeta Mittal, Shweta Rani, Sulabh Tyagi, Tarun Agrawal, Vikas Saxena (J128) Akanksha Mehndiratta, Ambalika Sarkar, Anuradha Gupta, , Ashish Sharma, Chetna Gupta, Himani Bansal, Janardhan Verma, Laxmi Chaudhary, Raju Pal, Rashmi Kushwaha, Shariq Murtuza, Shruti Gupta, Shruti Jaiswal, Varsha Garg

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Make use of the concepts related to objects, classes, constructor, destructor, and friend function for solving real-world problems.	Apply Level (Level 3)
CO2	Apply the principles of encapsulation, inheritance, polymorphism and abstraction in different programming problems.	Apply Level (Level 3)
CO3	Utilize the Standard Template Library to optimize the object oriented programming solutions.	Apply Level (Level 3)
CO4	Develop solutions using exception handling for programming problems.	Apply Level (Level 3)
CO5	Build MySQL queries to perform operations like ADD, DELETE, UPDATE, SELECT on relational databases.	Apply Level (Level 3)

Module No.	**Title of the Module**	**List of Experiments**	**No. of Labs for the module**
1.	OO Concepts using C++	Write output-based C++ programs to implement the concepts of Objects, Classes, Internal representations of Objects, encapsulation, Constructors, Destructors, Function and Operator Overloading, Static and Friend Functions.	3
2.	Inheritance using C++	Write programs in C++ to implement concepts of Base Class, Derived class, Method Overriding, Private and Public Inheritance, Multiple Inheritance.	2

3.	Polymorphism using C++	Write programs in C++ using Virtual Functions, Pure Virtual Functions, Abstract Classes, Dynamic Dispatch, Internal representations of method tables, RTTI, operator overriding.	2
4.	UML/Relationship Implementation in C++	Write programs in C++ using based on Class diagram, Relationships of Association, Aggregation, Composition, and Inheritance.	1
5.	Exceptions, Templates, and STL in C++	Write programs in C++ using Exceptions, Try, Catch and Throw, Re-throwing exceptions, Exception and Inheritance, Function Templates, Overloading Functions Template, Class Templates, Collection classes and iteration protocols (STL)	2
6.	Introduction to Database	Design simple SQL queries using MYSQL to apply various operations on single table like create, insert, delete, update, alter, etc., Queries on single table using select statement with or without where/ group by clause, etc.	2
		Total number of Labs	**12**

Evaluation Criteria

Components	**Maximum Marks**
Evaluation 1	15
Lab Test1	20
Evaluation 2	10
Lab Test 2	20
Mini Project	15
Attendance	10
TA	10
Total	**100**

Project based leaning: Groups of 3-4 students will choose a project topic. They will use the concepts of OOP and/or database to execute their project. In a team, they will learn how to apply the concepts for problem solving in a meaningful way.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

Text Books

1	Herbert Schildt, C++: The Complete Reference, McGraw-Hill Osborne Media, 4th Edition, 2017
2	Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Pearson, 7th Edition, 2016
3	Walter Savitch, Kenrick Mock," Absolute C++", Pearson, 6th Edition, 2016
4	E BALAGURUSAMY, Object Oriented Programming with C++, McGraw-Hill Education (India), 8th Edition, 2020
5	Avi Silberschatz, Henry F. Korth, and S. Sudarshan, "Database System Concepts", McGraw-Hill, 7th edition, 2019.

Reference Books

1	Cay S. Horstmann, Big C++: Late Objects , Wiley, 3rd edition, 2017
2	Stroustrup B., The C++ Programming Language, Addison Wesley, 4th Edition, 2015
3	Robert Lafore, Object Oriented Programming in C++, SAMS, 4th Edition, 2002
4	John Hubbard, Schaum's Outline of Programming with C++, McGraw-Hill, 2nd Edition, 2000