Detailed Syllabus

Lecture-wise Breakup

Course Code	15B11HS112	**Semester**: Odd	**Semester**: I **Session** 2024-25 **Month:** July-December	
Course Name	English			
Credits	2		**Contact Hours**	1-0-2
Faculty (Names)	**Coordinator(s)**	Dr.Monali Bhattacharya(Sec 62) & Dr.Ekta Srivastava(Sec 128)		
	Teacher(s) (Alphabetically)	Dr Anshu Banwari, Dr Danish Siddiqui, Dr Deepak Verma, Dr Ekta Singh, Dr Ekta Srivastava, Dr Harleen Kaur, Dr Monali Bhattacharya, Dr Nilu Choudhary.		

COURSE OUTCOMES		**COGNITIVE LEVELS**
C114.1	Show proficiency in basic concepts of grammar and phonetics usage.	Remembering (C1)
C114.2	Demonstrate an understanding of the basic aspects of English as a communication tool.	Understanding (C2)
C114.3	Apply grammar concepts, vocabulary skills and phonetics for effective communication and also develop effective professional writing skills.	Applying (C3)
C114.4	Analyze rhetorical devices and literature for enhancing communication skills.	Analyzing (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	English as a Communication Tool	Basic aspects of English: LSRW: Listening, Speaking, Reading, Writing Non-Verbal Communication: Body Language, Voice Modulation, Posture Presentation Skills Phonetics: Transcription, Pronunciation	6
2.	Grammar & Vocabulary	Tense, Aspect, Mood and Voice Vocabulary Enrichment strategies	1
3	Language through Literature	Forms of Literature & Rhetorical Devices One act Play Refund by Fritz Karinthy Famous Speech Swami Vivekanand's Chicago Speech	3
4.	Professional Application/Writing	Textual Organization ·Notice, Agenda and Minutes ·Format of Report Writing	4
		Total number of Lectures	**14**

Syllabus of Practical:

Syllabus for Reading Modules	**No. of Hours in Lab: 7**
Practical for Learning Comprehension Strategies of Reading: Summarizing Inferencing Newspaper reading and comprehension Relating background knowledge Distinguishing between fact and opinion Finding the main idea, important facts, and supporting details	5 Hrs
Practice Quick Reading through SKY Read up-Speed Up Software or SAT/CAT/IELTS exercises.	2 Hrs
Syllabus for Listening Modules	No. of Hours in Lab: 7
Practical for Mastering the Skill of Listening: Listening for the Main Idea; Listening for Detail: 5 Ws and H questions; Listening in sequence: for order following Through Ted Talks Listening for understanding personal & social connotations through News Brief, Interviews. Listening for non-verbal connotations through Audio-Videos and Movie Clips Listening for Functional Language: understanding choice of words for same situation.	5 Hrs
Practice Listening through software of Sky IELTS Listening Exercises or Podcasts	2 Hrs

Syllabus for Speaking Modules	**No. of Hours in Lab: 7**
Activities for Vocabulary Enrichment and learning Public Speaking: Practice through JAM Session- Situational Dialogues – Greetings – Taking; Leave – Introducing Oneself and Others. Making Requests and Seeking Permissions. Exposure to Structured Talks - Non-verbal Communication: Practice. Practice of Phonetics, Stress and Intonation while Making a Short Speech, Extempore and Making a Presentation	3 Hrs

Practice Speaking through software of Sky Pronounce and Sanako Pronounce	4 Hrs

Syllabus for Writing Modules	**No. of Hours in Lab: 7**
Grammar Practice & Exercises: Jumbled Paragraphs for grammar learning Picking the Out of Context sentence in a Jumbled Paragraph for proper communication. Application of right grammar concepts	2 Hrs
Cohesion in Writing Practical on Different forms of writing, like persuasive writing, expository, narrative, descriptive	2 Hr
Practice of Professional Writing Notice, Agenda. Minutes Memorandum and Letter Format Report Writing	3 Hrs

Evaluation Criteria

Components	**Maximum Marks**
Mid Term	30
End Semester Examination	40
TA	30 (Project, Lab Assessment)
Total	**100**

PBL Component: Students will be asked to form groups, with a maximum of five students per group, and will be assigned a project topic on which they will submit a project report.

Top of Form

Bottom of Form

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.	C.L.Bovee, J.V.Thill, M.Chaturvedi, *Business Communication Today*,9th Ed, Pearson Education, Pvt Ltd, 2021.
2.	A. Tiwari, *Communication Skills in English*. Khanna Publishers, 2022.

3.	K. M. Quintanilla and S. T. Wahl, *Business and Professional Communication*, Sage Publications Pvt India Ltd, 2011.
4.	] S. Kumar and P. Lata, *Communication Skills*, 1st ed. Oxford University Press, 2011.
5.	R. K. Bansal and J. B. Harrison, *Spoken English for India*, Orient Longman, 2018.
6.	M. A. Yadugiri, *The Pronunciation of English: Principles and Practice*, India: Viva Books Pvt. Ltd, 2015.
7.	A. R. Rizvi, *Effective Technical Communication*, 2nd ed. Chennai, India: McGraw Hill Education Private Limited, 2018.
8.	R. Murphy, *English Grammar in Use*, 5th ed. Cambridge, UK: Cambridge University Press, 2019.

9.	K. Mohan and N. P. Singh, *Speaking English Effectively*, 2nd ed. Delhi: Macmillan Publishers India Ltd., 2011.
10.	E. Suresh Kumar and P. A. Sreehari, *A Handbook for English Language Laboratories*. New Delhi: Foundation, 2009.
11.	F. Karinthy, "The Refund," Online. Available: https://egyankosh.ac.in/bitstream/123456789/27478/1/Unit-4.pdf.
12.	Swami Vivekananda and S. Srinivasan, "Sisters & Brothers of America: Speech at World Parliament of Religions, Chicago, 1893," Creative Space Independent Publishing Platform, 2015.

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11CI111	**Semester** ODD **(specify Odd/Even)**	**Semester** I **Session:** 2024-25 **Month from:** July-24 to Dec-24
Course Name	Software Development Fundamentals – I		
Credits	4	**Contact Hours**	3-1-0

Faculty (Names)	**Coordinator(s)**	Amitesh (J62), Shruti Gupta (J128)
	Teacher(s) (Alphabetically)	**J62:** Aastha Maheshwari, Amarjeet Prajapati, Amitesh, Anil Kumar Mahto, Ankita Verma, Anupama Padha, Ashish Singh Parihar, Asmita, Kapil Madan, Mradula Sharma, Prantik Biswas, Pushp, Shraddha Porwal, Sonal Saurabh, Yasmin Ghazala **J128:** Akanksha Mehndiratta, Chetna Gupta, Himani Bansal, Kedar Nath Singh, Niveditta Batra, Satya Prakash Patel, Shariq Murtuza, Shruti Gupta, Shruti Jaiswal, Twinkle Tyagi, Vartika Puri

COURSE OUTCOMES		**COGNITIVE LEVELS**
C109.1	Explain various phases of software development life cycle	Understand (Level 2)
C109.2	Explain various data types, memory allocation schemes. precedence of arithmetical and logical operations, and need of array, and structures	Understand (Level 2)
C109.3	Design the flow chart and write the high-level code for different problems	Understand (Level 2)
C109.4	Apply and implement functions with or without pointers for different problems	Apply (Level 3)
C109.5	Demonstrate and implement various operations like traverse, insertion, deletion, *etc.* on files	Apply (Level 3)

Module No.	**Subtitle of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Introduction to Software Development Life Cycle, Step by step solution to simple problems, developing logic/flow-chart/pseudo code to solve problems like 2D screen saver, simple/logical games, puzzles	6
2.	Data types, operators, and Control Flow	Data, variables and constants, data types, operators – binary, unary, ternary, operator precedence, operations using different operators, if, if-else, while, do-while, for, switch-case in C Programming	8
3.	Array	Fundamentals of Array, Implementation of 1D/2D Array and related operations like insertion, traversal, updation, etc. in C programming using different problems	7
4.	Pointers	Pointers in C, Dynamic memory allocation for 1D/2D array, Arithmetical operations on pointers	5
5.	Functions	Introduction to Functions and its implementation in C programming language, Functions using Pass by value, functions using pass by reference, recursive functions	5
6.	Structures and Union	Introduction and implementation of Structures and Union in C programming, Array of Structures, Pointer to Structures and related operations like insertion, traversal, updation, etc. in C programming using different problems, Structures using function	5

7.	File Handling	Introduction to File, creation of files in C programming language, Modes of File Handling like read, write, update; different types of files like binary file and text file and respective operations like, opening, closing, reading, writing, end of file, traversing the file, for structured and unstructured data	6
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance = 10, Class Test, Quizzes, etc = 05, Internal assessment = 05, Assignments in PBL mode = 05)
Total	**100**

Project Based learning: In this subject, students work in the team of 3-4 people, to implement a small application/mini-project based on the learned concepts. The students will be able apply various concepts of SDLC lifecycle, C pointers, functions, arrays, structures, union and file handling for developing a real life application. This will aid in their employability in software industry.

