DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Bachelor of Technology in Electronics & Computer Engineering

Detailed Course Structure & Curriculum

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, SOLAN								
COURSE CURRICULUM OF ELECTRONICS AND COMPUTER ENGINEERING (Effective from 2021-22 Session)								
B. TECH (Electronics and Computer Engineering) 1st SEMESTER								
S. No.	**Category Code**	**Subject Code**	**Name of the Subjects**	**Course Hours**			**Credits**	**Total Hours**
				L	**T**	**P**		
1	HSS	21B11HS111	English	2	0	0	**2**	**2**
2	HSS	21B17HS171	English Lab	0	0	2	**1**	**2**
3	Basic Sciences	18B11MA111	Engineering Mathematics -1	3	1	0	**4**	**4**
4	Basic Sciences	18B11PH111	Engineering Physics-I	3	1	0	**4**	**4**
5	Basic Sciences	18B17PH171	Engineering Physics Lab-I	0	0	2	**1**	**2**
6	Engg Science	18B11CI111	Programming for Problem Solving	2	0	0	**2**	**2**
7	Engg Science	18B17GE173	Engineering Graphics **OR**	0	0	3	**1.5**	**3**
		18B17GE171	Workshop Practices					
8	Engg Science	19B17CI171	Programming for Problem Solving Lab	0	0	4	**2**	**4**
9		18B17GE172	Mandatory Induction Program				**0**	**0**
						Total	**17.5**	**23**
B. TECH (Electronics and Computer Engineering) 2nd SEMESTER								
S.No.		**Subject Code**	**Name of the Subjects**	**Course Hours**			**Credits**	**Total Hours**
				L	**T**	**P**		
1	Basic Sciences	18B11MA211	Engineering Mathematics -II	3	1	0	**4**	**4**
2	Basic Sciences	18B11PH211	Engineering Physics-II	3	0	0	**3**	**3**
3	Basic Sciences	18B11PH271	Engineering Physics Lab II	0	0	2	**1**	**2**
4	Engg Science	18B11EC211	Electrical Science	3	1	0	**4**	**4**
5	Engg Science	18B17EC271	Electrical Science Lab	0	0	2	**1**	**2**
6	Engg Science	18B17GE171	Workshop Practices **OR**	0	0	3	**1.5**	**3**
		18B17GE173	Engineering Graphics					
7	Engg Science	18B17CI211	Data Structures and Algorithms	3	1	0	4	4
8	Engg Science	18B17CI271	Data Structures and Algorithms Lab	0	0	2	**2**	**4**
9	HSS	21B11HS211	Life Skills & Effective Communication	1	0	0	**1**	**1**
10	HSS	21B17HS271	Life Skills & Effective Communication Lab	0	0	2	**1**	**2**
						Total	**22.5**	**29**

B. TECH (Electronics and Computer Engineering) 3rd SEMESTER								
S. No.	**Category Code**	**Subject Code**	**Name of the Subjects**	**Course Hours**			**Credits**	**Total Hours**
				L	**T**	**P**		
1	HSS	21B11HS312	Interpersonal Dynamics, Values and Ethics	1	0	0	**1**	**1**
2	Basic Sciences	18B11MA311	Probability Theory and Random Processes	3	1	0	**4**	**4**
3	Engg Science	20B11EM311	Object Oriented Programming Concepts	3	0	0	**3**	**3**
4	Engg Science	20B17EM371	Object Oriented Programming Concepts Lab	0	0	2	**1**	**2**
5	PC	20B11EM312	Digital Electronics	3	0	0	**3**	**3**
6	PC	20B17EM372	Digital Electronics Lab + Verilog	0	0	2	**1**	**2**
7	PC	18B11EC313	Electronic Devices and Circuits	3	1	0	**4**	**4**
8	PC	18B17EC373	Electronic Devices and Circuits Lab	0	0	2	**1**	**2**
9	PC	20B17EM373	Network Simulation Lab (LabView and MATLAB)	0	0	2	1	2
10	HSS	21B11HS311	Professional Communication Practice	0	0	0	Audit	2
						Total	**19**	**25**

B. TECH (Electronics and Computer Engineering) 4th SEMESTER								
S. No.	**Category Code**	**Subject Code**	**Name of the Subjects**	**Course Hours**			**Credits**	**Total Hours**
				L	**T**	**P**		
1	HSS	18B11HS411	Finance and Accounts	3	0	0	**3**	**3**
2	Basic Sciences	18B11MA411	Discrete Mathematics	3	0	0	**3**	**3**
3	Engg Science	18B17EC474	Python Lab	0	0	2	**1**	**2**
4	PC	18B11CI412	Design and Analysis of Algorithms	3	0	0	**3**	**3**
5	PC	20B11EM411	Microprocessor Microcontrollers and Interfacing Techniques	3	1	0	**4**	**4**
6	PC	20B11EM412	Signals and Systems	3	1	0	**4**	**4**
7	PC	18B17CI472	Design and Analysis of Algorithms Lab	0	0	2	**1**	**2**
8	PC	20B17EM471	Microprocessor Microcontrollers and Interfacing Techniques Lab	0	0	2	**1**	**2**
9	PC	20B17EM472	Signals and Systems Lab	0	0	2	**1**	**2**
10	PC	18B11GE411	Environmental Studies	2	0	0	**0**	**2**
						Total	**21**	**27**

B. TECH (Electronics and Computer Engineering) 5th SEMESTER								
S. No.	**Category Code**	**Subject Code**	**Name of the Subjects**	**Course Hours**			**Credits**	**Total Hours**
				L	**T**	**P**		
1	HSS	18B11HS511	Project Management and Entrepreneurship	3	0	0	**3**	**3**
2	PC		Operating Systems	3	0	0	**3**	**3**
3	PC		Theory of Computation	3	0	0	**3**	**3**
4	PC		Theory of Computation Lab	0	0	2	**1**	**2**
5	PC		Communication Systems	3	0	0	**3**	**3**
6	PC		Operating Systems Lab	0	0	2	**1**	**2**
7	PC		Communication Systems Lab	0	0	2	**1**	**2**
8	Engg Science		Science Elective	3	0	0	**3**	**3**
9	PE		Professional Elective I	3	0	0	**3**	**4**
						Total	**21**	**25**

B. TECH (Electronics and Computer Engineering) 6th SEMESTER								
S. No.	**Category Code**	**Subject Code**	**Name of the Subjects**	**Course Hours**			**Credits**	**Total Hours**
				L	**T**	**P**		
1	PC		Compiler Design	3	0	0	**3**	**3**
2	PC		Computer Organization and Architecture	3	0	0	**3**	**3**
3	PC		Complier Design Lab	0	0	2	**1**	**2**
4	PC		Mini Project	0	0	6	**3**	**6**
5	PC		Database Systems	3	0	0	**3**	**3**
6	PC		Database Systems Lab	0	0	2	**1**	**2**
7	OE		Open Elective I (HSS Elective)	3	0	0	**3**	**3**
8	PE		Professional Elective II	3	0	0	**3**	**4**
9			Industrial Training				**0**	**0**
						Total	**20**	**26**

B. TECH (Electronics and Computer Engineering) 7 th SEMESTER								
S. No.	**Category Code**	**Subject Code**	**Name of the Subjects**	**Course Hours**			**Credits**	**Total Hours**
				L	**T**	**P**		
1	Project		Project Part-I				**7**	**7**
2	HSS		Indian Constitution	1	0	0	**0**	**1**
3	OE		Open Elective II	3	0	0	**3**	**3**
4	OE		Open Elective III	3	0	0	**3**	**3**
5	PE		Professional Elective DE III	3	0	0	**3**	**4**
6	PE		Professional Elective DE-IV	3	0	0	**3**	**4**
						Total	**19**	**22**

B. TECH (Electronics and Computer Engineering) 8 th SEMESTER								
S. No.	**Category Code**	**Subject Code**	**Name of the Subjects**	**Course Hours**			**Credits**	**Total Hours**
				L	**T**	**P**		
1	OE		Open Elective IV	3	0	0	**3**	**3**
2	PE		Professional Elective DE-V	3	0	0	**3**	**4**
3	PE		Professional Elective DE-VI	3	0	0	**3**	**4**
4	PE		Professional Elective DE-VII	3	0	0	**3**	**4**
5	Project		Project Part II				**8**	**8**
							20	**23**
			TOTAL CREDITS				**160**	
			TOTAL HOURS				**197**	
			HSS				**12**	
			Basic Science				**24**	
			Engg Science				**26**	
			Professional Core				**50**	
			Professional Elective				**21**	
			Open Elective				**12**	
			Project				**15**	

