ACADEMIC CURRICULA

UNDERGRADUATE DEGREE PROGRAMMES

Bachelor's Degree in Technology

(B.Tech - Four Years)

(Choice Based Flexible Credit System)

Regulations 2018

Volume – 2
(Detailed Syllabus for First Year Courses)

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

(Deemed to be University u/s 3 of UGC Act, 1956)

Kattankulathur, Kancheepuram 603203, Tamil Nadu, India

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Humanities and Social Sciences

including Management Courses

Regulations 2018

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Kattankulathur, Kancheepuram, Tamil Nadu, India

Course Code	18LEH101J	Course Name	ENGLISH	Course Category	H	Humanities and Social Sciences including Management	L	T	P	C
							2	0	2	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English and Foreign Languages	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Analyze the importance of communication in personal, professional contexts. Identify proper English pronunciation*			
CLR-2 :	*Strengthen vocabulary and grammar. Enhance listening and writing comprehension. Review films and documentaries*			
CLR-3 :	*Writing brief paragraphs using appropriate techniques. Enhance their English fluency in speaking*			
CLR-4 :	*Write effective essays, stories. Experience workplace communication aspects*			
CLR-5 :	*Research on a topic and write a comprehensible academic project reports. Make effective presentations*			
CLR-6 :	*Utilize English language skills along with technical skills in build wider career orientations*			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Identify types, modes, channels and barriers of communication. distinguish different speech sounds, pronounce correctly*	*1*	*70*	*60*	*L*	*H*	*L*	*H*	*H*	*H*	*L*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-2 :	*Identify, rectify the errors in the use of grammar and vocabulary. Improve listening and writing skills*	*2*	*65*	*60*	*L*	*H*	*L*	*H*	*H*	*H*	*L*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-3 :	*Develop a topic idea into a cohesive paragraph with examples. Improve the fluency of speaking skills*	*3*	*75*	*70*	*L*	*H*	*L*	*H*	*H*	*M*	*L*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-4 :	*Develop ideas into logical and coherent essays. Understand better the workplace culture*	*3*	*75*	*65*	*L*	*H*	*L*	*H*	*H*	*H*	*L*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-5 :	*Identify the steps involved in writing an academic project report. List and practice skills need for making a presentation*	*3*	*75*	*65*	*L*	*H*	*L*	*H*	*H*	*H*	*L*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-6 :	*Build listening, speaking, reading, writing abilities in English, To interact with English speaking people.*	*3*	*70*	*65*	*L*	*L*	*L*	*H*	*H*	*H*	*L*	*H*	*H*	*H*	-	*H*	-	-	-

		Communication	***Vocabulary and Grammar***	***Discourse Techniques***	***Workplace Communication***	***Project Writing***
Duration (hour)		**12**	**12**	**12**	**12**	**12**
S-1	SLO-1	*Definition, process of communication*	*Words with Foreign roots, Word formation – inflectional, derivational prefixes, suffixes*	*Sentence structure, Phrases and Clauses*	*Reading Comprehension, Guidelines questions (referential,critical,interpretative)*	*Topics for project writing*
	SLO-2	*Filling in-class worksheets*	*Quiz - Identifying the borrowed roots and their meanings-Worksheet exercise*	*Exercise: worksheet, Identifying phrases, clauses, compound, complex sentences*	*Practice Exercise*	*Discussion*
S-2	SLO-1	*Verbal and non-verbal communication*	*Synonyms and Antonyms and Standard abbreviations*	*Developing ideas into paragraphs – cohesion markers*	*Précis-writing Guidelines*	*Collection of Data – avoiding plagiarism-authenticity and credibility of data*
	SLO-2	*Individual and group activities - Role play*	*Context based activity / Learner compiling standard abbreviations from core subject*	*Identify topic sentence in a paragraph; writing a paragraph based on a topic*	*Practice Exercise*	*Collection of data for verification*
S-3	SLO-1	*LAB: Individual speech sounds*	*LAB: Listening to long conversations*	*LAB: Listening to short stories - Science fiction*	*LAB: Videos on workplace scenario Open Discussion on Workplace Etiquette*	*LAB: Importance of availing credible resources with examples*
	SLO-2	*Courseware on speech sounds (Listening and reproducing)*	*Identify communication contexts, use of making a word list in relation to the context*	*Identify main idea of the given story and narrate a story on the given topic – Written*	*speaking language known to everyone, space, polite words, actions, objective*	*Collecting and compiling resource materials*
S-4	SLO-1	*LAB: often mispronounced sounds*	*LAB: Listening to long conversations, daily life*	*LAB: Speaking - practice activity – brain storming – mind mapping*	*LAB: Videos on workplace communication*	*LAB: Guidelines for preparing a PPT; presentation techniques*
	SLO-2	*Audio visual material (Listening to minimal pairs and reproducing)*	*Identify various communication contexts and answering questions - collocation*	*Just a Minute*	*Role play based on the given workplace contexts*	*Preparing PPT on the topic of learners' choice*
S-5	SLO-1	*Other Types of Communication: general technical-formal, informal- external, internal*	*Homonyms and Homophones*	*Inputs on writing precisely, redundancies, wordiness-repetition-clichés*	*Summarising*	*Guidelines for writing: outline- objectives-background- methodology-discussion*
	SLO-2	*Write upon a selected type of communication*	*Fun activities – worksheets- cross words*	*Error analysis and editing*	*Group activity (oral/written) on the given passages*	*Drafting an outline*
S-6	SLO-1	*Listening, Speaking, Reading, Writing*	*Articles, Tenses*	*Defining, describing technical terms*	*Essay Writing, general introduction*	*Discussion using sample project*
	SLO-2	*Group activity (Newspaper) – Discussion and Feedback*	*Exercise through worksheets- individual activity -peer correction- open discussion*	*Writing definitions-product and process description*	*Brainstorming on relevant technical and non-technical topics*	*Writing the first draft on the selected topic*