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

Text Books

1.	Paul Deitel and Harvey Deitel, “C HOW TO PROGRAM”, 9th Edition, Pearson Education, 2023, ISBN 978-0-13-739839-3
2.	Ashok N. Kamthane, “Programming with ANSI and Turbo C”, Pearson Education, Delhi, 2003
3.	Griffiths, David, and Dawn Griffiths, “Head First C: A Brain-Friendly Guide”, O’Reilly Media, Inc., 2012.
4.	H. Cooper and H. Mullish, Jaico Publishing House. “Spirit of C”, 4th Edition, Jaico Publishing House, 2006
5.	Greg Perry, Dean Miller, “C Programming Absolute Beginner's Guide Paperback”, QUE; 3 edition, 2013

Reference Books

1.	Herbert Schildt. “The Complete Reference C”, 4th Edition, TMH, 200
2.	Brian W. Kernighan and Dennis M. Ritchie, “The C Programming Language”, 2nd Edition, Prentice-Hall India, New Delhi, 2002
3.	B. A. Forouzan, R. F. Gilberg “Computer Science: A Structured Programming Approach Using C”, 2nd Edition, Thomson Press, New Delhi, 2006

Detailed Syllabus
Lecture-wise
Breakup

Course Code	**15B17CI171**	**Semester** ODD	**Semester: 1st Session: 2024 -2025** **Month from: July –Dec**
Course Name	Software Development Fundamentals Lab-1		
Credits	1	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Dharmveer Singh Rajpoot (JIIT62)
	Teacher(s) (Alphabetically)	Alka, Amarjeet Prajapati, Amit Mishra, Amitesh, Anil Kumar Mahto, Ankita Verma, Archana Purwar, Ashish Singh Parihar, Asmita, Kapil Madan, Kavita Pandey, Shardha Porwal, Sonal Saurabh, Sulabh, Yasmin Ghazaala, Anupama Padha, Richa, Akshit

COURSE OUTCOMES		**COGNITIVE LEVELS**
C172.1	Develop programs/logic for data types, expressions and conditional structure.	Apply (level 3)
C172.2	Perform programs for arrays, strings and pointers	Apply (level 3)
C172.3	Perform programs of functions and recursive functions.	Apply (level 3)
C172.4	Implement programs for structure and union.	Apply (level 3)
C172.5	Implement menu driven programs to perform basic file operations.	Apply (level 3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Weeks (2 Labs/Week)**	**CO Mapping**
1	Flow chart and Logic Building	Developing logic/flow-chart/pseudo code to solve problems, simple/logical games, puzzles	2 Weeks	C172.1
2	Data Type, Statements, Expressions, Operators	Data, variables and constants, data types, operators – binary, unary, ternary, operator precedence, associativity	1 Week	C172.1
3	Control Flow	Develop C programs using conditional structure (if, if-else, nested if), and iterative control structure (do-while, while, for). Implement switch case statement.	2 Weeks	C172.1
4	Array and String	Array initialization, reading and writing operations with array, one dimensional, two-dimensional array, strings, and related operations like addition, multiplication, traversal, transpose etc.	2 Weeks	C172.2

5	Pointers	Pointers in C, Dynamic memory allocation for 1D/2D array, Arithmetical operations on pointers, recursive functions like palindrome, factorial, fibonacci series, number system etc	2 Weeks	C172.2, C172.3
6	Functions	User defined functions and inbuilt functions, Functions definition, declaration, calling, Pass by value, functions using pass by reference, functions with array	1 Week	C172.2, C172.3
7	Structures and Union	Struct keyword, Structure and Union, Structure variable, dot operator, pointer to structures, arrow operator, Array of Structures, structure using functions.	2 Weeks	C172.4, C172.2
8	File Handling	File creation, Modes of File Handling like read, write, update; different types of files like binary file and text file and respective operations like, opening, closing, reading, writing, end of file, traversing the file for structured and unstructured data	2 Weeks	C172.5
Total Number of Weeks			14 Weeks	

Project Based learning: In this subject, students work in the team of 3-4 people, to implement a small application/mini-project based on the learned concepts. The students will be able apply various concepts of SDLC lifecycle, C pointers, functions, arrays, structures, union and file handling for developing a real life application. This will aid in their employability in software industry.

Evaluation Criteria

Components	**Maximum Marks**
Lab Test -1	20
Lab Test -2	20
Day to Day	60
Evaluation 1	15
Evaluation 2	15
Project	15
Attendance	15
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	Paul Deitel and Harvey Deitel, “C HOW TO PROGRAM”, 9th Edition, Pearson Education, 2023, ISBN 978-0-13-739839-3
2	H. Cooper and H. Mullish, Jaico Publishing House. “Spirit of C”, 4th Edition, Jaico Publishing House, 2006
3	Herbert Schildt. “The Complete Reference C ”, 4th Edition, TMH, 2000

4	Brian W. Kernighan and Dennis M. Ritchie ,"The C Programming Language", 2nd Edition, Prentice-Hall India, New Delhi, 2002
5	Peter Norton, "Introduction to Computers", 5th edition, Tata McGraw-Hill, Delhi., 2005.
6	Balaguruswamy, Programming in ANCI C", 2nd Edition, TMH, 2001.
7	Ashok N. Kamthane , "Programming with ANSI and Turbo C", Pearson Education, Delhi, 2003
8	Rajaraman V., "Fundamentals of Computer", 3rd Edition, Prentice-Hall India, New Delhi, 2005.
9	B. A. Forouzan, R. F. Gilberg "Computer Science: A Structured Programming Approach Using C", 2nd Edition, Thomson Press, New Delhi, 2006.
10	Avi Silberschatz, Henry F. Korth, and S. Sudarshan, "Database System Concepts", 6th edition, McGraw-Hill, 2010.

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11PH111	**Semester: ODD**	**Semester: 1st, Session:** 2024-2025 **Month from: July to December**
Course Name	PHYSICS-1		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Prof. Sandeep Chhoker, Prof. Vikas Malik, Dr. Indrani Chakrabarty, Dr. Sudip Haldar
	Teacher(s) (Alphabetically)	Dr. Manoj Kumar, Dr Amit Verma, Dr Anuraj Panwar and Dr. Manoj Tripathi, Dr. Sandeep Mishra, Dr. Ashish Bhatnagar, Dr. Vaibhav Rawoot, Dr. Guruprasad Kadam, Dr. Indrani Chakrabarty, Dr. Urbashi Satpathi, Prof. Vikas Malik, Prof. Sandeep Chhoker