B. TECH (Electronics and Computer Engineering) --ELECTIVES								
	ELECTIVE-I							
S. No.	Category Code	Subject Code	Name of the Subjects	Course Hours			Credits	Total Hours
				L	T	P		
1	PE		Telecommunication and Switching network	2	0	0	2	2
2	PE		Telecommunication and Switching network Lab	0	0	2	1	2
3	PE		Java Programming	2	0	0	2	2
4	PE		Java Programming lab	0	0	2	1	2
5	PE		Information Theory & Coding	2	0	0	2	2
6	PE		Information Theory & Coding lab	0	0	2	1	2
7	PE		Network Analysis and Synthesis	2	0	0	2	2
8	PE		Network Analysis and Synthesis Lab	0	0	2	1	2
						Total	3	4
	ELECTIVE-II							
S. No.	Category Code	Subject Code	Name of the Subjects	Course Hours			Credits	Total Hours
				L	T	P		
1	PE		Control Systems	2	0	0	2	2
2	PE		Control Systems Lab	0	0	2	1	2
3	PE		Artificial Intelligence	2	0	0	2	2
4	PE		Artificial Intelligence Lab	0	0	2	1	2
5	PE		Multimedia Communication	2	0	0	2	2
6	PE		Multimedia Communication lab	0	0	2	1	2
7	PE		Digital Signal Processing	2	0	0	2	2
8	PE		Digital Signal Processing lab	0	0	2	1	2
9	PE		Embedded Systems Design	2	0	0	2	2
10	PE		Embedded Systems Lab	0	0	2	1	2
11	PE		Wireless Communication and Computing	2	0	0	2	2
12	PE		Wireless Communication and Computing Lab	0	0	2	1	2
						Total	3	4

	ELECTIVE-III							
S. No.	**Category Code**	**Subject Code**	**Name of the Subjects**	**Course Hours**			**Credits**	**Total Hours**
				L	**T**	**P**		
1	PE		Machine Learning	2	0	0	**2**	**2**
2	PE		Machine Learning Lab	0	0	2	**1**	**2**
3	PE		Next Generation Telecom Networks	2	0	0	**2**	**2**
4	PE		Next Generation Telecom Networks Lab	0	0	2	**1**	**2**
5	PE		Wireless Sensor Networks	2	0	0	**2**	**2**
6	PE		Wireless Sensor Networks Lab	0	0	2	**1**	**2**
7	PE		Data Mining and Predictive Analysis	2	0	0	**2**	**2**
8	PE		Data Mining and Predictive Analysis Lab	0	0	2	**1**	**2**
						Total	**3**	**4**

	ELECTIVE-IV							
S. No.	**Category Code**	**Subject Code**	**Name of the Subjects**	**Course Hours**			**Credits**	**Total Hours**
				L	**T**	**P**		
1	PE		Neural Networks and Fuzzy Logic	2	0	0	**2**	**2**
2	PE		Neural Networks and Fuzzy Logic Lab	0	0	2	**1**	**2**
3	PE		Software Defined Networking	2	0	0	**2**	**2**
4	PE		Software Defined Networking Lab	0	0	2	**1**	**2**
5	PE		Digital Image processing	2	0	0	**2**	**2**
6	PE		Digital Image processing Lab	0	0	2	**1**	**2**
7	PE		Adaptive Systems and Signal Processing	2	0	0	**2**	**2**
8	PE		Adaptive Systems and Signal Processing Lab	0	0	2	**1**	**2**
						Total	**3**	**4**

	ELECTIVE-V							
S. No.	**Category Code**	**Subject Code**	**Name of the Subjects**	**Course Hours**			**Credits**	**Total Hours**
				L	**T**	**P**		
1	PE		Pattern Recognition	2	0	0	**2**	**2**
2	PE		Pattern Recognition Lab	0	0	2	**1**	**2**
3	PE		Computer Vision	2	0	0	**2**	**2**
4	PE		Computer Vision Lab	0	0	2	**1**	**2**
5	PE		Network & Cyber Security	2	0	0	**2**	**2**
6	PE		Network & Cyber Security Lab	0	0	2	**1**	**2**
7	PE		Wavelets and Application	2	0	0	**2**	**2**
8	PE		Wavelets and Application Lab	0	0	2	**1**	**2**
						Total	**3**	**4**

	ELECTIVE-VI							
S. No.	**Category Code**	**Subject Code**	**Name of the Subjects**	**Course Hours**			**Credits**	**Total Hours**
				L	**T**	**P**		
1	PE		Game Theory with Computer Applications	2	0	0	**2**	**2**
2	PE		Game Theory with Computer Applications Lab	0	0	2	**1**	**2**
3	PE		Soft Computing Paradigms	2	0	0	**2**	**2**
4	PE		Soft Computing Paradigms Lab	0	0	2	**1**	**2**
5	PE		Computer Graphics	2	0	0	**2**	**2**
6	PE		Computer Graphics Lab	0	0	2	**1**	**2**
7	PE		Cloud Computing	2	0	0	**2**	**2**
8	PE		Cloud Computing Lab	0	0	2	**1**	**2**
						Total	**3**	**4**

	ELECTIVE-VII							
S. No.	**Category Code**	**Subject Code**	**Name of the Subjects**	**Course Hours**			**Credits**	**Total Hours**
				L	**T**	**P**		
1	PE		Computer Graphics and Animation	2	0	0	**2**	**2**
2	PE		Computer Graphics and Animation Lab	0	0	2	**1**	**2**
3	PE		Deep Learning	2	0	0	**2**	**2**
4	PE		Deep Learning Lab	0	0	2	**1**	**2**
5	PE		Automation and Robotics	2	0	0	**2**	**2**
6	PE		Automation and Robotics Lab	0	0	2	**1**	**2**
7	PE		IoT	2	0	0	**2**	**2**
8	PE		IoT and Computing Lab	0	0	2	**1**	**2**
9	PE		System Simulation and Modelling	2	0	0	**2**	**2**
10	PE		System Simulation and Modelling Lab	0	0	2	**1**	**2**
11	PE		Software Defined Radio and Applications	2	0	0	**2**	**2**
12	PE		Software Defined Radio and Applications Lab	0	0	2	**1**	**2**
13	PE		Satellite and Optical Communication	2	0	0	**2**	**2**
14	PE		Satellite and Optical Communication Lab	0	0	2	**1**	**2**
						Total	**3**	**4**

English and Technical Communication

COURSE CODE: 18B11HS111

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

: 2-0-0

Pre-requisite: None

Course Objectives:

1. The Student will be able to analyze communication situations and audiences to make choices about the most effective and efficient way to communicate and deliver messages.
2. The student will learn to deliver effective presentations in contexts that may require power point, extemporaneous or impromptu oral presentations
3. The student will learn to write grammatically correct business documents using appropriate business style.
4. The student will learn to speak and write grammatically correct sentences with the ability to express thoughts with clarity and accuracy.
5. Students will develop command over their language and synchronize their thoughts into written form

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	Understand and learn the concepts of better and effective communication	Familiarity
CO2	Learn the basics of business etiquettes, values and personal goal setting	Familiarity
CO3	Enable students to prepare better Power Point Presentations with clarity of expression and appropriate language.	Assessment
CO4	Help make communication stronger by learning the nature and mechanics of effective writing.	Assessment
CO5	Learn the different formats of business writing with correct knowledge of grammar.	Usage
CO6	Develop command over language, using techniques of vocabulary building and identifying common errors, redundancies and grammatical syntax.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Concept and Nature of Communication**: What is communication? Stages of communication. Ideation, encoding, transmission, decoding & response. Channels of communication. Communication in organizational settings. Etiquettes in social and Office settings. Work culture in Jobs. Barriers to effective communication. Guidelines to overcome communication barriers	4
2	**Self Development and Assessment:** Self Assessment, Awareness,. Personal goal Setting	2
3	**Effective presentation:** Pre- presentation jitters. Preparation and practice. Delivering the presentation. Qualities of a skilful presenter. Capturing and maintaining attention. Handling questions Power point presentations	4
4	**Nature and Mechanics of Writing (Basic Writing Skills):** Techniques for writing precisely: Defining. Describing, Classifying. Use of Phrases and Clauses in sentences Importance of Proper Punctuation. Organizing Principles of Paragraphs in documents	5
5	**Technical Writing:** Importance, structure and drafting and revising of Technical Reports. Technical writing style and Language. Business writing: Letters, Preparing resume, notices, agenda and minutes of meeting ,Daily Dairy entry	6
6	**Vocabulary Development:** Word Formation. Derivatives: Prefixes & Suffixes. Root words. Synonyms, Antonyms, Homophones and Homonyms. One word substitution	2
7	**Grammar and Usage**: Subject-Verb Agreement. Noun-Pronoun Agreement. Prepositions, Articles	3
8	**Identifying Common errors in writing :** Redundancies, Clichés , Misplace modifiers, words often confused and misused	2
Total lectures		42

Suggested Text Book(s):

1. Practical English Usage. Michael Swan. OUP.1995.
2. Remedial English Grammar. F.T. Wood. Macmillan. 2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001.
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006

5. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. OUP
6. A Communicative Grammar of English. 3rd Edn. G. Leech and J. Svartvik. 2012
7. Williams, K., Krizan, A. C., Logan, J. & Merrier, P. (2011) Business Communicating in Business 8th Ed. New Delhi: Cengage Learning.
8. Murphy, Herta A., Herbert Hildebrandt, Jane Thomas (2008) Effective Business Communication 7th Ed. New Delhi:Tata Mcgraw Hill Education Private Limited.
9. Guffey, M. A. (2000) Business Communication: Product & Process South-Western College Publishing.