S-7	SLO-1	*LAB: Material on mispronounced words*	*LAB: Watching documentaries & short films related to science and technology*	*LAB: Describing a scene or event -videos*	*LAB: Technical communication – Interpreting Data*	*Giving inputs on documentation based on IEEE*
	SLO-2	*Individual oral activity and rectification of the probable mistakes.*	*Picking out the terminology related to science and technology*	*String narration – describing an event or a scene*	*Group activity - interpretation of data - oral presentation*	*Preparing references*
S-8	SLO-1	*LAB: sentence types*	*LAB: Introduction to English es –British and American -Videos*	*LAB: Channels of communication - videos*	*LAB: External Communication-Advertising*	*Checklist for project format (PPT)*
	SLO-2	*Practice on sentence stress and intonation*	*Discussion on difference between British and American words*	*Observing and identifying the channels of communication –Role play*	*ADZAP (promoting a product) - Oral*	*Self-verification and submission of final draft*
S-9	SLO-1	*Communication barriers*	*Noun-pronoun agreement and subject-verb agreement*	*Inputs on Classifying/categorising and sequencing ideas with relevant diagrams*	*Essay Writing Guidelines: introduction, elaboration and conclusion with examples*	*LAB: Formal Presentation*
	SLO-2	*Individual activity- sharing of personal experiences*	*Identifying and learning through error analysis - worksheets*	*Writing a passage on the given hints, tree diagram, classification table and flow chart*	*Individual activity (Written) on the given topic*	*LAB: Formal Presentation*
S-10	SLO-1	*Organizational communication - Channels of communication*	*Misplaced modifiers - prepositions- prepositional verbs and phrasal verbs*	*Importance of punctuation – miscommunication –errors in punctuation*	*Organisational Report Writing - Progress report- Guidelines*	*LAB: Formal Presentation*
	SLO-2	*Group activity (worksheet) with visuals or written material.*	*Learn through practice – placing same modifier in different places in a sentence*	*Fun activities - worksheets for appropriate punctuation - written*	*Writing a progress report*	*LAB: Formal Presentation*
S-11	SLO-1	*LAB: short biographical account on famous personalities -video*	*LAB: Watching video based on daily life*	*LAB: Barriers of communication Language barriers - videos*	*LAB: Sample case studies for work ethics - videos*	*LAB: Formal Presentation*
	SLO-2	*Oral paraphrasing of the content shown*	*Observing and recording the features of spoken English*	*Identifying the language barriers of communication –Written*	*Debate on the videos shown*	*LAB: Formal Presentation*
S-12	SLO-1	*LAB: Listening to short conversations*	*LAB: Watching interviews of famous personalities*	*LAB: Barriers of communication-personal and organizational - video*	*LAB: Learning interview techniques through models*	*LAB: Formal Presentation*
	SLO-2	*Answering the questions on the above content*	*Quiz on the video shown*	*Role play on the videos shown*	*Mock interview*	*LAB: Formal Presentation*

Learning Resources	*1. Swan, Michael. Practical English Usage. OUP, 1995* *2. Kumar Sanjay and Pushpa Lata. Communication Skills. OUP, 2011*	*3. CIEFL, Hyderabad. Exercises in Spoken English. Parts I-III. OUP* *4. Anbazhagan K, Cauveri B, Devika M.P., English for Engineers. Cengage, 2016*	*5. www.mmm.english.com* *6. www.usingenglish.com*	*7. www.onlinewriting.com/purdue* *8. www.ieee.org/index.html*	

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts		
1. Dr. Usha Kodandaraman, ABK AOTS, Chenna . drushak@gmail.com	*1 .Dr. S. P.Dhanavel, IITM, Chennai, dhanavelsp@iitm@ac.in*	*1. Dr. K. Anbazhagan, SRMIST*	*3. Dr. Sukanya Saha, SRMIST*	*5. S. Ramya, SRMIST*
2. Mr. Durga Prasad Bokka, TCS Chennai, durgaprasad@tcs.com	*2. Ms. Subashree, VIT, Chennai, subashree@vit.ac.in*	*2. Ms. Cauveri B, SRMIST*	*4. Dr. M. M.Umamaheswari, SRMIST*	

Course Code	18LEH102J	Course Name	CHINESE	Course Category	H	Humanities and Social Sciences including Management	L	T	P	C
							2	0	2	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English and Foreign Languages	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Pronounce Chinese Romanization, know about China and Chinese speaking countries, Read basic Chinese characters			
CLR-2 :	Help ask about the need, counting numbers, Greet each other, express time and date in daily conversations			
CLR-3 :	Ask about directions, learn basic conversation on orientation			
CLR-4 :	Daily activities and asking about places and Chinese etiquette			
CLR-5 :	List the Chinese festivals and Chinese culture, acquire basic conversational skills			
CLR-6 :	Utilize Chinese language skills along with technical skills in build wider career orientations			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Pronounce Chinese language, Identify the basic Chinese scripts, tones and greetings	1	60	60	-	-	M	-	M	H	L	M	H	L	-	H	-	-	-
CLO-2 :	Identify basic grammar, count numbers, tell date and time, make interrogative sentences and basic conversations	2	65	62	-	-	H	-	H	M	L	M	H	M	-	H	-	-	-
CLO-3 :	Ask different kinds of questions, to tell age using Chinese words	2	68	63	-	-	M	-	M	L	L	M	L	M	-	H	-	-	-
CLO-4 :	Identify the different usage of Chinese grammar and vocabulary and introduce one self	2	69	65	-	-	H	-	H	H	L	M	H	H	-	H	-	-	-
CLO-5 :	Appropriately use different verbs and adjectives in basic conversations	2	72	63	-	-	H	-	H	H	L	M	M	H	-	H	-	-	-
CLO-6 :	Build listening, speaking, reading, writing abilities in Chinese, To interact with Chinese people and understand their culture	2	70	60	-	-	H	-	H	H	L	M	H	H	-	H	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	About china, Chinese speaking country, chinese language & culture.	Numbers in Chinese.	Introduction of few basic W/H words and framing basic interrogative sentences	Making of Affirmative negative question in Chinese	Introduction & application of few frequently used construction in Chinese.
	SLO-2	Introduction of initials, finals in Mandarin	Counting numbers and numeric system	Nationality	Conversation to make suggestion, accept of dealing suggestion, make comments.	Introduction & application of few frequently used construction in Chinese.
S-2	SLO-1	Tables of combination of initials and finals in Putonghua(Mandarin)	Chinese monetary system, Counting Chinese currency.	Direction in Chinese.	Sentence with nominal predicate, Subject verb construction as its predicate.	Famous Chinese festivals
	SLO-2	Basic greetings, Phrases used in daily life (in pinyin)	Converse to greet others, express needs	Making question with 几,多少	Fruit related vocabulary, application.	Major Chinese cities
S-3	SLO-1	Tables of combination of initials and finals in Putonghua(Mandarin)	Asking your need	Introducing one's nationality	Asking question with ma , wh words, affermative -negative	Application and usage of construction
	SLO-2	Tables of combination of initials and finals in Putonghua(Mandarin)	Nominal measure word	Asking about nationality	Lianxi	Lianxi
S-4	SLO-1	Prononciation of Pinyin chart	Telling phone number in chinese	Asking price	Asking question with ma , wh words, affermative -negative	Application and usage of construction
	SLO-2	Prononciation of Pinyin chart	Converting numbers	Lianxi	Lianxi	Lianxi
S-5	SLO-1	Introduction of Four Tones in Chinese language.	Time & time related greetings,	Politely and formally asking names ,Expressing apology.	Making Chinese sentences with verbal & Adjectival predicate.	Grammar related to 但是，可是，以前，以后，后来。
	SLO-2	Four Tones and related pronunciation.	Days&Seasons.	Introduction & Application of verbal Measure Word.	Introduction of 地	Introduction & Application of the basic optative verbs like会，能，可以.
S-6	SLO-1	Tonesandhi（一，不）in Chinese Tone discrimination in Chinese	Sentence patterns in Chinese, S-V-O sentences. Framing simple sentences.	Make sentences with在,and few corelated words like 这儿，那儿 with example	Few basic verbs and adjectives.	conversation how todescribe likes ,dislikes, interest and hobbies