COURSE OUTCOMES		**COGNITIVE LEVELS**
C101.1	Recall the basic principles of physics related to optics, relativity, quantum mechanics, atomic physics.	Remembering (C1)
C101.2	Illustrate the various physical phenomena with interpretation based on the mathematical expressions involved.	Understanding (C2)
C101.3	Apply the concepts/principles to solve the problems related to wave nature of light, relativity, quantum mechanics and atomic physics.	Applying (C3)
C101.4	Analyze and examine the solution of the problems using physical and mathematical concepts involved.	Analyzing (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Physical Optics	Analytical treatment of interference, Intensity distribution of fringe system, Fresnel's Bi-prism, Newton's rings, Michelson interferometer, Diffraction (limited to Fraunhofer class) from Single slit, double slit and Diffraction grating, Polarization, Phenomenological understanding of Birefringence, Principles of use of uni-axial crystals in practical polarizers, compensators and wave plates, Production and analysis of completely polarized light. Retardation Plate, Optical activity, Polarimeter. Resolving Power of Microscope.	17
2.	Relativity	Frame of references, Galilean Transformations, Michelson-Morley experiment, Lorentz transformations, Addition of velocities, Mass variation with velocity, Mass-energy relation.	5
3.	Atomic Structure	Origin of spectral lines, spin and orbital angular momentum, Quantum numbers, Designation of States, Atoms in magnetic field, Zeeman effect.	4
4.	Radiation	Black body radiation, Wein's law, Rayleigh Jeans law, Implications of Bose-Einstein statistics, Planck's law of radiation, Wein's Displacement Law.	4

5.	Quantum Mechanics	Wave-particle duality, Compton scattering, Matter waves, Heisenberg's uncertainty principle, Schrödinger wave equation and its applications to the free particle in a box (1D+3D), potential barrier and tunnel diode as its application	10
		Total number of Lectures	**40**

Evaluation Criteria

Components	**Maximum Marks**
T1 T2	20
End Semester Examination	20
TA	35
Total	25 [Attendance (05M), Two Quizzes (06 M), Assignments in PBL mode (10 M), and Internal assessment (04 M)] **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.	A. K. Ghatak, *Optics*, Tata McGraw Hill.
2.	E. Hecht, *Optics*, Pearson Education.
3.	F. A. Jenkins and H. E. White, *Fundamentals of optics*, Tata McGraw Hill.
4.	R. S. Sirohi, *Wave Optics*, Orient and Longman.
5.	Reshnick, *Relativity*, New Age.
6.	A. Beiser, *Concepts of Modern Physics*, Mc Graw Hill International.
7.	Introduction to Quantum Mechanics by David J. Griffiths, Second Edition, Pearson.
8.	Quantum Mechanics by Ghatak and Lokanathan, 5th Edition, Macmillan India.

Project Based Learning (PBL): The students will be given small projects (in groups) on various topics like Interference, diffraction, polarization, relativity, radiations, Quantum mechanics, to explore their applications in engineering, and technology to understand the role of physics. This will help the students to connect the concept studied in the class with their application in engineering and technology and will enhance their analytical skills.

Detailed Syllabus
Lab-wise Breakup

Course Code	15B17PH171	**Semester: ODD**	**Semester: 1st Session:**2024 -2025 **Month from July 24 to December 24**
Course Name	Physics Lab-1		
Credits	01	**Contact Hours**	02

Faculty (Names)	**Coordinator(s)**	Dinesh Tripathi, Ashish Bhatnagar and Urbashi Satpathy
	Teacher(s) (Alphabetically)	

COURSE OUTCOMES		**COGNITIVE LEVELS**
C170.1	Recall optics and modern physics principles behind the experiments.	Remembering (C1)
C170.2	Explainthe experimental setup and the principles involved behind the experiments performed.	Understanding (C2)
C170.3	Plan the experiment and set the apparatus and take measurements.	Applying (C3)
C170.4	Analyze the data obtained and calculate the error.	Analyzing (C4)
C170.5	Interpret and justify the results.	Evaluating (C5)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Optics	**1.**To determine the wavelength of sodium light with the help of Newton's rings setup **2.**To determine the wavelength of sodium light with the help of Fresnel's Bi-prism **3.** To find the specific rotation of cane- sugar solution by a polarimeter at room temperature, using half-shade / Bi-quartz device. **4.** To determine the dispersive power of the material of a prism with the help of a spectrometer. **5.** To determine the wavelength of prominent spectral lines of mercury light by a plane transmission grating using normal incidence method	1-5
2.	Modern Physics	**6.** To study the Photoelectric effect and determine the value of Planck's constant. **7.** Determination of Planck's constant by measuring radiation in a fixed spectral range.	1-5
3.	Electricity and Magnetism	**8.** To verify Stefan's law by electrical method. **9.**To determine the resistance per unit length of Carey Foster's bridge wire and specific resistance of the material of the given wire using Carey Foster's bridge. **10.** To study the variation of magnetic field with distance, along the axis of Helmholtz galvanometer, and to estimate the radius of the coil.	1-5

Evaluation Criteria

Components	**Maximum Marks**
Mid Term Viva (V1)	20
End Term Viva (V2)	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.	Dey and Dutta, *Practical Physics*, Kalyani Publication.
2.	Experiment hand-outs.

Project based learning: The project based on various concepts like Interference, Diffraction, Polarization, Modern Physics and basics of electricity and magnetism will be developed by every student of the group comprises of two or three students. Additionally, by doing this each member of the group would able to learn the concept and its application to address the challenges associated with the project in the meaning full way.

Course Description

Course Code	15B11MA111	**Semester** Odd	**Semester** I **Session** 2024-25 **Month from** July - Dec 2024
Course Name	Mathematics-1		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**		
	Teacher(s) (Alphabetically)		

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C105.1	Define the basics of matrices and calculus of functions of one or more variables.	Remembering (C1)
C105.2	Explain the concepts of calculus, matrices and Laplace transforms.	Understanding (C2)
C105.3	Make use of the concepts of matrices, calculus, differential equations and Laplace transforms in solving engineering problems	Applying (C3)
C105.4	Simplify and solve various problems of vector calculus, differential equations and Laplace transforms in engineering problems.	Analyzing (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Partial differentiation	Chain rule, change of variables, Taylor's series for function of two or more variables, maxima and minima of function of two variables, Jacobians.	7
2.	Double integrals	Change of order and change of variables, Gamma and Beta functions, Applications to areas and volumes, Equations to curves and surfaces, Plots of some well known curves and surfaces.	7
3.	Vector Differentiation	Gradient, divergence and curl, Normal and tangent to a plane surface.	3
4.	Vector Integration	Line integrals, Green's Theorem in a plane, surface integrals, Gauss and Stokes theorems.	7
5.	Differential Equations	Differential Equations with constant coefficients, Cauchy-Euler equations, Equations of the form y''=f(y), simple applications.	6
6.	Laplace Transform	Laplace Transform, inverse Laplace transform, Dirac delta and unit step function, Solution of IVPs.	6
7.	Matrices	Linear dependence and independence of rows, row echelon form, Rank, Gauss elimination method,	6

		Eigen values and vectors, symmetric matrices, Reduction to diagonal form Quadratic forms.	
		Total number of lectures	**42**

Evaluation Criteria

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

Project based learning: Each student in a group of 4-5 will apply the concepts of Differential Equations and Laplace Transform to solve practical problems.

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.	**Jain, R. K. &Iyenger, S. R. K.,** Advanced Engineering Mathematics, Alpha Science International.
2.	**Prasad, C.,** (a) Mathematics for Engineers (b) Advanced Mathematics for Engineers, Prasad Mudranalaya.
3.	**Lipschutz, S., Lipsom, M.,** Linear Algebra, Schaum Outline Series.
4.	**Thomas, G. B and Finney, R. L**., Calculus and Analytical Geometry, Pearson Education Asia (Adisson Wesley), New Delhi.

Detailed Syllabus
Lab-wise Breakup

Course Code	18B15GE112	**Semester:** ODD	**Semester:** I **Session:** 2024 -25 **Month-:** July-Dec
Course Name	Workshop		
Credits	1.5	**Contact Hours**	0-0-3

Faculty (Names)	**Coordinator(s)**	Nitesh Kumar (J62), Prabhakar Jha (J128)
	Teacher(s) (Alphabetically)	J62- Chandan Kumar, Madhu Jhariya, Nitesh Kumar, Satyanarayan Patel and Shwetabh Singh. J128- Niraj Kumar, Prabhakar Jha, Rahul Kumar.