Suggested Reference Book(s):

1. Lesikar, R. V., Flatley, M.E., Rentz, K. & Pande, N. (2009) Business communication 11th Ed. New Delhi: Mc Graw Hill.
2. Communication Skills. Sanjay Kumar and Pushp Lata. OUP. 2011.
3. Williams, K., Krizan, A. C., Logan, J. & Merrier, P. (2011) Business Communicating in Business 8th Ed. New Delhi: Cengage Learning.

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Etiquettes in Social and Office Settings (5) Rokeach value System(8) Notice and letter Writing/Report Writing(12)

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (English and Technical Communication)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	1	3	3	3	1	2	3	3	3	3	1	3	2.4
CO-2	1	2	3	2	1	1	2	3	3	3	1	3	2.0
CO-3	1	2	3	2	2	2	1	2	3	3	1	3	2.0
CO-4	1	1	2	3	2	1	1	3	2	3	1	3	1.9
CO-5	1	2	3	2	2	2	1	3	2	3	1	3	2.0
CO-6	1	2	2	2	2	2	1	3	2	3	1	3	2
Average	1	2	2.6	2.3	1.6	1.6	1.5	2.8	2.5	3	1	3	

English and Technical Communication Lab

COURSE CODE: 18B17HS171

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

: 0-0-2

Pre-requisite: None

Course Objectives:

1. The students will learn to speak and write grammatically correct sentences with the ability to express thoughts with clarity and accuracy.
2. The students will learn the rules of grammar in writing. It will enhance their ability to use logical sequencing while writing any business letter or document.
3. The students will learn using new words and build their vocabulary steadily and systematically by following the exercises.
4. Students will develop command over their language and synchronize their thoughts while writing different types and kinds of Business letters.
5. Students will be groomed to develop the art of speaking logically, confidently and pragmatically, involving understanding work ethics, manners and correct use of body language.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	Understand and sharpen writing skills using correct grammar in Emails, Business letters and Report writing.	Usage
CO2	Learn the basics of successful job applications.	Usage
CO3	Help make communication stronger by learning Non verbal cues and correct Body Language.	Usage
CO4	Enable students to prepare better Power Point Presentations with clarity of expression and appropriate language.	Usage
CO5	Develop advanced vocabulary by learning to use different ways of word construction and strategies of learning new words.	Usage
CO6	Learn to format different types of documents with command over language.	Usage

List of Exercises

S.No	Description	Hours
1	**The Writing Process:** Key vocabulary for writing; How do you write Vocabulary: What is a document; The Writing process; Prepositions; The Writing process: some thoughts	1
2	**Linking Ideas (I):** Linking by time; Linking by contrast and logic; Test yourself (learn about sequencing, exemplifying, highlighting and logic)	1
3	**Linking Ideas (II):** Referencing Words (1); Practice linking ideas (using connectors); Grammatical focus (Agreement)	1
4	**Applying for a Job:** Online Application (Spell Check); Use action words Resumes- the basics; Look at a Resume; Applying for a Job: a thought; The Covering letter	1
5	**Business Letters:** Grammar focus: contractions; A letter of complaint A letter of apology; Words: formal or informal? (Writing clearly and appropriately)	1
6	**Writing Emails:** Successful emails: the basics (Alternatives to gender-specific words); Marketing emails: some thoughts; Perfecting your document (Spell checking); Emails and letters: case studies (Analyze a formal response); Emails and Letters (Grammar Focus: Modals)	1
7	**Use of Body Language:** This exercise will include showing a couple of videos to the students on the use of Body Language in communication and also how to interpret other people's body language when they communicate. This will include studying facial expressions, gestures, non- verbal cues and eye contact.	1
8	**Use of Power Point Presentation :**This exercise will comprise of two videos on the specifics of preparing power- point presentations; the Do's and don'ts; examples from successful business entrepreneurs' presentations.	1
9	**Vocabulary Development:** Synonyms, Antonyms, Standard Abbreviations One word Substitution; Homophones, Homonyms, Paronyms, Words often confused and misused; Word Functioning Idiomatically; Foreign Words; Prefixes Suffixes	2
10	**Reports**: **Organizing Information:** What will I learn?; Organizing information; Why is organization important?; Finding information; Other Report types (Only reading); Write a report; Grammar focus: past or present? (1); Grammar Focus: past or present? (2)	1

11	**Reported Speech:** Introduction; The Rule; Practice: Pronouns; Practice: Verbal Actions; Pronunciation: Stress and Rhythm; Do you understand; Vocab: reporting verb; Your test	**1**
12	**Perfecting your Document (I):** What will I learn?; The elements of formatting Format a document; British or North American?	**1**
13	**Perfecting your Document (II):** Proofreading: Grammar mistakes; Practice Proofreading; Spell Checking; Common Misspellings; Final thought: the golden rules	**1**
Total Lab Hour		**14**

Softwares Used

1. **Software Clarity S. Net 7**
   This software supports Wireless LAN and wired LAN.
2. **Software: Tense Buster 9.0**
3. **Software: Business Writing**

Methodology

The course follows a lab based teaching-learning method with classroom discussions and activities on fundamental concepts of grammar with a strong emphasis on skill development of students with regard to speaking, writing, logically interpreting ideas into words and reasoning in the classroom. The exercises are solved by the students on the softwares and the marking is automatically shown. Additionally, they are asked to draft letters and memos in their Lab files/registers after reading specimens on the softwares and improve their English with choice of specific and technical words.

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	10 Marks
4	Lab Assessment	15 Marks
5	Class Exercises	30 Marks
6	Discipline	05 marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	0	1	3	2	3	1	0	3	2	3	1	3	**1.8**
CO2	1	1	3	2	2	3	2	3	3	3	1	3	**2.2**
CO3	0	2	2	2	3	1	2	3	3	3	1	3	**2**
CO4	1	2	3	3	3	1	1	1	3	3	1	3	**2**
CO5	1	2	0	3	1	2	1	2	2	3	1	3	**1.7**
C06	1	2	0	1	1	2	2	3	2	3	1	3	**1.7**
Average	**0.6**	**1.6**	**1.8**	**2.1**	**2.1**	**1.6**	**1.3**	**2.5**	**2.5**	**3**	**1**	**3**	

Engineering Mathematics I

COURSE CODE: 18B11MA111

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

L-T-P: 3-1-0

Pre-requisite: Basic concepts of calculus and algebra

Course Objectives:

1. Various techniques of Multivariate Calculus and Integral Calculus.
2. The fundamental concepts of Vector Calculus.
3. The fundamentals of Laplace transforms and their applications.
4. To develop the essential tool of Matrices and Linear Algebra in a comprehensive manner.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Evaluate partial derivatives with its physical significance and expand functions of several variables.	Familiarity & Usage
CO-2	Find maxima and minima of functions of several variables with / without constraints.	Assessment
CO-3	Find areas and volumes of solids using multiple integration	Assessment
CO-4	Understand the calculus of vectors and vector valued functions with their physical significance	Familiarity & Usage
CO-5	Use Laplace transforms and inverse Laplace transforms to solve IVP	Usage
CO-6	Solve linear systems of equations and perform diagonalization of matrices	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Differential Calculus:** Limits and continuity of function, Partial Differentiation, Chain rule, Total Derivative; Maxima, Minima and Saddle points; Method of Lagrange's multipliers, Taylor's series for two or more variables	10

2	**Integral Calculus:** Improper integrals; Beta and Gamma functions and their properties; Double integrals, Change of order and Change of variables, Applications to areas and volumes.	**10**
3	**Vector Calculus:** Equations to a line and a plane, Tangent plane and Normal line, Gradient, Curl and divergence and their physical significance, Directional derivatives, Line and surface integrals.	**6**
4	**Laplace Transform:** Laplace Transform, Inverse Laplace transform, Convolution, Dirac delta and Unit Step function, Solution of initial value problems.	**6**
5	**Matrices:** Algebra of matrices, Row Echelon form, Inverse and Rank of a matrix, Symmetric, Skew- symmetric and Orthogonal matrices; Determinants; Solution of systems of linear equations (Gauss's elimination, Rank method), Linear Independence and Dependence of vectors. Eigen values and Eigenvectors; Cayley-Hamilton Theorem, Diagonalization of matrices and Orthogonal transformation.	**10**
Total lectures		**42**

Suggested Text Book(s):

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Jain and Iyengar, Advanced Engineering Mathematics, Narosa Publishing House.