	SLO-2	*Chinese characters. The eight strokes of characters, proper stoke orders.*	*Introduce 是 and 不是*	*Important locations used in daily life.*	*Opposite words.*	*Conduct conversation how todescribe likes, dislikes.,interest and hobbies*
S-7	SLO-1	*Pronounce word in proper tone*	*Vocabulary*	*Asking about places.*	*Usage of verbs*	*Usage of grammar*
	SLO-2	*Personal Pronouns and relations, Plural forms of pronouns*	*Asking date and time*	*lianxi*	*练习*	*lianxi*
S-8	SLO-1	*Writing characters with proper stroke order*	*Usage of time words in a sentence*	*Asking about directions.*	*Usage of adjectives with different adverbs*	*Asking about interest and hobbies*
	SLO-2	*Writing characters with proper stroke order*	*Introducing each other*	*lianxi*	*练习*	*lianxi*
S-9	SLO-1	*Sentence structure with the adjective 很 and Framing sentences, negative of 很。*	*Weekdays in Chinese, Month, Year&Writing Date.*	*Profession relatedvocabulary, application withexamples.*	*Colour and vocabulary, application withexamples.*	*Conversation how to bergain and purchase products.*
	SLO-2	*Introduction of adverb 也， Interrogative particle呢， application & Usages.*	*Introduction of verb有 and it'snegative form .Nominal measure word.*	*Basic conversation about persons ouccupation*	*describe family members and talk about university and department*	*conversation how to bergain and purchase products.*
S-10	SLO-1	*Possesive/ Structural Particle的, application of 的with pronouns.*	*Framing of basic interrogative sentences with modal particle吗。*	*Introduction of interrogative phrase 多大， Tellingone'sage in Chinese.*	*Sports &Games realated vocabulary, special usages,*	*Use of conjugation 还是， 或者with example.*
	SLO-2	*Writing Chinese characters basic conversation related to greetings*	*Framing of basic interrogative sentences with modal particle吗。*	*Introduction of past tense and aspect particle 了。*	*application withexamples.*	
S-11	SLO-1	*Writing greetings in characters with proper stoke order*	*Asking simple question*	*Asking age*	*Asking about likes and dislikes*	*Asking about purchasing products*
	SLO-2	*练习*	*Asking date*	*lianxi*	*Asking about likes and dislikes*	*Asking about purchasing products*
S-12	SLO-1	*Basic Expression*	*Birthday in Chinese*	*Asking about occupation*	*Asking about family members*	*Usage of conjugation*
	SLO-2	*练习*	*Grammar – has, have*	*lianxi*	*Asking about family members*	*Usage of conjugation*

Learning Resources	*1. Liu Xun, New Practical Chinese reader, Beijing Language and Culture University Press, 2008*	*2. Elementary Chinese Reader- 1, Sinolingua Beijing China, 2007*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Dr. Usha Kodandaraman, ABK AOTS, Chennai. drushak@gmail.com	*1. Dr. S. P. Dhanavel, IIT Madras, dhanavelsp@iitm.ac.in*	*1.Ms. Poulomi Ghosal, SRMIST*
2. Mr. Paul Das, NEC, Chennai	*2. Ms. Subashree, VIT, Chennai, subashree@vit.ac.in*	*2. Mr. Soumya Brata Halder, SRMIST*

Course Code	18LEH103J	Course Name	FRENCH	Course Category	H	Humanities and Social Sciences including Management	L	T	P	C
							2	0	2	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English and Foreign Languages	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Get to know about France, its culture, heritage and countries speaking French. Build basic abilities to converse in French
CLR-2 :	Identify and ask for information. Describe people with adjectives. Build conversational abilities
CLR-3 :	Ask for and Provide directions, Identify French educational system, Draft a curriculum vitae
CLR-4 :	Tell Time and converse in time related situations, Identify French etiquette
CLR-5 :	Appreciate French cuisine and their food habits
CLR-6 :	Utilize French language skills along with technical skills in build wider career orientations

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Identify and pronounce French alphabets, Greet, Converse, Introduce, Read, identify basic French grammar	1	70	60	-	-	M	-	M	H	L	M	H	H	-	H	-	-	-
CLO-2 :	Identify French adjectives, verbs ending in"er" and frame simple sentences and make conversations	2	65	60	-	-	H	-	H	M	L	M	H	H	-	H	-	-	-
CLO-3 :	Orient someone by giving directions, Ask for directions, Express possession, conjugate verbs in "ir', Draft curriculum vitae	2	65	60	-	-	L	-	M	L	L	M	L	L	-	H	-	-	-
CLO-4 :	Express and use time, create a routine using reflexive verbs, conjugate a reflexive verb and regular verbs in "re"	3	75	65	-	-	H	-	H	H	L	M	H	H	-	H	-	-	-
CLO-5 :	Paragraph on French food habits and also their own using partitive articles. Alimentation is associated with partitive articles	3	75	65	-	-	H	-	H	H	L	M	M	H	-	H	-	-	-
CLO-6 :	Build listening, speaking, reading, writing abilities in French, To interact with French people and understand French culture	3	70	65	-	-	H	-	H	H	L	M	H	H	-	H	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	L'alphabet, Les accents	Les nombres 70 à 100	Les articles contractes (au...)	Les adjectifs démonstratifs	La forme négative (ne…plus, ne…. Jamais
	SLO-2	Les salutations	Les nombres 101 a 1000	Les articles contractes (du..)	La famille	La forme négative (ne…que. Ne… rien)
S-2	SLO-1	Les pronoms sujets, Les verbes: être, avoir, s'appeler, habiter	Le genre des noms	Les verbes : Vouloir, pouvoir, devoir	Les 2 groupes verbes	Les verbes acheter, manger, Commencer, payer
	SLO-2	Les articles indéfinis	le nombre des noms	Les verbes irréguliers	Les verbes : sortir, partir	L'argent
S-3	SLO-1	L'expression	Comprendre une petite annonce	Faire une enquête	Proposer a qqn pour une sortie	Demander le prix
	SLO-2	Les salutations	Rédiger une annonce simple	Ecrire une liste	Proposer a qqn de faire qqc	Faire les courses
S-4	SLO-1	Se communiquer en classe	Chercher un logement	Les gouts des autres	Apprécier qqc	Les services et les commerces
	SLO-2	Epeler, s'appeler	Décrire un logement	Les temps libres et les loisirs	Ne pas apprécier qqc	Payer ses achats
S-5	SLO-1	Les numéros 0 a 69	Le 1 e groupe verbe, les professions	Les adjectifs interrogatifs	Le 3e groupe verbes	L'impératif affirmatif
	SLO-2	Les jours, les mois, les émotions	Les verbes venir et aller	Les mots interrogatifs	Les vêtements	L'impératif négatif
S-6	SLO-1	Les pays, les couleurs	Le genre des adjectifs	Les verbes pronominaux(1)	Les adverbes de fréquence	Les articles partitifs
	SLO-2	Des portraits de pays francophones	les nombre des adjectifs	Les verbes pronominaux(1)	Les adverbes de temps	Les exp. De quantités