COURSE OUTCOMES		**COGNITIVE LEVELS**
C179.1	Tell the basic Introduction of various shops and safety measures associated with it.	Remembering Level (C1)
C179.2	Understand the working, usage and application of various Tools and Machines in various shops	Understanding Level(C2)
C179.3	Build the appropriate Work Plan for the prototype prepration in the various shops.	Applying Level (C3)
C179.4	Choose the appropriate Tools to fabricate joints utilizing work-bench tools in various shops.	Evaluating Level (C5)
C179.5	Create various prototypes in the carpentry trade, fitting trade, sheet metal and welding trade.	Creating Level (C6)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Carpentry	Preparation of T joint as per the given specification. Preparation of dovetail joint/ cross lap joint as per given specification.	**C179.2, C179.3, C179.4 C179.5**
2.	Welding Shop	To study Gas welding and Arc welding equipment and various safety measures associated with it. To make butt joint and lap joint.	**C179.1, C179.2, C179.3, C179.4, C179.5**
3.	Sheet Metal Shop	To prepare a square tray using GI sheet. To prepare a funnel using GI sheet.	**C179.2, C179.3, C179.4 C179.5**
4.	Fitting Shop	To prepare V- groove fit as per given specifications. To prepare square fit as per given specifications.	**C179.2, C179.3, C179.4, C179.5**

5.	Machine Shop	To perform turning, facing and grooving operation on Lathe. To perform slotting operation on Shaper Machine. To perform face milling operation on Milling Machine. To study G and M Codes for a CNC Machining.	**C179.1, C179.2**

Evaluation Criteria

Components	**Maximum Marks**
Viva 1	20
Viva 2	20
Report file, Attendance, and D2D	60 [File Work (20) + Attendance (10) + Experimental Work (30)]
Total	**100**

Project based learning: Here students are divided in groups and learn about the applying of appropriate tools to fabricate joints utilizing work-bench tools which helps them in creating various prototypes in the field of engineering and technology. In the present workshop laboratory with the application of the course outcomes, students prepare their projects like robotic car, cutting of electronic board made of wood, etc. where application of carpentry shop, sheet metal shop and fitting shop is required.

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.	Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai
2.	Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology",4th edition, Pearson Education India Edition, 2002.
3.	Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata Mc GrawHill House, 2017.
4.	John K.C., Mechanical Workshop Practice, 2nd Edition, PHI, 2010
5.	Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998
6.	Gowri P.Hariharan and A. Suresh Babu," Manufacturing Technology – I" Pearson Education, 2008
7.	Raghuwanshi B.S., Workshop Technology Vol. I & II, Dhanpath Rai & Sons.

Detailed Syllabus

(Lecture-wise Breakup)

Course Code	24B11EC111	**Semester:** ODD **(specify Odd/Even)**	**Semester:** 1st **Session:** 2024 -2025 **Month from** July to Dec
Course Name	BASIC ELECTRONICS		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Varun Goel and Divya Kaushik	
	Teacher(s) (Alphabetically)	Ankur Bhardwaj, Divya Kaushik, Jitendra Mohan, K. Nisha, Mandeep Narula, Nitin Muchhal, Samriti Kalia, Satyendra Kumar, Varun Goel, Vinay Tikkiwal, Yogesh Kumar	

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Recall the concepts of various circuit elements and Kirchhoff's laws.	Remembering Level (C1)
CO2	Understand the basics of semiconductor PN junction diodes and Op-Amp, and their applications.	Understanding Level (C2)
CO3	Apply network theorems to effectively solve complex DC circuits.	Applying Level (C3)
CO4	Explain the operation of transistors (BJT and MOSFET) and analyze their biasing techniques.	Analyzing Level (C4)

Module No.	Title of Module	Topics in the Module	No. of Lectures for the module
1	Basic Circuit Analysis	Kirchhoff's Laws, Voltage Divider rule, Current Divider Rule, DC circuit analysis (Nodal, Mesh), Superposition and Thevenin/Norton Theorem	10
2	PN Junction diode and Applications	PN Junction, Biasing the PN Junction, Current–Voltage Characteristics of a PN Junction, PN Junction Diodes, Half Wave Rectifier & Full Wave Rectifier Clipper & Clamping Circuits	8
3	Zener Diode and Applications	Zener Diode and applications, Line and Load Regulations of reference circuits.	4
4	Introduction to BJT	Introduction to BJT, operation, characteristics, Biasing and Stability	6
5	Introduction to MOSFET	Introduction to MOSFET, operation, characteristics and biasing	6
6	Op-amps and applications	Block Diagram Representation of Typical Op-Amp, Schematic Symbol, Op-Amp parameters, Ideal Op-Amp, Equivalent Circuit of Op-Amp, Op-Amp Applications: Inverting Configuration, Non-Inverting Configuration, Voltage	8

		Follower, summer, comparator, difference Amplifier, Integrator, Differentiator	
		Total number of Lectures	**42**

Evaluation Criteria

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

Project-based learning: Students will learn fundamental concepts, working and applications of different semiconductor devices to develop aptitude among students to design minor and major projects. Also, the students with knowledge of BJT, MOSFETs, and OP-AMP, can design and analyze the circuits for the signal processing applications

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.	R. L. Boylestad, and L. Nashelsky, "Electronic Devices and Circuit Theory", 11th edition, Prentice Hall of India, 2014.
2.	D.C. Kulshreshtha, "Basic Electrical Engineering", Revised 1st edition, Tata McGraw Hill, 2017

Reference Books

3.	R.C. Dorf and James A. Svoboda, "Introduction to Electric Circuits", 9th edition, John Wiley & Sons, 2013.
4.	Charles K. Alexander (Author), Matthew N.O Sadiku, "Fundamentals of Electric Circuits", 6th edition, Tata McGraw Hill, 2019.

Detailed Syllabus
Lab-wise Breakup

Course Code	24B15EC111	**Semester:** Odd **(specify Odd/Even)**	**Semester:** 1st **Session** 2024-25 **Month from:** July to December
Course Name	Basic Electronics Lab		
Credits	1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Samriti Kalia, Vinay Anand Tikkiwal
	Teacher(s) (Alphabetically)	Abhishek Kashyap , Abhay Kumar, Alok Joshi, Ankur Bhardwaj, Archana Pandey, Divya Kaushik, Garima Kapoor, Nitin Muchhal, Varun Goel, RituRaj, K. Nisha, Mandeep Narula, Satyendra Kumar, Shamim Akhtar, Yogesh Kumar

COURSE OUTCOMES - At the end of the course, students will be able to:		**COGNITIVE LEVELS**
CO1	Recall various electronic components and working of basic measuring instruments	Remembering (C1)
CO2	Understand the input-output characteristics of BJT	Understanding (C2)
CO3	Verify Kirchhoff's laws and apply network theorems to solve DC circuit	Applying (C3)
CO4	Analyze operational amplifier in various configurations and characteristics of basic diodes including their applications	Analyzing (C4)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Introduction to basic electrical equipment and components	Introduction to various components (Resistor, Capacitor, Inductor, and IC) and instruments Multimeter, Bread board, Regulated D.C. power supply, and CRO.	CO1
2.	Basic Circuit Analysis	Verification of KVL and KCL using a given circuit.	CO3
3.	Basic Circuit Analysis	Verification of Superposition theorem.	CO3
4.	PN Junction diode and Applications	To study the forward bias I-V (current-voltage) characteristics of a simple p-n junction diode. Also determine the forward resistance of the diode	CO4

5.	PN Junction diode and Applications	To observe the output waveform of half/full wave rectifier and calculate its ripple factor and efficiency	CO4
6.	Zener diode and Applications	To study the reverse bias I-V (current-voltage) characteristics of a Zener diode. Also determine the breakdown voltage, static and dynamic resistances.	CO4
7.	Bipolar Junction Transistors	To plot input characteristics of a common emitter NPN BJT	CO2
8.	Bipolar Junction Transistors	To plot output characteristics of a common emitter NPN BJT	CO2
9	Operational Amplifier	To realize inverting and non inverting amplifier configuration using Op-Amp IC- 741	CO4
10.	Operational Amplifier	To realize adder and subtractor circuits using Op-Amp IC-741	CO4
11.	Basic Circuit Analysis	Verification of Thevenin's Theorem	CO3
12.	PN Junction diode and Applications	Realization of desired wave shapes using clipper and clamper circuits	CO4
13.	Virtual Lab Experiments	To plot input characteristics of a common collector NPN BJT.	CO2
14.	Virtual Lab Experiments	To plot output characteristics of a common collector NPN BJT.	CO2

Evaluation Criteria

Components	**Maximum Marks**
Mid Sem Viva	20
End Sem Viva	20
Day-to-day performance, Lab Record	60
Total	**100**

Project Based Learning: Students will learn working of basic electronic equipment and applications of basic circuit theorems and different semiconductor devices including diodes and transistors to design circuits for various applications.