Suggested Reference Book(s):

1. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
2. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc18_ma05/preview
2. Link to topics related to course:
   i. https://www.whitman.edu/mathematics/calculus_online/chapter14.html
   ii. https://nptel.ac.in/courses/103103037/5
   iii. https://nptel.ac.in/courses/111106051
   iv. https://nptel.ac.in/courses/111107108/25
   v. https://nptel.ac.in/courses/117101056/16

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour.	Syllabus covered upto T-1
2.	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (1) - 5 Quizzes (2) - 15 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Engineering Mathematics I)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	1	0	1	2	1	0	0	0	2	1	1	1
CO-2	3	2	3	1	2	1	0	0	0	1	2	2	1.5
CO-3	2	1	1	0	1	1	0	0	0	2	1	2	1
CO-4	3	1	1	1	2	2	0	0	0	2	1	2	1.5
CO-5	2	2	1	2	1	2	0	0	0	1	2	3	1.5
CO-6	3	2	1	1	1	2	0	0	0	2	2	3	1.5
Average	2.67	1.5	1.17	1	1.5	1.5	0	0	0	1.67	1.5	2.17	

Engineering Physics-I

COURSE CODE: 18B11PH111

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

: 3-1-0

Pre-requisite: None

Course Objectives:

1. To enable the students to get better understanding about physical optics and its applications in engineering.
2. To familiarize students about modern physics and its applications in engineering.
3. To enable the students to get better understanding about thermal physics and its applications in engineering.
4. To familiarize students with relativistic mechanics.
5. At the conclusion of the course, the ability of students should have enhanced to think logically about the problems of science and technology and obtain their solutions

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To learn the fundamental of physical optics	Familiarity
CO-2	To implement the concepts and theory for solving the application related problems of physical optics	Assessment
CO-3	To learn the basic and mathematical methods for relativity and related fields	Familiarity and Assessment
CO-4	To learn the basic concepts of modern , laser and thermal physics	Familiarity
CO-5	To implement the concept of modern and thermal physics ; analyzing and solving the related problems	Assessment and Implementation

Course Contents:

Unit	Contents	Lectures required
1	**Interference:** Introduction, Young's double slit experiment, Phase difference and Path Difference, Coherence, Analytical treatment of interference, Methods of interference (division of wave front & division of amplitude) Applications of interference in the field of engineering, Scientific applications of interference.	8
2	**Diffrection:** Introduction, Difference between interference and diffraction, Fresnel and Fraunhoffer class of diffraction, Diffraction grating, Applications of diffraction grating, Resolving and dispersive power of an optical instrument.	6
3	**Polarization:** Introduction, Difference between unpolarized and polarized light, Means of production of polarized light, Optical activity, specific rotation, Lorentz half shade and biquartz polarimeter.	4
4	**Atomic Physics:** Introduction, Quantum numbers, spin and orbital angular momentum, Atoms in magnetic field, Zeeman effect, Atoms in electric field, Stark effect.	4
5	**Quantum Physics:** Wave particle duality, uncertainty principle and its applications, wave function, Schrodinger equation and its solutions, Particle in a box, Harmonic Oscillator	6
6	**Lasers:** Principle and working of laser, Different types of lasers (Three level and four level lasers).	2
7	**Thermal Physics:** Introduction, Zeroth law of Thermodynamics. First law of thermodynamics, Specific heat relation, Work done during an isothermal and adiabatic process. Second law of thermodynamics, concept of entropy, entropy for an ideal gas, Third law of thermodynamics, Principle of increase of entropy or degradation of energy, Reversible and irreversible processes. Carnot cycle and Carnot engine, Refrigerator, Clausius-Cleyperon equation, Thermodynamic Potentials, Maxwell's equations.	8
8	**Relativistic Mechanics**: Inertial & non-inertial frames, Michelson-Morley experiment, Einstein's postulates. Lorentz transformation, equations. Length contraction & Time dilation, Addition of velocities; Variation of mass with velocity Mass energy equivalence.	4
Total lectures		**42**

Suggested Text Book(s):

1. Engineering Physics, Shatendra Sharma & Jyotsna Sharma, Pearson Pub. 2018.
2. N. Subrahmanayam, Brij Lal and M.N. Avadhanulu, A Text Book of Optics, S. Chand (2012).
3. Brij Lal, N Subrahmanyam and P.S. Hemne, Heat Thermodynamics and Statistical Physics, S. Chand, 3rd edition 2012.
4. Arthur Beiser, Concepts of Modern Physics, McGraw Hill, 6th edition (1994).

Suggested Reference Book(s):

1. F.A. Jenkins and H.E. White, Fundamentals of Optics, McGraw-Hill (1981).
2. R. Eisberg and R. Resnick, Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles, John Wiley & Sons, 2nd edition (1985).

3. Ajoy Ghatak, Optics, Tata McGraw Hill, 5th addition, (2012)

Other useful resource(s):

1. Link to topics related to course:
   i. https://nptel.ac.in/courses/122107035/
   ii. https://nptel.ac.in/courses/122103011/
   iii. https://nptel.ac.in/courses/122101002/28
   iv. https://nptel.ac.in/courses/122105023/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Parallel and Distributed Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2				2				2		2	**1.25**
CO-2	2	2	2	2	2	2				2		2	**2**
CO-3	3	2				2				2		2	**1.4**
CO-4	3	3				2				2		2	**1.5**
CO-5	3	3	3	3	3	3				3		3	**3**
Average	**2.6**	**2.4**	**2.5**	**2.5**	**2.5**	**2.2**				**2.2**		**2.2**	

Engineering Physics Lab-I

COURSE CODE: 18B17PH171

COURSE CREDITS: 1

CORE/ELECTIVE: CORE

: 0-0-2

List of Experiments:

S.No	Description	Hours
1	To determine the wavelength of sodium light by measuring the diameters of Newton's Rings	4
2	To find the wavelength of sodium light using Fresnel's biprism.	2
3	To determine the distance between two virtual source using biprism.	2
4	To measure the wavelengths of certain lines in the spectrum of the mercury lamp using plane transmission grating.	2
5	To determine the dispersive power of the material of prism with the help of a spectrometer.	2
6	To measure the angle of prism with the help of a spectrometer.	2
7	To determine the magnetic susceptibility of a given paramagnetic liquid using Quinck's method.	4
8	To find the specific rotation of sugar solution by using a half shade polarimeter.	4
9	To find the specific rotation of sugar solution by using a biquartz polarimeter.	4
10	To verify the Malus's law for a given light using polarizer and analyzer.	2
Total Lab hours		**28**

Suggested/Resources:

1. S. P. Singh, Advanced Practical Physics,Pragati Prakashan, Vol. 1 (2013).
2. C. L. Arora, Practical Physics, S. Chand Company Limited, 20th edition (2004).
3. N. Subrahmanayam, Brij Lal and M.N. Avadhanulu, A Text Book of Optics, S. Chand (2012)
4. Ajoy Ghatak, Optics, Tata McGraw Hill, 5th addition, (2012)
5. F.A. Jenkins and H.E. White, Fundamentals of Optics, McGraw-Hill (1981).

6. Dabir S. Viswanath, Tushar Ghosh, Dasika H.L. Prasad, Nidamarty V.K. Dutt, Kalipatnapu Y. Rani , Viscosity of Liquids: Theory, Estimation, Experiment, and Data , Springer (2007).

Programming for Problem Solving

COURSE CODE: 19B11CI111

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

: 2-0-0

Pre-requisite: None

Course Objectives:

1. To formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs (in C language).
3. To test and execute the programs and correct syntax and logical errors.
4. To implement conditional branching, iteration and recursion.
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
6. To use arrays, pointers and structures to formulate algorithms and programs.
7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
8. To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

Course outcomes:

S.NO	Course outcomes	Level of Attainment
CO-1	To formulate simple algorithms for arithmetic and logical problems.	Familiarity
CO-2	To translate the algorithms to programs (in C language).	Familiarity
CO-3	To test and execute the programs and correct syntax and logical errors.	Usage
CO-4	To implement conditional branching, iteration and recursion.	Usage
CO-5	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.	Usage
CO-6	To use arrays, pointers and structures to formulate algorithms and programs.	Usage
CO-7	To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.	Assessment
CO-8	To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration	Assessment

Course Contents:

Unit	Contents	Lectures required
1	**Introduction to Programming (4 lectures)** Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) - (1 lecture). **Idea of Algorithm:** steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. (1 lecture) From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code- (2 lectures)	4
2	**Arithmetic expressions and precedence**	2
3	**Loops:** Conditional Branching and Loops (6 lectures) Writing and evaluation of conditionals and consequent branching (3 lectures) Iteration and loops (3 lectures)	6
4	**Arrays:** Arrays (1-D, 2-D), Character arrays and Strings	6
5	**Basic Algorithms:** Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required.	6
6	**Function:** Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference **Recursion:** Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.	5 4
7	**Structure:** Structures, Defining structures and Array of Structures	4
8	**Pointers:** Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation) **File handling**	3 2
Total lectures		**42**

Suggested Text Book(s):

1. Byron Gottfried, Schaum's Outline of Prokli[gramming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Suggested Reference Book(s):

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc18-cs10

2. Link to topics related to course:
   a. **https://www.learn-c.org/**
   b. **https://www.programiz.com/c-programming**
   c. **https://www.codechef.com/ide**

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course outcomes (Programming for Problem Solving)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	2	3	2	2	3	2	3	2	2	3	3	**2.5**
CO-2	3	2	3	2	2	3	3	2	2	3	3	3	**2.6**
CO-3	2	2	2	2	2	3	3	3	2	2	3	3	**2.4**
CO-4	3	2	3	2	3	2	2	3	3	3	2	2	**2.5**
CO-5	3	2	2	2	3	2	2	2	2	3	3	3	**2.4**
CO-6	2	3	3	3	3	2	3	2	2	3	3	2	**2.6**
CO-7	2	2	2	2	2	3	3	3	2	2	3	3	**2.4**
CO-8	3	2	3	2	2	3	2	3	2	2	3	3	**2.5**
Average	**2.6**	**2.1**	**2.6**	**2.1**	**2.4**	**2.6**	**2.5**	**2.6**	**2.1**	**2.5**	**2.9**	**2.8**	

Programming for Problem Solving Lab

COURSE CODE: 19B17CI171

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

: 0-0-4

Pre-requisite: No prior programming experience is expected however, mathematical maturity level of science or engineering undergraduate is assumed.