S-7	SLO-1	*Présentez- vous*	*Les vocabulaires des objets*	*Parler de ses loisirs*	*Décrire une tenue*	*Accepter une invitation*
	SLO-2	*Présenter qqn*	*Décrire son voisin*	*Exprimer ses gouts*	*Décrire les accessoires*	*refuser une invitation*
S-8	SLO-1	*S'informer sur qqn*	*Décrire votre profession*	*Exprimer une préférence*	*Parler qqc*	*Donner son appréciation*
	SLO-2	*Demander des informations personnelles*	*La langue, activité recap.*	*Exprimer une envie, Activité quotidienne*	*justifier*	*S'exprimer a table*
S-9	SLO-1	*Les prépositions de lieu (1)*	*Les adjectifs possessifs (sing)*	*Le verbe aller*	*Le passe compose : avoir*	*Le pronom « en » de quantité*
	SLO-2	*Les verbes : parler, habiter*	*Les adjectifs possessifs (pl)*	*Le futur proche*	*Le passe compose : etre*	*Il faut*
S-10	SLO-1	*Les articles définis*	*Les prépositions de lieu(2)*	*L'heure*	*L\imparfait (1)*	*Les festivals du mot*
	SLO-2	*Les pronoms Personnelles*	*Les orientations*	*Les Temps*	*L'imparfait (2)*	*Les festivals en France*
S-11	SLO-1	*Demander poliment*	*Les pièces, l'équipement*	*Demander l'heure*	*Parler d'un film*	*Donner des instructions (il Faut)*
	SLO-2	*Répondre poliment*	*S'infirmer un logement*	*Dire l'heure*	*Féliciter un souhait*	*Cuisine d'une parisienne d'adoption*
S-12	SLO-1	*Les vocabulaires d'informatique*	*Ecrire un portrait*	*Raconter sa vie sur un blog*	*Adresser un souhait*	*Commander au restaurant*
	SLO-2	*S'inscrire sur un site*	*La description physique*	*Justifier*	*Ecrire une carte postale*	*Ecrire une recette*

Learning Resources	*1. SAISONS 1 – Didier - 2017*	*2. BIENVENUE – Course Book in French – Department of EFL, SRMIST- 2017*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember / Understand	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
Level 2	Apply / Analyze	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
Level 3	Evaluate / Create	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts	
1. Mr. D. Hemachandran, Renault Nissan, Senior Language Specialist	*1. Dr. S. P. Dhanavel, IIT Madras, dhanavelsp@iitm.ac.in*	*1. Dr. K. Anbazhagan, SRMIST*	*2. Ms. K. Sankari, SRMIST*
2. Mr. Durga Prasad Bokka, TCS Chennai, durgaprasad@tcs.com	*2. Ms. Judy Niranjala, SIET college for Women, Chennai*	*3. Mr. J. Sabastian Satish, SRMIST*	

Course Code	18LEH104J	Course Name	GERMAN	Course Category	H	Humanities and Social Sciences including Management	L	T	P	C
							2	0	2	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English and Foreign Languages	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Get to know about Germany, its culture, heritage. Build basic abilities to converse in German*			
CLR-2 :	*Identify and ask for information. Introduce oneself. Build conversational abilities*			
CLR-3 :	*Ask for and Provide directions in German, Identify German cities, buildings and everyday life like cuisine*			
CLR-4 :	*Develop the ability to read, understand and initiate a conversation*			
CLR-5 :	*Enable basic conversational skills to behave in a German speaking society, in restaurants and in public places*			
CLR-6 :	*Utilize German language skills along with technical skills in build wider career orientations*			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Identify and pronounce German alphabets, Greet, Converse, Introduce, Read, identify basic German grammar*	*1*	*70*	*60*	-	-	*L*	*L*	*M*	*H*	*L*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-2 :	*Compose dialogue between strangers, ask simple information*	*2*	*65*	*55*	-	-	*M*	*L*	*M*	*H*	*L*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-3 :	*Orient someone by giving directions, by using Imperatives and different types of definite & indefinite articles*	*2*	*73*	*60*	-	-	*M*	*M*	*H*	*M*	*M*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-4 :	*Write a dialogue by using different verbs of Accusative articles*	*3*	*65*	*55*	-	-	*M*	*M*	*H*	*H*	*M*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-5 :	*Create conversations in social places like; restaurants, identify and order food varieties*	*3*	*65*	*55*	-	-	*M*	*M*	*H*	*H*	*L*	*H*	*H*	*H*	-	*H*	-	-	-
CLO-6 :	*Build listening, speaking, reading, writing abilities in German, linteract with Germans and understand their culture*	*3*	*75*	*65*	-	-	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	-	*H*	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	*Alphabets, Grüßen und Verabschieden.*	*UmbestimmtArtikel im Nominativ.*	*T, N, D verbenkonjugationen und Satzschreiben.*	*Die Uhezeiten verstehen und nennen.*	*Etwasgemeinsam planen, über Geburtstag sprechen.*
	SLO-2	*Über Länder, Sprachensprechenim Deutschland, WichtigeStädteim Deutschland.*	*Zahlenbis 1000 und Wortschatz.*	*Ordinal Zahlen und Tagezeiten*	*Zeitangabenmachen.*	*Schreiben Sie: Einladung für ihre Geburtstag.*
S-2	SLO-1	*Zahelenbis 20, Sich und andere Vorstellen.*	*Plätze und Gebäudebe nennen, Fragenzuortenstellen.*	*Überessensprechen,VerschiedeneGerichte in Deutschland durch PPT.*	*Umregelmäßige verbenkonjugationen und BeispieleSatz.*	*Possessive Artikel im Akkuativ.*
	SLO-2	*Telefonnummer und E-mail Adressenennen.*	*Negation und übersetzung.*	*Buchstabieren und Wortschtz.*	*"ieren" verben conjugation und Beispielesatz.*	*BeispieleSätze.*
S-3	SLO-1	*Alphabet Aussprache und hört die grüßen.*	*Hörübung: Die Telefonnummer.*	*Hörübung: Aussprache die Umlauteä, ö, ü und beispieleSätze.*	*Hörübung: Dem Dialog zuhören und die Zeit schreiben.*	*E-mail schreiben: Einladung ihrer Geburtstagsferier.*
	SLO-2	*Verabschiedenen Wörten.*	*Buchstabieren und Wortschtz.*	*Hören und buchstabieren.*	*Übungen.*	*Übungen.*
S-4	SLO-1	*Länder, Sprachen, Der Film: Über den Guten Tag und die Telefonnummer.*	*Der Film: Über die Sehenwürdigkeiten in Detschland.*	*Dialog: Über das Essen und seine preisepraktizieren.*	*Mit den Regulägige und Umregelmäßigen verbeneigene Sätze schreiben*	*Das Gesprächhören und verstehen.*
	SLO-2	*Übungen.*	*Sprechen über den wichtige Städte im Deutschland.*	*Übungen.*	*"ieren" verben konjugationen.*	*Wortschatz und buchstabieren.*
S-5	SLO-1	*Über Länder und Sprachensprechen.*	*Himmelsrichtungen und Verkehrsmittel nennen.*	*Einen Einkauf Planen und sprechen*	*Über die Familiesprechen und sichverabreden.*	*Das Briefeschreiben erklären, eineEinldung verstehen und schreiben.*
	SLO-2	*Hören und buchstabieren.*	*NachdemWegfragen und einem Wegbeschreiben*	*Gespräche beim Einkauf führen.*	*Sich für eine verspätung entschuldigen.*	*Personal pronomen und beispieleSätze.*
S-6	SLO-1	*Aussagesatz und personal pronomen in Nominativ und beispieleSätze.*	*Texte mit internationalenwörtern verstehen.*	*Gesprächebeim Essen führen.*	*EinenTermin telefonisch vereinbaren.*	*ImRestaurentbestellen und bezahlen, übereinEreignis sprechen,*
	SLO-2	*ÜberArbeit, Berufe und Arbeitszeitensprechen.*	*Artikel lernen.*	*W-fragen texte verstehen.*	*Schreiben Sie die Uhrzeiten.*	*BestimmtInformationen in Texten finden.*