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.	R. L. Boylestad, and L. Nashelsky, “Electronic Devices and Circuit Theory”, 11th Ed., Prentice Hall of India, 2014.
2.	D.C. Kulshreshtha, “Basic Electrical Engineering”, Revised 1st Ed., Tata McGraw Hill, 2017
3.	S.M. Sze, K.K. Ng, “Physics of Semiconductor Devices”, Wiley India, 3rd Ed., 2006.
4.	R. A. Gayakwad, “Op-Amps and Linear Integrated Circuits”, 4th Ed., Pearson, 2000.

Detailed Syllabus

Lecture-wise Breakup

Course Code	15B11EC211	**Semester** Odd	**Semester** 3rd **Session** 2024 -2025 **Month from** July to December
Course Name	Electrical Science-2		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Pimmy Gandotra, Abhijeet Upadhya
	Teacher(s) (Alphabetically)	Atul Kumar, Astha Sharma, Amrita Kaul, Aanchal Agarwal, Bhartendu Chaturvedi, Bhuvaneshwari S, Gaurav Verma, Jyoti Deshwal Yadav, Megha Agarwal, Manika Jha, Nidhi Tewari , Ravi, Rishibrind Upadhyay, Sajai Vir Singh, Shradha Saxena, Saurabh Chaturvedi, Vaishali Sharma, Vivek K. Dwivedi

COURSE OUTCOMES		**COGNITIVE LEVELS**
C203.1	Remember the complete response of the first order and second order circuits with energy storage and/or non-storage elements.	Remembering Level (C1)
C203.2	Understand two-port network parameters and operational amplifier, first-order & second-order filters.	Understanding Level (C2)
C203.3	Applying the concept of semiconductors in PN junction diode, Zener diode and its various applications.	Applying Level (C3)
C203.4	Analyzing the characteristics and operation of bipolar junction transistor (BJT) and its biasing, stability aspects.	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Transient Analysis	First-order RC/RL circuit analysis, sequential switching, differential equation approach for solving 1st and 2nd order network containing DC and Non constant source.	10
2.	Two Port Network Parameters	Introduction to Z, Y, h and Transmission two-port parameters and their conversions.	5
3.	Operational Amplifier and Filters	Introduction to Operational Amplifier and its applications, First-order and Second-order (Low Pass, High Pass, Band pass and Band Stop) Filters.	5

4.	Introduction to Semiconductor	Semiconductor Physics-Energy Band Model, Types of semiconductors, Drift Current, conductivity equations and Hall Effect.	6
5.	Diodes & it's Applications	P-N Junction diode, Biasing the PN Junction diode, Current–Voltage Characteristics of a P-N Junction, Half Wave Rectifier &Full Wave Rectifier, Clipper &Clamper Circuits, Zener Diode and its application as voltage regulator	8
6.	Introduction to Bipolar Junction Transistor	Transistor Construction and Basic Transistor Operation, Transistor Characteristics in different configuration (CE, CB, CC), Transistor Biasing & Stability.	8
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25
Total	**100**

Project Based Learning: Students will learn about the transient responses of the first/second order circuits, which is the utmost requirement for electronic circuit design. Also, the students with the knowledge of OP-AMP and filters, can design and analyse the circuits for the signal processing applications.

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.	R. C. Dorf and James A. Svoboda, "Introduction to Electric Circuits", 9thed, John Wiley & Sons, 2013.
2.	Charles K. Alexander, Matthew N.O. Sadiku, "Fundamentals of Electric Circuits", 6th Edition, Tata McGraw Hill, 2019.
3.	Abhijit Chakrabarti, Circuit Theory Analysis and Synthesis, 7thed, Dhanpat Rai &Co. 2018.
4.	Robert L.Boylestad, Louis Nashelsky, "Electronic Devices and Circuit Theory", 11thed, Prentice Hall of India, 2014.
5.	Jacob Millman, Millman's Electronic Devices and Circuits (SIE), 4thed, McGraw Hill Education, 2015.

Course Description
Lecture wise Breakup

Course Code	15B17EC271	**Semester :** Odd	**Semester :** III **Session :** 2024-2025 **Month :** July- December
Course Name	Electrical Science Lab-2		
Credits	1	**Contact Hours**	0-0-2

Faculty (Names)	**Coordinator(s)**	Atul Kumar, K. Nisha
	Teacher(s)	Abhijeet Upadhya, Bajrang Bansal, Bhartendu Chaturvedi, Megha Agarwal, Monika, Neetu Joshi, Pimmi Gandotra, Prabhanshu, Ravi Kumar, Rishibrind Upadhaya, Sajai Vir Singh, Saurabh Chaturvedi, Shraddha Saxena, Smriti Bhatnagar, Vishal N Saxena

COURSE OUTCOMES		**COGNITIVE LEVELS**
C204.1	Recall the basic concepts and terms about different equipment like CRO, function generator, multi meter, and components like resistor, capacitor, inductor, breadboard, diode, and transistor.	Remembering Level (C1)
C204.2	Illustrate the transient analysis of first order series RC circuits.	Understanding Level (C2)
C204.3	Experiment with different types of two-port network models and Op-amp configurations.	Applying Level (C3)
C204.4	Examine the characteristics of PN junction and Zener diodes and analyze their applications.	Analyzing Level (C4)
C204.5	Explain the characteristics of a BJT in different configurations like common emitter and common base.	Evaluating Level (C5)

Module No.	**Title of the Module**	**List of Experiments**	**COs**
1.	Introduction: Basic equipment & first order passive circuits	To study the basic concepts and terms about different equipment like CRO, function generator, Regulated D.C. power supply and multimeter.	C204.1
		To study the transient response of a series RC circuit and the time constant concept using pulse waveforms.	C204.2
2.	Two port resistive networks	To determine the Z-parameters of a two- port resistive network.	C204.3
		To determine the h-parameters of a two-port resistive network.	C204.3
3.	Operational amplifier and its applications	To realize inverting and non inverting configurations using Op-Amp IC 741 amplifier.	C204.3
		To realize an adder and subtractor circuits using Op-Amp IC 741 amplifier.	C204.3
4.	PN junction and Zener diodes	To study the forward and reverse bias (volt-ampere) characteristics of a simple p-n junction diode. Also determine the forward resistance of the diode.	C204.4
		To study the forward and reverse bias volt-ampere characteristics of a Zener diode. Also determine the breakdown voltage, static and dynamic resistances.	C204.4

5.	Diode applications	To observe the output waveform of half/full wave rectifiers and calculate its ripple factor and efficiency.	C204.4
		Realization of desired wave shapes using clipper and clamper circuits.	C204.4
		To study Zener voltage regulator and calculate percentage regulation for line regulation and load regulation.	C204.4
6.	Bipolar Junction Transistor	To plot input characteristics of a common emitter npn BJT.	C204.5
		To plot output characteristics of a common emitter npn BJT.	C204.5
		To plot input characteristic of a BJT in Common Base Configuration.	C204.5
		To plot output characteristic of a BJT in Common Base Configuration.	C204.5
7.	First order filters	To plot frequency and phase response of First order low pass and high pass filters.	C204.5

Evaluation Criteria

Components	**Maximum Marks**
Viva1	20
Viva2	20
Attendance and D2D	60 (15+45)
Total	**100**

Project Based Learning: Students will learn about the transient response of first and second order passive circuits. Also, students will learn about Op-amp and its applications like adder and subtractor circuits. This course also gives the understanding of semiconductor diode and Bipolar Junction Transistor. These concepts are required for Electronic circuits design.