Course Objectives:

1. Develop problem solving ability using programming.
2. To impart adequate knowledge on the need of programming languages and problem solving techniques.
3. To develop a methodological way of problem solving
4. Analyze and construct effective algorithms
5. Employ good programming practices such as incremental development, data integrity checking and adherence to style guidelines
6. Learn a programming approach to solve problems

Course Outcomes:

S.No.	**Course Outcomes**	**Level of Attainment**
CO-1	Understand the Typical C Program Development Environment, compiling, debugging, Linking and executing.	Familiarity
CO-2	Introduction to C Programming using Control Statements and Repetition Statement	Usage
CO-3	Apply and practice logical formulations to solve some simple problems leading to specific applications.	Assessment and Usage
CO-4	Design effectively the required programming components that efficiently solve computing problems in real world.	Assessment &Usage

List of Experiments:

S.No	**Description**	**Hours**
1	Getting acquainted with the C program Structure and basic I/O. Getting acquainted with the various data types and arithmetic operator used in C.	2
2	Write a program to obtain the reversed number and to determine whether the original and reversed numbers are equal or not.	2

	Write a program to check whether a triangle is valid or not, when the three angles of triangle are entered through the keyboard. A triangle is valid if the sum of all three angles is equal to 180 degrees. Check a given I/P is character, number or special symbol.	
3	WAP to check a given number is Armstrong or not. Calculate factorial of a number Given number is prime or not.	2
4	Write a program to add first seven terms of the following series using any loop: 1/1! + 2/2! + 3/3! +….. Any five pattern program.	2
5	WAP to swap two numbers with function using 3rd variable or without using (call by value & reference). Write a function to find out the roots of quadratic equation.	2
6	Factorial using recursion Fibonacci series using recursion.	2
7	WAP to sort N elements of an array using bubble sort. WAP for Binary search & linear search.	2
8	Find Max, Min, 2nd Max, Standard Deviation. Reverse elements of an array.	2
9	Matrix addition, Multiplication and Transpose.	2
10	WAP to handle pointer variables and access the elements of an array using pointers. WAP to insert a string and perform operations: string length, copy, concatenation, compare, lower to upper, etc.	2
11	Write a program to find whether the string is palindrome or not using pointers Write a program to delete all vowels from sentence, assume that sentence is not more than 80 character long using pointers.	2
12	Enter the detail of 5 students using structure and print the details of all students including pointers and also sort the detail of students using DOB.	2
13	Dynamic allocation function and random function with string and integer array.	2
14	Perform operation on files: open, read, write, close etc.	2
	Total Lab hours	**28**

Suggested/Resources:

1. Yale N. Patt and Sanjay J. Patel, Introduction to Computing Systems, from bits & gates to C & beyond, 2nd Edition, 2004.
2. Deitel and Deitel, C How to Program, 7th Edition, 2013.
3. Venugopal Prasad, Mastering C, Tata McGraw Hill.
4. Complete Reference with C, Tata McGraw Hill.
5. Drmey, How to solve it by Computer, PHI.
6. Kerninghan and Ritchie, The C Programming Language.
7. http://www.acm.uiuc.edu/webmonkeys/book/c_guide/
8. http://msdn.microsoft.com/en-us/library/25db87se.aspx

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO 11	PO12	Average
CO1	3	3	1	1	2	2	1	1	1	2	1	2	**1.7**
CO2	3	3	2	1	3	1	1	1	1	2	1	2	**1.8**
CO3	3	3	2	2	2	3	2	1	1	2	2	2	**2.1**
CO4	3	3	3	3	3	2	1	1	1	2	1	3	**2.2**
Average	**3**	**3**	**2**	**1.8**	**2.5**	**2**	**1.3**	**1**	**1**	**2**	**1.3**	**2.3**	

Engineering Graphics

COURSE CODE: 18B17GE173

COURSE CREDITS: 1.5

CORE/ELECTIVE: CORE

: 0-0-3

Pre-requisite: None

Course Objectives:

1. To introduce the students to the "universal language of Engineers" for effective communication through drafting exercises of geometrical solids.
2. To enable students to acquire and use engineering drawing skills as a means of accurately and clearly communicating ideas, information and instructions.
3. To impart knowledge to students about creating a sheet and software aided layout of required dimensions in 2-D and 3-D view.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	To impart and inculcate proper understanding of the theory of projection.	Familiarity
CO2	To improve the visualization skills	Assessment
CO3	To enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient	Usage
CO4	To impart the knowledge on understanding and drawing of simple residential/office buildings.	Usage

List of Experiments

S.No	Description	Hours
1	Introduction to Lettering	**3**
2	Scales and their types	**2**
3	Construction of Polygons	**4**
4	Projection of points	**2**
5	Projection of lines	**4**
6	Projection of planes	**3**
7	Drawing of building plan	**6**

8	Introduction to Basic Commands in Auto-CAD	**3**
9	Orthographic projections in Auto-CAD	**3**
10	Isometric Projection in Auto-CAD	**4**
11	Projections of solids in Auto-CAD	**1**
12	Section of solids in Auto-CAD	**1**
Total Lab hours		**36**

Suggested/Resources:

1. Engineering Drawing & Graphics with AutoCAD by K.Venugopal, New Age International Pvt. Ltd., New Delhi (India)
2. Engineering Drawing by N.D.Bhatt, V.M.Panchal and Pramod R. Ingle, Charotar Publishing House, Anand, Gujarat (India)
3. Engineering Drawing [With Introduction to Auto-CAD] by Roop Lal and Ramakant Rana, IK International Publishing House Pvt. Ltd.

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	10 Marks
4	Lab Assessment	50 Marks
	Total	**100 marks**

Workshop Practices

COURSE CODE:18B17GE171

COURSE CREDITS: 1.5

CORE/ELECTIVE: CORE

: 0-0-3

Pre-requisite: Concrete Technology

Course Objectives:

1. To learn the basics of different workshop practices by understanding and implementing used in different shops of workshop.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	Study of various carpentry processes and its applications in carpentry	Familiarity
CO2	Study and practice the use of various carpentry tools for different carpentry processes	Familiarity
CO3	Study and manufacturing of different wood working joints	Assessment
CO4	Study the principles, classification and application of different welding processes	Usage
CO5	Study and Manufacturing of various welding joints using electric arc welding and gas welding	Usage

List of Experiments

S.NO.	Subtitle	Topics
1.	Carpentry	To Study the carpentry processes
		To study and identify carpentry tools
		To prepare a T-Lap Joint
		To prepare Motise-tenon joint
		To prepare corner joint
2.	Welding	To study the different welding processes with mechanism
		To prepare lap welding joint
		To prepare butt welding joint
3.	Sheet Metal work	To cut and prepare V joint from metal using hexablade
4.	Turning	To study the lathe machine and its operation with one turning job

Suggested/Resources:

1. Workshop Practices by S.K. Hajra and Chaudhary

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	3	2	2	1	1	1	1	1	1	**1.83**
CO2	3	3	3	3	3	1	1	1	1	1	1	3	**2.00**
CO3	3	3	2	3	2	3	2	1	1	1	2	1	**2.00**
CO4	3	3	3	2	3	2	1	1	1	1	1	1	**1.83**
CO5	2	2	3	3	3	3	1	1	1	1	1	1	**1.83**
Average	**2.80**	**2.80**	**2.80**	**2.80**	**2.60**	**2.20**	**1.20**	**1.00**	**1.00**	**1.00**	**1.20**	**1.40**	

Engineering Mathematics II

COURSE CODE: 18B11MA211

COURSE CREDITS: 4

CORE/ELECTIVE: CORE

: 3-1-0

Pre-requisite: Engineering Mathematics I

Course Objectives:

1. The various methods of solving the second order differential equations with variable coefficients, to study the basic properties of Bessel Functions, Legendre polynomials, Chebyshev polynomials and their Applications.
2. To obtain solutions of Wave, Diffusion and Laplace Equation.
3. To study calculus of complex variables.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Solve problems related to convergence of series	Familiarity & Usage
CO-2	Understand basics of Ordinary Differential equation	Assessment
CO-3	Comprehend series solution with certain special functions e.g. Bessel, Legendre Eqn.	Usage
CO-4	understand partial differential Eqn and Solve Heat, wave & Laplace equation	Usage
CO-5	Understand Functions of a complex variable, Analytic functions, Mobius Transformation	Usage
CO-6	Solve Contour integration and find Taylor's and Laurent's series	Familiarity & Usage
CO-7	Evaluate certain real defnite and improper integrals.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Sequences and Series:** Convergence of sequence and series, tests for convergence; Power series, Fourier series: Half range sine and cosine series, Parseval's theorem.	**7**

2	**Differential Equations Part I:** Basics of first order Differential Equations, Second and Higher order differential equations with constant coefficients. Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation;	**7**
3	**Differential Equations Part II:** Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties. Introduction to Partial Differential Equations, Solutions of One dimensional Wave, Heat Equation & Laplace Equation**.**	**12**
4	**Complex Variable – Differentiation:** Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.	**8**
5	**Complex Variable – Integration:** Contour integrals, Cauchy Theorem, Cauchy Integral formula, Liouville's theorem and Maximum-Modulus theorem; Taylor's series, zeros of analytic functions, singularities, Laurent's series; **[CO-6]** Residues, Cauchy Residue theorem, Evaluation of definite integral involving sine and cosine, improper integrals.	**8**
Total lectures		**42**

Suggested Text Book(s):

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006
2. Jain and Iyengar, Advanced Engineering Mathematics, Narosa Publishing House

Suggested Reference Book(s):

1. Simmons, G.F., Differential Equations with Applications, 2nd Ed, McGraw-Hill, 1991.
2. Brown, J.W., Churchill, R.V. , Complex Variables and Applications, 6th Ed., McGrawHill, 1996.
3. Spiegel, Murray R, Theory and Problems of Complex variables Schaum's series.
4. Sneddon I. N., Introduction to Partial Differential Equations, Dover Publications, 2006

Other useful resource(s):

1. Link to NPTEL course contents: https://nptel.ac.in/courses/122101003/2
2. Link to topics related to course:
   i. https://nptel.ac.in/courses/111104031/
   ii. https://nptel.ac.in/courses/111104031/8
   iii. https://nptel.ac.in/courses/122107037/29
   iv. https://nptel.ac.in/courses/111107056/
   v. https://nptel.ac.in/courses/117101055/14

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour.	Syllabus covered upto T-1
2.	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (1) - 5 Quizzes (2) - 15 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Engineering Mathematics II)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	1	0	1	2	1	0	0	0	2	1	1	1
CO-2	2	2	1	1	1	2	0	0	0	1	2	2	1.5
CO-3	3	2	1	0	2	1	0	0	0	1	1	3	1.5
CO-4	3	1	2	1	2	2	0	0	0	2	1	2	1.5
CO-5	2	2	1	2	1	1	0	0	0	2	2	2	1.5
CO-6	3	2	2	1	2	1	0	0	0	1	2	1	1.5
CO-7	3	1	1	0	2	2	0	0	0	2	1	2	1.5
Average	2.71	1.57	1.14	1	1.71	1.42	0	0	0	1.57	1.42	1.85	

Engineering Physics-II

COURSE CODE: 18B11PH211

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

: 3-0-0

Pre-requisite: None

Course Objectives:

1. To offer a broad aspect of those areas of Physics which are specifically required as an essential background to engineering students for their studies in higher semesters.
2. To enable the students to get better understanding about solid state physics and its applications in engineering.
3. To familiarize students about electromagnetism and its applications in engineering.
4. To enable the students to get better understanding about statistical physics and its applications in engineering.
5. To familiarize students with optical fibers communication.
6. At the conclusion of the course, the ability of students should have enhanced to think logically about the problems of science and technology and obtain their solutions.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To learn the fundamentals of vector calculus and its applications in electrostatics	Familiarity
CO-2	Knowledge of, physical interpretation, and ability to apply Maxwell's equations to determine field waves, potential waves, energy ,charge conservation conditions and other diverse engineering problems.	Familiarity/Assesment
CO-3	Able to distinguish Step Index, Graded index fibers and compute mode volume and Implementation of numerical methods for calculating the design parameters of optical fiber.	Familiarity/Problem Solving
CO-4	To understand the basics of statistical distributions and use Maxwell-Boltzmann distribution, Fermi-Dirac and Bose-Einstein distributions to solve problems in some physical systems	Familiarity/Problem Solving
CO-5	To analyze atomic structure, Crystal structure, Crystal axes and planes, X-ray diffraction data and effect of energy bands on electronic behavior of solids.	Analytical Skills/ Familiarity
CO-6	To understand the concepts of modern solid state physics ,various properties of semiconductors and apply Hall effect to calculate allied parameters of semiconductors	Familiarity/ Usage

Course Contents:

Unit	Contents	Lectures required
1	**Electromagnetism:** Basic knowledge of fields, gradient, divergence and curl, Coulomb's law and related numerical, electric flux, Gauss's law for the charge inside and outside the Gaussian surface, applications of Gauss law: spherical and cylindrical symmetries, electric field due to charged conductor, force per unit area on the surface of the charged conductor, treatment of electrostatic problems by solution of Laplace and Poisson's equations. Biot Savart law, Ampere's law, Maxwell's equations in free space and dielectric media, energy in electromagnetic waves (Poynting vector and Poynting theorem), plane electromagnetic waves in free space, transverse nature, wave impedance and energy flow, energy density and energy flux (Poynting vector) in an electromagnetic field, radiation pressure.	12
2	**Statistical Physics & Applications:** Introduction, macrostates, microstates, thermodynamic probability, distribution of n-particles in k-cells, phase space, minimum volume, classical and quantum statistics: common approach to three statistics, Maxwell-Boltzmann (ideal gas), Bose-Einstein (photon gas), Fermi-Dirac distributions (electron gas), Compton effect.	10
3	**Optical Fiber Communication:** Light propagation in fibers, Step index and Graded Index fibers, Numerical Aperture and Attenuation, Single and Multimode fibers and their propagation characteristics, Fiber losses and optical fiber applications.	4
4	**Solid State Physics:** Basic ideas of bonding, ionic bonding, covalent bonding (hybridization), metallic bonding, dispersion bonds, dipole bonds, hydrogen bonds, 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 neighbour distance, atomic radius, atomic packing factor in crystal structure, calculation of lattice constant, lattice planes and Miller indices, separation between lattice planes. X-ray diffraction, Bragg's law of X-ray diffraction, Bragg's x-ray spectrometer, powder crystal method, rotating crystal method. Electronic conduction in metals, classical free electron theory, quantum theory of free electrons, band theory of solids, distinction between metals, semiconductors and insulators, intrinsic and extrinsic semiconductors, carrier concentration in thermal equilibrium in intrinsic semiconductor, Fermi level and energy band diagram in intrinsic semiconductor, energy band diagram and Fermi level in extrinsic semiconductors, effect of temperature on extrinsic semiconductor, electrical conductivity of intrinsic semiconductor and extrinsic semiconductor, Hall effect, allied parameters and its applications.	16
Total lectures		42

Suggested Text Book(s):

1. David J Griffiths, Introduction to Electrodynamics, Eastern Economy Editions, PHI, 4th edition (2012).
2. Brij Lal, N Subrahmanyam and P.S. Hemne, Heat Thermodynamics and Statistical Physics, S. Chand, 3rd edition (2012).
3. Gerd Keiser, Optical Fiber Communication, Tata McGraw-Hill Education Pvt. Ltd., 5th edition (2013).
4. S. O. Pillai, Solid State Physics, New age international publishers, 7th edition (2016).

Suggested Reference Book(s):

1. Charles Kittel, Introduction to Solid State Physics. John Wiley & Sons, 8th edition (2005).
2. Ghatak Ajoy, Thyagarajan, Introduction to Fiber Optics, Cambridge University Press (2006).
3. Silvio R A, Salinass, Introduction to Statistical Physics, Springer Verlag (2004).
4. Lakhanpal R C, Modern Approach to Statistical Physics and Thermodynamics, Modern Publishers (2003).