S-7	SLO-1	*Übersich und anderesprechen.*	*Hörübung: Schreiben Sie die Zahlen.*	*Kurzer Dialog über das Einkaufen.*	*Üben: Wie man den Termin festlegt.*	*Schreiben eines Briefes über jede gegebene situation.*
	SLO-2	*Fragen und antworten.*	*Events im Hamburg.*	*Übungen: Verben konjugationen.*	*Hören und buchstabieren.*	*Übungen: Trennbare Verben konjugationen.*
S-8	SLO-1	*Sich und anderevorstellen.*	*Fragen Sie die Wegbeschreibung in dem sie die Bildersehen.*	*Kurzer Dialog über das Essen.*	*Hörübung: Die Zeit durch hören des Dialogs schreiben.*	*Hörübung und Schreiben: Freizeitaktivitäten.*
	SLO-2	*W-Fragen.*	*Lesen und verstehen.*	*Hören: wie man bestellt.*	*Übungen.*	*Satzmithilfsverben.*
S-9	SLO-1	*Zahlen ab 20 nennen, über Jahrezeiten im Deutschland.*	*Imperativ mit Sie, Lesen und verstehen.*	*Wortschatz und Buchstabieren.*	*Umbestimmt Artikel im Akkusativ.*	*Untrennbare verben konjugationen. Beispiele Sätze.*
	SLO-2	*Wochentage und Monate.*	*Lange und KurzeVokale.*	*Schreiben Sie die Sätze.*	*Zeitangabenmit am, um, von…. bis.*	*BeispieleSätze.*
S-10	SLO-1	*Bestimmt Artikel in Nominativ.*	*Regelmäßige verben Konjugationen.*	*PositionenimSatz, Bestimmt Artikel im Akkusativ.*	*Erklärt die Grammatik Präpositionen im Akkusativ.*	*Präteritum von Hilfsverben und konjugationen.*
	SLO-2	*Verwendungen von Hilfsverben.*	*Satzschreiben.*	*AkkusativVerben konjugationen.*	*Beispiele**Sätze im** Präpositionen **.***	*Modal verben konjugationen und beispiele **Sätze.***
S-11	SLO-1	*Ja oder NeinFragen durch PPT.*	*Der Imperetivsätze und auch die Regelmäßigeverben*	*Essen im D-A-CH, Beruferund ums Essen.*	*Hören und sprechen: die Tagesablauf.*	*Übung für Modal verben wie, Aussagesatz, Satzfrage.*
	SLO-2	*Typische Hobby's.*	*Lernen Sie die Sätze durch PPT.*	*Hören Sie den dialog.*	*Schreiben: Die Tagesabluf.*	*W-Frage und Trennabreverben.*
S-12	SLO-1	*Der Film: Über den Termin.*	*Der Film: Die Autofahrt und das Verkehrsmittel.*	*Der Film: Frühstück bei den Bergs.*	*Pünktlichkeit in D-A-CH und Der Film: Nie hast du Zeit und Termine.*	*Der Film: Hast du Zeit? Im Restaurant und Überraschung.*
	SLO-2	*Über deineFamilie.*	*Claudia Berg in der Arbeit.*	*Einkaufen planen.*	*Der Termin und die Verabredung.*	*Schreiben Sie die Sätze mit Hilfs verben.*

Learning Resources	1. Netzwerk – Klett – Langeiseheidt, Munchen, 2015	2. Grundkurs Deutsch, Dept.of EFL, SRMIST

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts	
1. Dr. Usha Kodandaraman, ABK AOTS, Chennai. drushak@gmail.com	*1. Dr. S. P. Dhanavel, IIT Madras, dhanavelsp@iitm.ac.in*	*1. Dr. K. Anbazhagan, SRMIST*	*2. Dr. P. Tamilarasan, SRMIST*
2. *Mr. Vivek Raghunathan, Health care, vivek.raghunathan@waikatodhb.health.nz*	*2. Ms. Subashree, VIT, Chennai, subashree@vit.ac.in*	*3. Ms. Srilitha Srinivasan, SRMIST*	