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.	R.C.Dorf, A. Svoboda, "Introduction to Electric Circuits",9th ed, John Wiley & Sons, 2013.
2.	D. Roy Choudhary and Shail B. Jain, "Linear Integrated Circuit," 2nd Edition, NAILP, 2003
3.	A.S .Sedra & K.C.Smith, Microelectronic Circuits Theory and Application, 6th Edition, Oxford University Press, 2015(Text Book)

Detailed Syllabus
Lecture-wise Breakup

Course Code	18B11EC214	**Semester** Odd **(specify Odd/Even)**	**Semester** III **Session**2024-25 **Month from** July. to December
Course Name	Signals & Systems		
Credits	4	**Contact Hours**	3+1

Faculty (Names)	**Coordinator(s)**	Dr. Parul Arora, Dr. Rahul Kaushik
	Teacher(s) (Alphabetically)	Dr. Ajay Kumar, Dr. Kuldeep Baderia, Dr. Madhu Jain, Dr Vineet Khandelwal

COURSE OUTCOMES: At the end of the course, students will be able to		**COGNITIVE LEVELS**
C210.1	Recall the mathematical representation, classification, applications and analyze both continuous-time (CT) and discrete-time (DT) signals and systems.	Remembering Level (C1)
C210.2	Interpret the response of CT and DT LTI systems in time domain.	Understanding Level (C2)
C210.3	Apply the use of different frequency domain transforms to examine and explain the spectral representation of the CT and DT signals and systems.	Applying Level (C3)
C210.4	Analyze Laplace transform and Z-transform for the response and behavior of the CT and DT systems.	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Signals and their classifications	Signal: definition, Classifications of Signals (Continuous-time & Discrete-time, Analog & Digital, Energy & Power, Deterministic & Random, Periodic & Aperiodic, Even and Odd etc.)	4
2.	Systems and their classifications	Classifications of Systems Classifications of Systems (Linear & Nonlinear, Time invariant & Time varying, Causal & Non- causal, Memory & Memory less, Stable & unstable system), LTI Systems (continuous-time and discrete-time)	5
3.	Response of LTI system	Impulse response of a system, Response of LTI system, Convolution (Integral and Sum).	5
4.	Fourier analysis of Continuous time signal and system	Continuous Transforms Fourier series, Convergence of Fourier series, Continuous-time Fourier Transform, properties of Fourier series and Transform, Frequency domain analysis of continuous time LTI system	7
5.	Fourier analysis of Discrete time signal and system	Discrete Transforms Fourier series, Convergence of Fourier series, Discrete-time Fourier Transform, properties of Discrete-time Fourier series and Transform, Frequency domain analysis of discrete-time LTI system	7

6.	Laplace Transform	Laplace Transform, Concept of ROC and Transfer function, pole-Zero plot, properties Laplace Transform, solution of differential equations using Laplace Transform, System function, Laplace approach to analysis the LTI system, stability analysis	7
7.	Z-transform	Z- Transform, Concept of ROC, properties Z- Transform, solution of difference equations using Z- Transform, System function, pole-Zero plot , Z- Transform approach to analysis the Discrete-time LTI system, stability analysis of Discrete-time LTI system	6
8.	Introduction to Digital Filters: FIR & IIR	Digital filters:- definition and frequency response of basic filtering function like BP, HP, LP, BR, AP Definition and representation of IIR and FIR digital filter	1
		Total number of lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25
Total	**100**

Project Based Learning: This course's primary learning purpose is for students to be able to analyze various signal types, their transformations, and their implementation. This course also covers the design and response of several types of signal transform. The opinions of students were acquired through a course exit survey conducted at the completion of the course.

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.	A.V. Oppenheim, A.S. Willsky & S.H. Nawab, Signals & Systems, Pearson New International Edition, 2/e, 2015.
2.	H.P. Hsu, Schaum's outlines of signals and systems, 2nd edition, McGraw Hill; 2011.
3.	S. Haykin& B. Van Veen, Signals and Systems, 2nd edition, John Wiley & sons, 2004.
4.	M. Mandal, Amir Asif, Continuous and Discrete Time Signals and Systems, Cambridge, 2007.
5.	M. J. Roberts, Signals and Systems, Tata Mcraw-Hill, 2003.
6.	TarunRawat, Signals and Systems, Oxford University Press, 2010.
7.	J. G. Proakis & D. G. Manolakis, Digital Signal Processing, Principles, Algorithms and Applications, Fourth edition, PHI, 2007.
8.	Kumar, A. Anand. Signals and systems. PHI Learning Pvt. Ltd., 2013.

Detailed Syllabus
Lab-wise Breakup

Course Code	18B15EC214	**Semester** ODD **(specify Odd/Even)**	**Semester:** III **Session:** 2024-2025 **Month:** July to December
Course Name	Signals and Systems Lab		
Credits	1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	B. Suresh, Saurabh Chaturvedi
	Teacher(s) (Alphabetically)	Bhawna Gupta, Kuldeep Baderia, Madhu Jain, Rahul Kaushik, Vijay Khare, Ritesh Sharma, Ritu Raj, Saurabh Chaturvedi, Megha Agarwal,Bajrang Bansal,

COURSE OUTCOMES: At the end of the course, students will be able to		**COGNITIVE LEVELS**
C270.1	Demonstrate MATLAB for generation of continuous time signals & discrete time signals and SIMULINK for realization of systems described by differential & difference equations	Understanding Level (C2)
C270.2	Apply the coding skills of MATLAB for convolution of continuous time signals and discrete time signals for DFT and IDFT.	Applying Level (C3)
C270.3	Analyze different LTI systems with frequency domain representation of continuous time and discrete time periodic and aperiodic signals.	Analyzing Level (C4)
C270.4	Determine Laplace transform of continuous time signals and Z-transform of discrete time signals.	Evaluating Level (C5)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	Understanding of MATLAB and its use in continuous time and discrete time signals	Introduction to MATLAB and its various applications.	C270.1
2.	Study and classification of continuous time signals	Introduction to continuous time (CT) signals.	C270.1
3.	Study and classification of discrete time signals	Introduction to discrete time (DT) signals.	C270.1
4.	Study of parts ofsignals	Introduction to even and odd parts of signals.	C270.1
5.	Study of plotting of different signals using MATLAB	Write MATLAB codes for generating and plotting various combinations of the two signals and perform time scaling,time shifting, time reversal and multiple transformations.	C270.1
6.	Study and calculation of power and energy of	Write MATLAB codes for finding the signal energy and power of signals.	C270.1

	signals using MATLAB		
7.	Apply the concepts of MATLAB in finding the convolution sum of signals	To calculate the convolution sum of two discrete time signals.	C270.2
8.	Apply the concepts of MATLAB in finding the convolution sum of signals	To calculate the convolution integral of two continuous time signals.	C270.2
9.	Analyze different LTI systems with frequency domain representation	Realization of LTI system and verify it.	C270.3
10.	Analyze frequency domain representation of continuous time and discrete time periodic signals	Determine frequency domain representation of CT and DT periodic signals.	C270.3
11.	Analyze different LTI systems with frequency domain representation of continuous time and aperiodic signals	Determine frequency domain representation of CT and DT aperiodic signals.	C270.3
12.	Analyze and realize discrete Fourier transform and inverse discrete Fourier transform	Write your own MATLAB function to compute discrete Fourier transform (DFT) and inverse discrete Fourier transform (IDFT) for the spectral analysis of signals.	C270.3
13.	Determine Laplace transform of continuous time signals	Find out output y(t) of the system where input is x(t) and impulse response is h(t) using Laplace transform. Also, find the ROC of the transform.	C270.4
14.	Determine Z-transform of discrete time signals	Find out output y[n] of the system where input is x[n] and impulse response is h[n] using Z-transform. Also, find the ROC of the transform. Verify answer using MATLAB commands ztrans and iztrans. Check stability of the system using MATLAB.	C270.4
15.	Introduction to SIMULINK	Introduction to SIMULINK and to realize systems described by differential and difference equations.	C270.4
16.	Understanding of MATLAB and its use in signals	Virtual Lab: 1. Signals and their properties	C270.1
17.	Understanding of MATLAB and its use in systems	Virtual Lab: 2. System and their properties	C270.3
18.	Understanding of MATLAB and its use in frequency domain	Virtual Lab: 3. Fourier analysis of signals	C270.3

	representation of signals		

Evaluation Criteria

Components	**Maximum Marks**
Viva 1 (Mid Sem. Viva)	20
Viva 2 (End Sem. Viva)	20
Assessment Components	20
Attendance	15
Lab Record	15
Virtual Lab Experiments	10
Total	**100**

Project-Based Learning: Every Student will learn analyzing different LTI systems with frequency domain representation of continuous time and discrete time periodic and aperiodic signals. Moreover, small groups of students are required to develop one Simulink model to realize systems described by differential anddifference equations.