Other useful resource(s):

1. Link to topics related to course:
   i. https://nptel.ac.in/courses/115101004/
   ii. https://nptel.ac.in/courses/115101005/
   iii. https://nptel.ac.in/courses/115105099/
   iv. https://nptel.ac.in/courses/122101002/

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Engineering Physics-II)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	2				2		2	**2**
CO-2	2	3	3	3	3	2				2		2	**2.5**
CO-3	3	3	3	2	3	2				2		2	**2.5**
CO-4	2	3	3	3	2	2				3		3	**2.6**
CO-5	3	3	3	3	2	1				3		3	**2.6**
CO-6	3	3	3	3	2	1				3		3	**2.6**
Average	**2.5**	**2.8**	**2.8**	**2.7**	**2.3**	**1.7**				**2.5**		**2.5**	

Engineering Physics Lab-II

COURSE CODE: 18B17PH271

COURSE CREDITS: 1

CORE/ELECTIVE: CORE

: 0-0-2

Pre-requisite: None

Course Objectives:

1. The Art of Experimentation: The introductory laboratory engages each student in significant experiences with experimental processes, including some experience in investigation.
2. Experimental and Analytical Skills: The laboratory help the student develop a broad array of basic skills and tools of experimental physics and data analysis.
3. Conceptual Learning: The laboratory help student's to understand basic physics concepts.
4. Understanding the Basis of Knowledge in Physics: The laboratory help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments.
5. Developing Collaborative Learning Skills: The laboratory helps students to develop collaborative learning skills that are vital to success in many lifelong endeavors.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	To Understand different aspects of magnetism and semi conductive properties of materials and their use in design of various devices.	Familiarity
CO2	To helps the students to understand the concepts of light propagation in optical fiber and introduce them to various losses in optical fiber communication.	Familiarity and Assessment
CO3	To demonstrate the scientific results based on observation.	Assessment and usage
CO4	Scientific discussion for clear and concise conclusion on particular scientific results.	Assessment and usage
CO5	To develop collaborative learning skills	Assessment and usage

List of Experiments:

S.No	Description	Hours
1	To determine the numerical aperture, of an optical fibre using LED as a light source.	**2**
2	To determine the attenuation coefficient, losses of an optical fiber	**2**
3	To measure resistivity of semiconductor using four probe methods.	**2**
4	To measure energy band gap of the Ge crystal using four probe methods and compare with optical band gap.	**2**
5	To study Hall effect in semiconductor and determination of its allied parameters.	**2**
6	To determine the carrier concentration and type of doping using hall coefficient.	**2**
7	To calculate the e/m ratio for an electron using Thomson method/Bar magnet method	**4**
8	To study magnetostriction in magnetic materials using He-Ne laser.	**4**
9	To study the coercivity, saturation magnetization, retentivity of given materials.	**4**
10	Experimental Determination of Planck's constant using Light Emitting Diodes (LEDs) and Photoelectric Effect.	**4**
Total Lab hours		**28**

Suggested/Resources:

1. S. P. Singh, Advanced Practical Physics,Pragati Prakashan, Vol. 1 (2013).
2. C. L. Arora, Practical Physics, S. Chand Company Limited, 20th edition (2004).
3. N. Subrahmanayam, Brij Lal and M.N. Avadhanulu, A Text Book of Optics, S. Chand (2012)
4. Ajoy Ghatak, Optics, Tata McGraw Hill, 5th addition, (2012)
5. F.A. Jenkins and H.E. White, Fundamentals of Optics, McGraw-Hill (1981).
6. Dabir S. Viswanath, Tushar Ghosh, Dasika H.L. Prasad, Nidamarty V.K. Dutt, Kalipatnapu Y. Rani , Viscosity of Liquids: Theory, Estimation, Experiment, and Data , Springer (2007).

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	3	2	2	1	1	3	1	1	1	**2.00**
CO2	3	3	3	3	2	2	1	1	3	1	1	1	**2.00**
CO3	3	3	3	3	2	2	1	1	3	1	1	1	**2.00**
CO4	2	2	2	2	2	2	1	1	1	1	1	1	**1.5**
CO5	2	2	2	2	2	2	1	1	1	1	1	1	**1.5**
Average	**2.6**	**2.6**	**2.6**	**2.6**	**2.0**	**2.0**	**1.0**	**1.00**	**2.2**	**1.00**	**1.0**	**1.0**	

Electrical Science

COURSE CODE:

18B11EC211 COURSE

CREDITS: 4

CORE/ELECTIVE: CORE

: 3-1-0

Pre-requisite:

None Course

Objectives:

1. To introduce various circuit elements.
2. To analyze different DC and AC circuits using various circuittheorems.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand the basic parameters related to DC and AC circuit.	Familiarity
CO-2	Understanding electrical principle, laws, and working of electrical machines.	Familiarity
CO-3	Understanding different theorems to analyze DC and AC circuits.	Usage
CO-4	Understanding sinusoidal steady state analysis of various AC circuits.	Usage
CO-5	Demonstrate knowledge of and apply the theory of transformers and induction motors.	Assessment

Course Contents:

Unit	Contents	Lectures required
1	DC Circuits: Electrical circuit elements (R, L and C), Voltage and current sources, series and parallel combination of elements, star and delta connections, Kirchhoff current and voltage laws, analysis of simple circuits and dc excitation using Node and Mesh analysis. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits	9
2	AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RLC combinations (series and parallel), resonance.	9
3	Sinusoidal steady state analysis: Representation of sine function, Phasor diagrams, Impedance and admittances, AC circuit analysis, Effective or RMS values, Average power and Complex power.	8
4	Transformers: Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency.	5
5	Electrical Installations: Types of wires and cables, earthling, types of batteries, important characteristics for batteries, elementary calculations for energy consumption, power factor improvement and battery backup.	5

6	Electrical Machines: Introduction to machines, single-phase induction motor, construction, working, loss components and efficiency, staring and speed control of induction motor.	6
Total lectures		42

Suggested Text Book(s):

1. W.H. Hayt, J. E. Kemerlay & S.M. Durbin: Engineering Circuit Analysis, 6th Ed., TATA McGraw Hill, 2006.
2. J. Hiley, K. Brown, & I.M. Smith: Electrical and Electronic Technology, 10th Ed., Pearson, 2019.
3. D.C. Kulshreshtha: Basic Electrical Engineering, 1st Ed., McGraw Hill Education, 2011.

Suggested Reference Book(s):

1. Ozgur Ergul: Introduction to Electrical Circuit Analysis, 1st Ed., Wiley , 2017.
2. V.N. Mittle and Arvind Mittal: Basic Electrical Engineering, 2nd Ed., Tata McGraw Hill, 2015.

Other useful resource(s):

Link to NPTEL course contents: https://nptel.ac.in/courses/108102097/3 (Prof. S.C. Dutta Roy, IIT Delhi)

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (Electrical Science)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	3	2	2	1	1	1	1	1	3	2
CO-2	3	2	2	2	3	2	1	1	1	1	2	3	1.92
CO-3	3	3	3	3	2	2	1	1	1	1	1	3	2
CO-4	3	3	3	3	2	2	1	1	1	1	1	3	2
CO-5	3	3	3	3	3	2	1	1	1	1	2	3	2.17
Average	3	2.8	2.8	2.8	2.4	2	1	1	1	1	1.4	3	

Electrical Science Lab

COURSE CODE: 18B17EC271

COURSE CREDITS: 1

CORE/ELECTIVE: CORE

L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. The primary objective of this course is to provide a thorough understanding of circuit analysis and measurement of various electrical parameters.
2. Analysis of a given circuit depending on types of elements - DC analysis, Transient analysis and Frequency analysis.
3. To acquire hands on experience of conducting various experiments on electrical machines.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO1	Understanding basic electrical sources and measuring devices: Power supply, Multimeter, CRO/DSO and Function Generator.	Familiarity
CO2	Understand the basic working principle of a transformer and the operation of electrical machines.	Usages
CO3	Practical implementation of the fundamental electrical theorems and modeling of simple electrical systems.	Usages
CO4	Accurate measurement of voltage, current, power and impedance of any circuit.	Usages
CO5	DC analysis, Transient analysis and Frequency analysis of a given circuit depending on types of elements.	Assessment
CO6	Teamwork skills for working effectively in groups and develop analytical skills to compare experimental results with theoretical concepts.	Assessment

List of Experiments

S.No	Description	Hours
1	Introduction to Power supply & Multimeter.	2
2	To determine the equivalent resistance of a circuit using color code and to verify it using a multimeter. To verify Voltage divider and Current divider.	2
3	To verify Delta to Star and Star to Delta conversion.	2
4	Introduction to CRO & Function Generator	2
5	To verify Kirchoff's voltage law (KVL) and Kirchoff's Current Law (KCL)	2
6	To verify Superposition Theorem	2

7	To verify Norton's Theorem	2
8	To verify Thevenin's Theorem and Maximum Power Transfer Theorem	2
9	To study the transient response of series RC circuits using different values and R and C	2
10	Determination of frequency response of current in RLC circuit with sinusoidal ac input	2
11	To determine the turns ratio and polarities of transformer windings.	2
12	To obtain the equivalent circuit parameters from OC and SC tests, and to estimate efficiency & regulation at various loads.	2
Total Lab hours		24

Suggested Resources:

1. W.H. Hayt, J. E. Kemerlay & S.M. Durbin, "Engineering Circuit Analysis", Eighth Edition, McGraw Hill, 2012.
2. Van Valkenburg, "Network Analysis", Prentice-Hall India, 2001.
3. D.C. Kulshreshtha, "Basic Electrical Engineering", First Edition, McGraw Hill, 2011.