Course Code	18LEH105J	Course Name	JAPANESE	Course Category	H	Humanities and Social Sciences including Management	L	T	P	C
							2	0	2	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English and Foreign Languages	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Identify the basics of Japan language and the facts of Japan, Make useful expressions and basic conversations.*			
CLR-2 :	*Identify someone and ask for information. Physical description of people with adjectives. Focus of basic conversation*			
CLR-3 :	*Ask and give directions, Use conversation on orientation. Identify the Japan educational system*			
CLR-4 :	*Create daily activities and tell time. Appreciate Japan etiquette. Conjugate a reflexive verb and 3rd group of regular verbs*			
CLR-5 :	*Identify diverse food habits of the Japanese people.*			
CLR-6 :	*Utilize Japan language skills along with technical skills in build wider career orientations*			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Identify, pronounce Japan alphabets, know about Japan, its culture. Greet each other and converse, Introduce oneself*	*1*	*70*	*60*	*M*	*L*	*L*	*L*	*M*	*H*	*M*	*H*	*H*	*M*	*L*	*H*	-	-	-
CLO-2 :	*Describe with the help of Japan adjectives, identify first group verbs ending in e. Frame simple sentences*	*2*	*65*	*65*	*M*	*L*	*L*	*L*	*M*	*H*	*M*	*H*	*H*	*M*	*L*	*H*	-	-	-
CLO-3 :	*Orient someone by giving directions, Express possession and conjugate 2nd group verbs. Draft their own curriculum vitae*	*2*	*65*	*65*	*M*	*L*	*L*	*L*	*M*	*H*	*M*	*H*	*H*	*M*	*L*	*H*	-	-	-
CLO-4 :	*Express time and use expressions of time in daily conversations, paragraph on daily routine with the help of reflexive verbs*	*3*	*75*	*65*	*M*	*L*	*L*	*L*	*M*	*H*	*M*	*H*	*H*	*M*	*L*	*H*	-	-	-
CLO-5 :	*Create a paragraph on the food habits of the Japan people and also their own using particles.*	*3*	*75*	*65*	*M*	*L*	*L*	*L*	*M*	*H*	*M*	*H*	*H*	*M*	*L*	*H*	-	-	-
CLO-6 :	*Build listening, speaking, reading, writing abilities in Japan, To interact with Japan people and understand Japan culture*	*3*	*75*	*65*	*M*	*L*	*L*	*L*	*M*	*H*	*M*	*H*	*H*	*M*	*L*	*H*	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	*Introduction to Japan*	*Hiragana Lesson 7 Ma and Ya series.*	*Lesson 5 – Particles.*	*Lesson 6 – renshuu and exercises*	*Lesson 9 Renshuu*
	SLO-2	*Japanese language and culture*	*ma/ya series related words*	*Japanese sports.*	*Religious beliefs,.*	*Explanation of ~te form I Group*
S-2	SLO-1	*Greetings*	*Lesson 3 – time - reading*	*Japanese martial arts.*	*Lesson 7 – reading and grammar*	*Explanation of ~te form II Group*
	SLO-2	*Self Introduction*	*Lesson 3 grammar.Classroom expressions. Kara, made, ni, ne and o*	*De and to*	*Ongaku and manga*	*Explanation of ~te form II and III Group*
S-3	SLO-1	*Hiragana Lesson 1 (vowels and related words)*	*Hiragana Lesson 8 Ra/Wa series*	*Kanji*	*Common expressions*	*Exceptional cases of verb groups*
	SLO-2	*Lesson 1– reading. Self introduction*	*Ra/Wa series related words*	*iku, miru, yasumu and kau*	*Body parts (vocabulary).*	*Line*
S-4	SLO-1	*Lesson 1 grammar (wa,ka,mo,no,desu/ja arimasen)*	*Lesson 3 – renshuu and exercises*	*Revision of complete Hiragana*	*Explanation of past tense of verbs.*	*Lesson 10 - reading and grammar*
	SLO-2	*Days of the week*	*Family. Festivals of Japan.Omiyage*	*Revision of all Particles*	*Kanji – kuchi, ame, hairimasu, kirimasu, ji, han and fun*	*Explanation of ~tai form*
S-5	SLO-1	*Hiragana Lesson 2*	*Hiragana Lesson 9*	*Assignment*	*Lesson 7 reading.*	*Japanese currency.*
	SLO-2	*ka and ga series and related words*	*Double consonants and related words*	*Assignment*	*Lesson 7 exercises*	*Japanese political system*
S-6	SLO-1	*Lesson 1 – renshuu*	*Lesson 4 – reading, grammar and vocabulary*	*Surprise Test*	*Introduction to Adjectives*	*Lesson 10 – renshuu and exercises.*
	SLO-2	*Ojigi and exercises. Numbers and months*	*Directions. Kanji – person, man, woman, child, tree and book*	*Surprise Test*	*I-ending and na-ending adjectives Forms.*	*Kanji – ookii, chiisai, eki and chuui*

S-7	SLO-1	*Hiragana Lesson 3*	*Directions. Kono…, kochira…, yo.*	*Revision of Hiragana (3 charts),*	*Lesson 8 Reading*	*Kanji – daigaku, nen, nihon and nihongo*
	SLO-2	*sa and za series and related words*	*I & na-ending adjectives introduction*	*long vowels and double consonants*	*Lesson 8 grammar*	*Places of interest in Japan*
S-8	SLO-1	*Seasons.*	*Hiragana Lesson 10 (long vowels and related words).*	*Review of grammar*	*Explanation of ~masen ka*	*Food and drink (vocabulary).*
	SLO-2	*Kore/kono – demonstrative pronouns*	*Lesson 4 – renshuu*	*Particles*	*Explanation of mashou*	*Transport*
S-9	SLO-1	*Hiragana Lessons 4 and 5*	*Hashi*	*Katakana – introduction*	*Lesson 8 – renshuu.*	*Review of particles*
	SLO-2	*ta/da and na/ha series and related words*	*Hiragana Lesson 11 (chart 3 and related words).*	*Katakana – rules*	*Value your time*	*Review of Kana and Kanji*
S-10	SLO-1	*Kore…/kono…-reading, grammar and vocabulary*	*Counters explanation*	*Review of lessons 1-5*	*Kanji - days of the week*	*Review of verbs and adjectives*
	SLO-2	*Ni and ga, arimasu/imasu, Dare/donata.Renshuu and Meishi*	*Kanji – days of the week*	*Grammar and vocabulary*	*Japanese food and*	*Japanese house and living style*
S-11	SLO-1	*Hiragana Lesson 6 (ba/pa series).*	*Hiragana – special words like wa, e and o and sentence reading*	*Katakana vocabulary*	*Lesson 9 reading*	*Japanese tea ceremony*
	SLO-2	*Lesson 2 – exercises. Introduction to time.*	*Lesson 5 – reading.*	*Kanji – ikimasu, mimasu, yasumimasu*	*Lesson 9 grammar*	*Japanese Religious beliefs.*
S-12	SLO-1	*Kanji numbers – 13. Time expressions*	*Lesson 5 Grammar.*	*Lesson 6 – reading and grammar*	*Stationery*	*Japanese Economy*
	SLO-2	*Colours and basic 5 kanjis (ue, shita, naka, yama and kawa)*	*Lesson 5 Vocabulary.*	*Visiting a Japanese home*	*Transport (vocabulary)*	*Calligraphy*