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.	J .G. Proakis and D. G. Manolakis, *Digital Signal Processing: Principles, Algorithms, and Applications*, Third Edition, Prentice Hall, 1999.
2.	A. V. Oppenheim and R. W. Schafer, *Discrete-Time Signal Processing*, Second Edition, Prentice Hall, 1999.
3.	Sanjit K. Mitra, *Digital Signal Processing: With DSP Laboratory Using MATLAB: A Computer-Based Approach*, Second Revised Edition, TMH, 2001.

Detailed Syllabus
Lecture-wise Breakup

Course Code	18B15EC215	**Semester:** Odd **(specify Odd/Even)**	**Semester:** 3rd **Session** 2024-25 **Month from:** July to December
Course Name	Digital Circuit Design		
Credits	4	**Contact Hours**	3 + 1

Faculty (Names)	**Coordinator(s)**	Prof. Ashish Goel and Dr. Priyanka Gandhi
	Teacher(s) (Alphabetically)	Mr. Atul Kr. Shrivastava, Dr. Gaurav Khanna, Dr. Hemant Kumar, Prof. Jasmine Saini,

COURSE OUTCOMES - At the end of the course, students will be able to:		**COGNITIVE LEVELS**
C271.1	Remember conversion of various number systems and binary codes.	Remembering Level (C1)
C271.2	Understand Boolean algebra and its minimization techniques. Understand fundamentals of programmable logic devices and digital logic families.	Understanding Level (C2)
C271.3	Applying basic concepts of Boolean Algebra to construct combinational and sequential logic circuits. Applying timer IC to classify wave shaping circuits.	Applying Level (C3)
C271.4	Analysis of sequential circuits using flip- flops. Develop skills to analyze Finite state machines using logic circuits.	Analysing Level (C4)
C271.5	Design Finite state machines using concepts of combinational and sequential circuits.	Evaluating Level (C5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures
1	Introduction to Digital Systems, Binary Codes and Boolean Algebra	Digital systems, Importance, Analog vs. digital world; Conversion of bases, Representation of negative numbers, 9's and 1's complements, 10's and 2's complements, Arithmetic using 1's and 2's complements; Hexadecimal code, BCD, Excess-3 code, Gray code and Alphanumeric code; Basic theorems and properties of Boolean algebra; Digital logic gates.	4
2	Boolean Function Representation and Minimization Techniques	Canonical and standard forms; Prime implicants and essential prime implicants; Minimization of Boolean functions using Karnaugh map and Quine-McCluskey technique; Two-level gate implementation.	5
3	Combinational logic circuits	Binary adders and subtractors: Half adder, full adder, half subtractor, full subtractor, full adder using half adder, parallel adder, adder cum subtractor, look ahead carry adder; Circuit delay calculation; Magnitude comparator; Decoder and encoder; Multiplexer and demultiplexer; Binary multiplier; Code converters.	10

4	Sequential logic circuits	Latches and flip-flops: SR, JK, master-slave JK, T and D; Conversion of flip-flops; Synchronous and asynchronous counters; Registers and shift registers; Counters using shift registers; State diagram; Analysis of sequential circuits using flip- flops.	10
5	State machines	Finite state machine of sequential circuits - Moore and Mealy machines.	5
6	Programmable logic devices	RAMs- DRAM, SRAM and ROM. PLDs: PLAs, PALs and PROMs.	3
7	Introduction to digital logic families	Parameters of logic families, Types- DTL, RTL, TTL, CMOS.	3
8	Wave shaping circuits	Linear wave shaping circuits, Schmitt trigger, Square wave generator, IC-555 based Multi vibrators.	2
Total Lectures			42

Evaluation Criteria

Components	**Maximum Marks**
Test 1	20 Marks
Test 2	20 Marks
End Term	35 Marks
Teacher Assessment	25 Marks [Assignment 1: 6, Assignment 2: 9, Regularity and proficiency: 10]
Total	**100**

Project based learning: Digital Circuit Design is a fundamental course in Electronics and Communication Engineering. In this course, a description of the effective and innovative logic circuit design is presented, which can be utilized to design various logic circuits. The project-based exercises using Boolean logic functions, constructing a truth table, assembling the logic gates, counters design and FSM are also included.

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.	M. Morris Mano, “Digital logic and computer design,” 5th ed., Pearson Prentice Hall, 2013.
2.	M. Morris Mano and Michael D. Ciletti, “Digital Design with an Introduction to the Verilog Hdl,” 5th Edition, Pearson Education, 2013.
3.	R. P. Jain, “Modern Digital Electronics,” 4th Edition, Tata McGraw-Hill Education, 2009.
4.	A. Anand Kumar, “Fundamentals of Digital Circuits,” PHI; 4th Revised edition, 2016.

Detailed Syllabus
Lab-wise Breakup

Course Code	18B15EC215	**Semester:** Odd **(specify Odd/Even)**	**Semester:** 3rd **Session** 2024-25 **Month from:** July to December
Course Name	Digital Circuit Design Lab		
Credits	1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Dr. Hemant Kumar, Dr. Priyanka Kwatra
	Teacher(s) (Alphabetically)	Dr. Jasmine Saini, Dr. Abhijeet Upadhyay, Dr. Shivani, Abhay Pratap Singh, Dr. Gaurav Khanna, Dr. Ashish Goel

COURSE OUTCOMES - At the end of the course, students will be able to:		**COGNITIVE LEVELS**
C271.1	Remember the truth tables of logic gates and verify the same using important digital ICs	Remembering Level (C1)
C271.2	Understand the universal behaviour of NAND and NOR gates and implement the basic logic gates using universal gates	Understanding Level (C2)
C271.3	Apply the concepts of logic gates to realize various combinational logic circuits such as comparator and decoders	Applying Level (C3)
C271.4	Analyze the behaviour of sequential logic circuits such as Flip-flops and counters	Analyzing Level (C4)
C271.5	Design wave shaping circuits for a given specification	Evaluating Level (C5)

Module No.	Title of the Module	List of Experiments	CO
1.	Nomenclature and specifications of digital ICs	Introduction to Digital Circuit Design Lab: Nomenclature of Digital ICs, specifications, study of the data sheet, concept of V_{CC} and ground, verification of the truth tables of logic gates using ICs.	C271.1
2.	Implementation of basic logic gates	(a) To understand and implement basic logic gates AND, OR, NOT using NAND and NOR gates (b) To implement Ex-OR gate using NOR gates only (c) To implement the Boolean expression(s) using NAND gates	C271.2
3.	Combinational Logic circuits	To realize 4-bit Binary to Gray and Gray to Binary Code Converters applying the concepts of logic gates	C271.3
4.	Combinational Logic circuits	To realize a Half Adder, Full Adder and Half Subtractor applying the concept of logic gates	C271.3
5.	Combinational Logic circuits	To realize a 2-bit Multiplier applying applying the concept of logic gates	C271.3
6.	Combinational Logic circuits	To realize and implement 2-bit Magnitude Comparator using logic gates.	C271.3
7.	Combinational Logic circuits	To realize 4:1 Multiplexer using NAND gates.	C271.3
8.	Combinational Logic circuits	To realize 2:4 Decoder using basic logic gates and to realize Half Adder using 2:4 Decoder as a block.	C271.3
9.	Seven-segment display	Display decimal digit between 0-9 on seven segment using BCD Decoder IC-7447.	C271.3
10.	Sequential Logic	To analyze and verify the truth table of SR, Gated SR, Gated D	C271.4

	circuits	Latch using logic gates and of JK flip flop using IC-74LS76.	
11.	Sequential Logic circuits	To analyze a Ripple Counter (Asynchronous) using JK flip flop IC-74LS76 and display the output on seven segment.	C271.4
12.	Sequential Logic circuits	To design and implement counting sequence 0, 7, 1, 6, 2, 5, 0, 7…. (Repeating) using IC-74LS76.	C271.5
13.	Wave shaping circuits	Using IC-555 in Astable mode to generate a rectangular pulse of 1ms period with duty cycle 75%.	C271.5

Evaluation Criteria

Components	**Maximum Marks**
Mid Sem Viva	20
End Sem Viva	20
Day-to-day performance, Lab Record	60
Total	**100**

Project Based Learning: The main learning objective of this Lab course is that students should be able to analyze and design simple combinational and sequential circuits by means of logic gates. Students' opinions have been obtained by means of course exit survey at the end of the course.