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Program Outcomes (POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO1	3	3	3	2	2	2	3	1	1	1	1	1	1.92
CO2	3	3	3	2	3	2	1	1	1	1	1	1	1.83
CO3	3	3	2	3	2	3	2	1	1	1	2	1	2.00
CO4	3	3	3	2	3	2	1	1	1	1	1	1	1.83
CO5	3	2	3	3	3	2	1	1	1	1	1	1	1.83
C06	3	3	3	3	2	2	2	3	2	2	2	2	2.42
Average	3.00	2.83	2.83	2.50	2.50	2.17	1.67	1.33	1.17	1.17	1.33	1.17	

Data Structure and Algorithms

COURSE CODE: 18B11CI211

COURSE CREDIT: 4

CORE/ELECTIVE: CORE

: 3-1-0

Pre-requisites: C/C++

Course Objectives:

1. To impart the basic concepts of data structures and algorithms.
2. To understand concepts about searching and sorting techniques
3. To understand basic concepts about stacks, queues, lists, trees and graphs.
4. To enable them to write algorithms for solving problems with the help of fundamental data structures
5. Introduce students to data abstraction and fundamental data structures.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To gain knowledge on the notions of data structure, Abstract Data Type.	Familiarity
CO-2	For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.	Assessment
CO-3	For a given Search problem (Linear Search and Binary Search) student will able to implement it.	Assessment
CO-4	For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.	Assessment
CO-5	Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.	Assessment
CO-6	Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.	Usage

Course Contents:

Unit	Contents	Lectures required
1	**Introduction:** Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.	**7**

2	**Stacks:** ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis.	**5**
3	**Queues:** ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.	**5**
4	**Linked Lists:** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.	**8**
5	**Trees:** Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.	**6**
6	**Sorting and Hashing:** Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.	**6**
7	**Graph:** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	**5**
Total lectures		**42**

Suggested Text Book(s):

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press

Suggested Reference Book(s):

1. "Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.
3. "Data structures and Algorithms Made Easy" 5th edition by Narasimha Karumanchi, Career monk publications
4. "Data Stru*c*ture and Algorithms in C" 2nd edition by Mark Allen Weiss (2002), Pearson Education

Other useful resource(s):

3. Link to NPTEL course contents: https://nptel.ac.in/courses/106102064/
4. Link to topics related to course:
   - **a.** https://onlinecourses.nptel.ac.in/noc18_cs25/preview
   - **b.** https://nptel.ac.in/courses/106103069/
   - **c.** http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

Course Outcomes (Data Structure and Algorithms)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	3	2	2	3	2	2	2	3	1	3	**2.4**
CO-2	3	3	3	2	3	2	3	2	2	3	1	3	**2.5**
CO-3	3	3	3	2	2	3	1	2	3	3	1	3	**2.4**
CO-4	3	3	3	2	3	3	2	2	3	3	1	3	**2.6**
CO-5	3	3	3	2	3	3	2	2	3	3	1	3	**2.6**
CO-6	3	3	3	2	3	3	2	2	2	3	1	3	**2.5**
Average	**3**	**3**	**3**	**2**	**2.7**	**2.8**	**2**	**2**	**2.5**	**3**	**1**	**3**	

Data Structure and Algorithms Lab

COURSE CODE: 18B17CI271

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

: 0-0-4

Pre-requisites: None

Course Objectives:

1. Develop problem solving ability using Programming
2. Develop ability to design and analyze algorithms
3. Introduce students to data abstraction and fundamental data structures
4. Develop ability to design and evaluate Abstract Data Types and data structures
5. Apply data structure concepts to various examples and real life applications

Course outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	To gain knowledge onthe notions of data structure, Abstract Data Type	Familiarity
CO-2	To have hands on skills to evaluate different kinds of linked lists and their applications in day to day problem solving.	Usage
CO-3	To have hands on skills to evaluate different kinds stacks and their applications and implementations in day to day problem solving	Assessment
CO-4	To have hands on skills to evaluate different kinds queues and their applications and implementations in simulations.	Assessment
CO-5	To acquire knowledge of various sorting algorithms	Usage
CO-6	To learn Searching: Balanced tree, red-black tree, lower bounds for searching	Usage
CO-7	To learn to code for operations on Tree or BST (Creation; Traversing like pre-order, post-order and in-order; Searching element; finding height etc.)	Usage
CO-8	Introduction to Heaps	Usage
CO-9	To learn to code for operations on Graphs (Creation; entering info, printing output and deleting; traversal of BFS and DFS algorithm)	Assessment

List of Experiments:

S.No	Description	Hours
1	**Getting acquainted with** a) Arrays and Strings, Structures, b) Recursion, Pointers c) Dynamic memory allocation	 2 4 4
2	**Operations on: (Creation, insertion, deletion, sorting, traversing, reversing etc)** a) Linear Linked List, b) Doubly and c) Circular Linked List	 4 4 2
3	**Operations on Stacks:** a) Creation; pushing; popping; b) testing underflow, overflow; c) prefix and postfix	 4 2 2
4	**Operations on Queues:** a) Creation; b) enqueue; dequeue; c) testing underflow, overflow	 4 2 2
5	**Operations on Tree or BST:** Creation; a) Traversing like preorder, post-order and in-order; b) Searching element; finding height etc.	 4 2
6	**Implementation of sorting algorithms 1:** Insertion Sort and Selection Sort Algorithm with arrays using dynamic memory allocation.	2
7	**Implementation of sorting algorithms 2:** Bubble Sort and Merge Sort Algorithm with arrays using dynamic memory allocation.	2
8	**Implementation of sorting algorithms 3:** Implementation of Radix Sort and Quick Sort Algorithm with arrays using dynamic memory allocation.	2
9	**Operation on Heaps:** a) Heaps, b) Heap Sort	 2 2
10	**Implementation of Searching algorithms:** Linear Search Algorithm and Binary Search Algorithm using dynamic memory allocation.	2
11	**Operations on Graphs :** (Creation; entering info; printing Output and deleting; traversal of BFS and DFS algorithm etc.)	2
Total Lab hours		**56**

Minor Project(s) – (*Only for 2 credit lab)*

- Design GUI based program to solve any binary equation.
- Design GUI based program to find the roots of quadratic equation.
- Design a program that picks the characters at equal interval from the given text/paragraph and generate a new paragraph in which each set of word can't have more than 4 characters. Last word of the paragraph can have <=4 characters.
- Program to input following data into disk file. Code, name, department and salary of employee in a firm. After creating file read the file and find following-

Methodology
algorithms
Code execution
Future scope
Count number of employees as per department
Search record of employee
Display record of employee
Display list of employee in alphabetical order as per department
Read record from file

Suggested Books/Resources:

1. ***Langsam, Augestein, Tenenbaum : Data Structures using C and C++, 2nd Edn, 2000, Horowitz and Sahani : Fundamental of Data Structures in C, 2nd Edn, 2008***
2. Weiss : Data Structures and Algorithm Analysis in C/C++, 3rd Edn, 2006
3. Sahani : Data Structures, Algorithms and applications in C++, 1997.
4. Corman et al : Introduction to Algorithms, 3rd Edn., 2009
5. http://www.nptel.iitm.ac.in/video.php?subjectId=106102064, last accessed Mar 13, 2014.
6. http://www.cs.auckland.ac.nz/~jmor159/PLDS210/ds_ToC.html, last accessed Mar 13, 2014.
7. http://courses.cs.vt.edu/csonline/DataStructures/Lessons/index.html, last accessed Mar 13, 2014.
8. Link to topics related to course:
    a. http://cse.iitkgp.ac.in/~pallab/pds16/pds16.htm
    b. https://onlinecourses.nptel.ac.in/programming101/preview

Evaluation Scheme:

1	Mid Sem. Evaluation	20 Marks
2	End Sem. Evaluation	20 Marks
3	Attendance	15 Marks
4	Lab Assessment	45 Marks
	Total	100 marks

Course Outcomes (COs) contribution to the Programme Outcomes(POs)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Average
CO-1	3	2	3	2	2	3	3	3	2	3	2	2	**2.5**
CO-2	3	3	3	2	3	3	3	3	2	3	2	3	**2.8**
CO-3	3	3	3	2	2	3	3	3	3	3	2	2	**2.7**
CO-4	3	3	3	3	3	3	3	2	2	3	3	3	**2.8**
CO-5	3	3	3	2	2	2	3	3	3	3	2	2	**2.6**
CO-6	3	3	3	3	3	3	3	2	2	3	3	3	**2.8**
CO-7	3	3	3	3	3	3	2	2	3	3	3	3	**2.8**
CO-8	3	3	3	2	3	3	3	3	3	3	2	3	**2.8**
CO-9	3	3	2	3	3	3	3	3	3	2	3	3	**2.8**
Average	**3**	**2.9**	**2.9**	**2.4**	**2.7**	**2.9**	**2.9**	**2.7**	**2.6**	**2.9**	**2.4**	**2.7**	