Learning Resources	1. Minna no Nihon Go, 3A Corporation, Tokyo, Japan, 2002	2. A Basic Course in Japanese – Department of EFL, SRMIST, 2017

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Dr. Usha Kodandaraman, ABK AOTS, Chennai. drushak@gmail.com	*1. Dr. S. P. Dhanavel, IIT Madras, dhanavelsp@iitm.ac.in*	*1. Ms.R.Padmajaa, SRMIST*
2. Mr. Paul Das, NEC, Chennai	*2. Dr. K. Anbazhagan, SRMIST*	*2. Mr. B.Vijaya Kumar, SRMIST*

Course Code	18LEH106J	Course Name	KOREAN	Course Category	H	Humanities and Social Sciences including Management	L	T	P	C
							2	0	2	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English and Foreign Languages	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Know about Korea and its culture; to be able to read, write the Korean script, and to introduce oneself and other people*			
CLR-2 :	*Manage daily life living in Korea. Talking daily activities. Asking for and giving directions, describing the location*			
CLR-3 :	*Be able to shop by asking for the availability of things, and learning about the currency system*			
CLR-4 :	*Tell time, to socialize: make appointments, talk about weekend plans/activities*			
CLR-5 :	*Communicate about studying Korean and about future career or academic plans*			
CLR-6 :	*Utilize Korean language skills along with technical skills in build wider career orientations*			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Read, pronounce and write the Korean script, Introduce oneself and other people. Get to know about Korea and its culture*	*1*	*70*	*60*	-	-	*L*	-	*H*	*H*	*L*	*M*	*M*	*H*	-	*H*	-	-	-
CLO-2 :	*Manage daily life in Korea - ask for and give directions, describe locations, count, shop, and talk about daily activities*	*2*	*65*	*65*	-	-	*L*	-	*H*	*M*	*L*	*M*	*H*	*H*	-	*H*	-	-	-
CLO-3 :	*Talk about past activities (past tense), the weather and use the Korean currency*	*2*	*65*	*65*	-	-	*L*	-	*M*	*H*	*L*	*M*	*M*	*M*	-	*H*	-	-	-
CLO-4 :	*Tell time, to socialize: make appointments, talk about weekend plans/activities*	*3*	*75*	*65*	-	-	*L*	-	*H*	*H*	*L*	*M*	*H*	*H*	-	*H*	-	-	-
CLO-5 :	*Communicate about studying Korean and about future career or academic plans*	*3*	*75*	*65*	-	-	*L*	-	*H*	*M*	*L*	*M*	*H*	*H*	-	*H*	-	-	-
CLO-6 :	*Build listening, speaking, reading, writing abilities in Korean, To interact with Korean people and understand Korean culture*	*3*	*75*	*65*	-	-	*L*	-	*H*	*H*	*L*	*M*	*H*	*H*	-	*H*	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	*Introduction to Korea and Korean - 한글소개, 한국 소개*	*2. 일상 생활daily life, new vocab (action, places)*	*listening &key sentences drilling*	*dialogue1& dialogue2 practice*	*grammar point 1-그래서*
	SLO-2			*reading/writing*		*grammar point1-(으)ㄹ거예요*
S-2	SLO-1	*single vowels (단모음)*	*grammar point1-아요/ 어요&grammar point2-에 가다*	*5.쇼핑2 shopping2 new vocab (counter noun)*	*listening &key sentences drilling*	*dialogue1& dialogue2 practice*
	SLO-2				*reading/writing*	
S-3	SLO-1	*이중모음과 자음 double vowels & basic consonants*	*dialogue1& dialogue2 practice*	*grammar point1-ㅂ니다/습니다,-ㅂ니까/습니까&*	*8.시간 time new vocab (time)*	*listening & reading*
	SLO-2					
S-4	SLO-1	*쌍 자음과 음절double consonants & syllables*	*listening & reading/writing*	*teaching money*	*Teaching date & weeks*	*writing for weekend activities*
	SLO-2					
S-5	SLO-1	*받침과 음절1 Batchim & syllables*	*3.위치location new vocab(object /location)*	*dialogue1& dialogue2 practice*	*grammar point1-에*	*11.한국어 공부(studying Korean) new vocab(pronouns)*
	SLO-2				*grammar point2-시-분*	
S-6	SLO-1	*받침과 음절2 Batchim & syllables*	*grammar point1-이/가*	*listening &key sentences drilling*	*dialogue1& dialogue2 practice*	*grammar point1- 나/저, 내/제*
	SLO-2		*grammar point2-에 있다/없다*	*reading/writing*		*grammar point2-'ㄷ' irregular verbs*
S-7	SLO-1	*자모 연습. (practices vowels and consonants)*	*dialogue1& dialogue2 practice*	*6.어제 일과yesterday's daily routine new vocab (action, places)*	*listening &key sentences drilling*	*dialogue1& dialogue2 practice*
	SLO-2				*reading/writing*	
S-8	SLO-1	*듣기. 교실 표현(listening & class terms)*	*listening &key sentences drilling*	*grammar point1-았/었*	*9. 약속 appointment new vocab(location& plan*	*listening &key sentences drilling*
	SLO-2		*reading/writing*	*grammar point2-에서*		*reading/writing*

S-9	SLO-1	*1.자기소개self –introduction , new vocab(nationality, occupation*	*4. 쇼핑1shopping1 new vocab (items to shop)*	*dialogue1& dialogue2 practice*	*grammar point1- (으)ㄹ까요*	*12.계획(plan) –(으)ㄹ 거예요.*
	SLO-2				*grammar point2- 아요/어요*	
S-10	SLO-1	*grammar point1- 이/에요/예요*	*shopping1 teaching numbers*	*listening &key sentences drilling*	*dialogue1& dialogue2 practice*	*grammar point1- pro nouns 이/그/저 + 것(things)*
	SLO-2	*grammar point2-은/는*		*reading/writing*		*grammar point2- '—' irregular verbs & dialogue2*
S-11	SLO-1	*dialogue1& dialogue2 practice*	*grammar point1-을/를*	*7. 날씨 weather new vocab(season& weather)*	*listening &key sentences drilling*	*dialogue1& dialogue2 practice*
	SLO-2		*grammar point2-(으)세요*		*reading/writing*	
S-12	SLO-1	*listening &key sentences drilling*	*dialogue1& dialogue2 practice*	*grammar point1-그리고*	*10.주말 활동 (weekend activities) new vocab (places& weekend activities)*	*listening &key sentences drilling*
	SLO-2	*reading/writing*		*grammar point2-안*		*reading/writing*