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.	M. Morris Mano, Digital logic and computer design, 5th ed., Pearson Prentice Hall, 2016.
2.	R. P. Jain, "Modern Digital Electronics," 4th Edition, Tata McGraw-Hill Education, 2022.
3.	A. Anand Kumar, "Fundamentals of Digital Circuits," PHI; 4th Revised edition, 2016.

Probability and Random Processes (15B11MA301)

Conditional probability, Bayes theorem, random variables, probability and cumulative density functions, MGF and CF, joint, marginal and conditional distributions, probability distributions, Bernoulli, Binomial, Poisson, Negative binomial, Geometric distributions. Uniform, Exponential, Normal, Gamma, Earlang, Weibull distributions, reliability, MTTF, system reliability, random processes, averages, stationary processes, random walk, Wiener process, semi-random telegraph signal process, ergodic processes, PSDF, Poisson processes, Markov chains.

Course Description

Course Code	15B11MA301	**Semester** Odd	**Semester** III **Session** 2024-2025 **Month from** Aug 2024 - Dec 2024
Course Name	Probability and Random Processes		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Prof. B.P.Chamola	
	Teacher(s) (Alphabetically)	Prof. B.P.Chamola, Dr. Yogesh Gupta, Prof. Pato Kumari, Dr. Dinesh CS Bisht, Dr. Manish Kr. Bansal	

COURSE OUTCOMES:		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C201.1	recall the concepts of probability theory and probability distributions.	Remembering Level (C1)
C201.2	explain random variables, probability distributions and reliability models.	Understanding Level (C2)
C201.3	solve the problems concerning random variables, their distributions, reliability models and random processes.	Applying Level (C3)
C201.4	examine random process models and solve the related problems.	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Probability	Three basic approaches to probability, conditional probability, total probability theorem, Bayes' theorem.	5
2.	Random Variables	One dimensional random variables (discrete and continuous), distribution of a random variable (density function and cdf). MGF and characteristic function of a random variable and its utility. Bivariate random variable, joint, marginal and conditional distributions, covariance and correlation.	8
3.	Probability Distributions	Bernoulli, binomial, Poisson, negative binomial, geometric distributions. Uniform, exponential, normal, gamma, Earlang and Weibull distributions.	8
4.	Reliability	Concept of reliability, reliability function, hazard rate function, mean time to failure (MTTF). Reliability of series, parallel, series-parallel, parallel-series systems.	6
5.	Random Processes I	Introduction, Statistical description of random processes, Markov processes, processes with	7

		independent increments. Average values of random processes. Strict sense and wide sense stationary processes, their averages. Random walk, Wiener process. Semi-random telegraph signal and random telegraph signal process. Properties of autocorrelation function.	
6.	Random Processes II	Ergodic processes. Power spectral density function and its properties. Poisson processes. Markov chains and their transition probability matrix (TPM).	8
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 4-6 will apply the concept of probability distributions of random variables and reliability models arising in different real-life situations.

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.	**Veerarajan, T.,** Probability, Statistics and Random Processes, 3rd Ed. Tata McGraw-Hill, 2008.
2.	**Papoulis, A. & Pillai, S.U.,** Probability, Random Variables and Stochastic Processes, Tata McGraw-Hill, 2002.
3.	**Ross, S. M.,** Introduction to Probability and Statistics for Engineers and Scientists, 4th Ed., Elsevier, 2004.
4.	**Palaniammal, S.,** Probability and Random Processes, PHI Learning Private Limited, 2012.
5.	**Prabha, B. and Sujata, R.,** Statistics, Random Processes and Queuing Theory, 3rd Ed., Scitech, 2009.

CO-PO-PSO mapping

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
C201.1	1	2	1	1								2		
C201.2	2	2	2	1								2		
C201.3	3	2	3	2					1			2		
C201.4	3	3	3	2								2		
Avg	**2.3**	**2.3**	**2.3**	**1.5**					**1**			**2**		

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11HS211	**Semester :ODD (specify Odd/Even)**	**Semester** :III **Session 2024-25** Month from: July-December
Course Name	Economics		
Credits	03	**Contact Hours**	2-1-0

Faculty (Names)	**Coordinator(s)**	Dr.Amba Agarwal(Sec 128) & Dr. Amandeep Kaur(Sec 62)
	Teacher(s) (Alphabetically)	Dr.Anshu Banwari Dr. Amandeep Kaur Dr. Amba Aggarwal Dr. Kanupriya Misra Bakhru Dr. Manas Behera Dr. Mukta Mani Dr. Neha Singh Dr. Vandana Sehgal Dr. Praveen Sharma Dr.Purwa Srivastava Dr. Sakshi Varshney

COURSE OUTCOMES		**COGNITIVE LEVELS**
C206.1	*Understand* the fundamental concepts of micro and macro economics.	Understanding Level(C2)
C206.2	*Apply* the concepts of opportunity cost, national income accounting and various business forecasting methods.	Applying Level (C3)
C206.3	*Analyze* the concepts of demand, supply, market equilibrium, consumer choices and production in micro-economic decision making.	Analyzing Level (C4)
C206.4	*Evaluate* the different market structures and their implications on the behavior of the firm.	Evaluating Level(C5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Economics Definition, Basic economic problems, Resource constraints and welfare maximization. Micro and Macro economics. Production Possibility Curve. Circular flow of economic activities.	2
2.	Basics of Demand, Supply and Equilibrium	Demand side and supply side of the market. Factors affecting demand & supply. Elasticity of demand & supply – price, income and cross-price elasticity. Market equilibrium price.	6
3.	Theory of Consumer Choice	Theory of Utility and consumer's equilibrium. Indifference Curve analysis, Budget Constraints, Consumer Equilibrium.	2
4.	Demand forecasting	Regression Technique Time-series Smoothing Techniques: Exponential, Moving Averages Method	4

5.	Production theory and analysis	Production function. Isoquants, Isocostlines, Optimal combination of inputs. Stages of production, Law of returns, Return to scale.	2
6.	Cost Theory and Analysis	Nature and types of cost. Cost functions- short run and long run Economies and diseconomies of scale	2
7.	Market Structure	Market structure and degree of competition Perfect competition Monopoly Monopolistic competition Oligopoly	6
8	National Income Accounting	Overview of Macroeconomics, Basic concepts of National Income Accounting,	2
9	Macro Economics Issues	Introduction to Business Cycle, Inflation-causes, consequences and remedies: Monetary and Fiscal policy.	2
		Total number of Lectures	28 (lectures)

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz+ Project+ Class Participation)
Total	**100**

Project based learning: Students have to form a group (maximum 5 students in each group) and have to do an economic analysis on the topic assigned. An economic impact analysis assesses the impact of an event on the economy in a particular area. It generally measures the effect on revenue, profits, wages and jobs. The knowledge gained in conducting economic analysis will enhance student's decision-making 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.	H.C. Petersen, W.C. Lewis, *Managerial Economics*, 4th ed., Pearson Education 2001.
2.	D. Salvatore, Managerial Economics in a Global Economy, 8th ed., Oxford University Press, 2015.
3.	S. Damodaran, Managerial Economics, 2 nd ed., Oxford University Press, 2010.
4.	M. Hirschey, Managerial Economics, 12th ed., Cengage India, 2013.
5.	P.A. Samuelson, W.D. Nordhaus, S. Nordhaus,Economics,18th ed., Tata Mc-Graw Hill, 2006.
6.	S.K. Misra& V. K. Puri, Indian Economy, 38th ed., Himalaya Publishing House, 2020.