Learning Resources	1. Sejong Korean 1, The National Institute of the Korean Language. Hawoo Publisher, 2013	

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

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2. Mr. Paul Das, NEC, Chennai	*2. Ms. Subashree, VIT, Chennai, subashree@vit.ac.in*	*2. Ms. Cho Seul Hee, SRMIST*

Course Code	18PDH101T	Course Name	GENERAL APTITUDE	Course Category	H	Humanities and Social Sciences including Management	L	T	P	C
							0	0	2	1

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Career Development Centre	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Recapitulate fundamental mathematical concepts and skills*			
CLR-2 :	*Hone critical thinking skills by analyzing the arguments with explicit and implicit premises*			
CLR-3 :	*Sharpen logical reasoning through skillful conceptualization,*			
CLR-4 :	*identification of relationships between words based on their function, usage and characteristics*			
CLR-5 :	*nurture passion for enriching vocabulary*			
CLR-6 :	*Acquire the right knowledge, skill and aptitude to face any competitive examination*			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

					Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Build a strong base in the fundamental mathematical concepts*	2	80	75	L	H	-	H	M	-	-	-	H	H	L	H	-	-	-
CLO-2 :	*Identify the approaches and strategies to solve problems with speed and accuracy*	2	75	70	-	H	-	H	M	-	-	-	H	H	-	H	-	-	-
CLO-3 :	*Gain appropriate skills to succeed in preliminary selection process for recruitment*	2	80	75	-	H	-	H	M	-	-	-	H	H	L	H	-	-	-
CLO-4 :	*Collectively solve problems in teams and groups*	3	75	70	L	H	-	H	M	-	-	-	H	H	-	H	-	-	-
CLO-5 :	*Build vocabulary through methodical approaches*	3	85	80	-	H	-	H	M	-	-	-	H	H	L	H	-	-	-
CLO-6 :	*Enhance lexical skills through systematic application of concepts and careful analysis of style, syntax, semantics and logic*	2	85	80	-	H	-	H	M	-	-	-	H	H	-	H	-	-	-

Duration (hour)		6	6	6	6	6
S-1	SLO-1	*Types of numbers, Divisibility tests*	*Square root, Cube roots, Remainder*	*Percentage Introduction*	*Discount*	*Logarithms Intro*
	SLO-2	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*
S-2	SLO-1	*Introduction to Significance of Verbal Aptitude in Competitive Examinations*	*Contextual Vocabulary Exercise – Synonyms*	*Sentence Completion Basic Level Exercises – Single Blank*	*Reading Comprehension – Introduction*	*Grammar Rules – A comprehensive Introduction*
	SLO-2	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*
S-3	SLO-1	*LCM and GCD*	*Identities*	*Percentage Problems*	*Simple Interest*	*Logarithms Rules*
	SLO-2	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*
S-4	SLO-1	*Vocabulary enrichment techniques*	*Contextual Vocabulary Exercise - Synonyms*	*Sentence Completion Basic Level Exercises – Double Blank*	*Reading Comprehension – Summary & Main Idea*	*Sentence Completion - Grammar*
	SLO-2	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*
S-5	SLO-1	*Unit digit, Number of zeroes, Factorial notation*	*Fractions and Decimals, surds*	*Profit and Loss*	*Compound Interest, Installments*	*Linear Equations*
	SLO-2	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*
S-6	SLO-1	*Vocabulary enrichment Techniques*	*Contextual Vocabulary Exercise - Antonyms*	*Cloze Test*	*Reading Comprehension – Summary & Main Idea*	*Spotting Errors*
	SLO-2	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*

Learning Resources	1. *Nishit K. Sinha, The Pearson Guide to Quantitative Aptitude and Data Interpretation for the CAT* 2. *Dinesh Khattar-The Pearson Guide to QUANTITATIVE APTITUDE for competitive examinations* 3. *Charles Harrington Elstor, Verbal Advantage: Ten Easy Steps to a Powerful Vocabulary, Random House Reference, 2002* 4. *Merriam Webster's Vocabulary Builder, Merriam Webster Mass Market, 2010*	5. *Norman Lewis, How to Read Better and Faster, Goyal, 4th Edition* 6. *Franklin GRE Word List, 3861 GRE Words, Franklin Vocab System, 2014Wiley's GMAT Reading Comprehension Grail, Wiley, 2016* 7. *Manhattan Prep GRE : Reading Comprehension and Essays, 5th Edition* 8. *Martin Hewings, Advanced Grammar in Use. Cambridge University Press, 2013*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	-	*40%*	-	*30%*	-	*30%*	-	*30%*	-	*30%*
	Understand										
Level 2	Apply	-	*40%*	-	*40%*	-	*40%*	-	*40%*	-	*40%*
	Analyze										
Level 3	Evaluate	-	*20%*	-	*30%*	-	*30%*	-	*30%*	-	*30%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts	
1. Mr. Pratap Iyer, Study Abroad Mentors, pratap.iyer30@gmail.com	*1. Mr Nishith Sinha, dueNorth India Academics LLP, nsinha.alexander@gmail.com*	*1. Dr. P. Madhusoodhanan, SRMIST*	*2. Dr. M. Snehalatha, SRMIST*
2. Mr Ajay Zenner, Career Launcher, ajay.z@careerlauncher.com	*2. Dr. Dinesh Khattar, Delhi University, dinesh.khattar31@gmail.com*	*3. Mr Jayapragash J, SRMIST*	*4. Mrs. Rukmani, SRMIST*

ACADEMIC CURRICULA

Basic Science Courses

Regulations - 2018

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

(Deemed to be University u/s 3 of UGC Act, 1956)

Kattankulathur, Kancheepuram, Tamil Nadu, India

Course Code	18PYB101J	Course Name	PHYSICS: ELECTROMAGNETIC THEORY, QUANTUM MECHANICS, WAVES AND OPTICS	Course Category	B	Basic Sciences	L	T	P	C
							3	1	2	5

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Physics and Nanotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Identify the applications of electric field on materials			
CLR-2 :	Identify the applications of magnetic field on materials			
CLR-3 :	Identify the significance of quantum theory			
CLR-4 :	Create insights to the concepts of optical effects			
CLR-5 :	Analyze the working principle of lasers and optical fibers			
CLR-6 :	Utilize the concepts in physics for the understanding of engineering and technology			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Identify the effect of charge dynamics	2	80	70	H	H	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	Analyze electromagnetic induction	2	85	75	H	H	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	Apply quantum mechanics to basic physical problems	2	75	70	H	-	-	H	-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	Apply ray propagation and optical effects	2	85	80	H	H	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-5 :	Identify the applications of lasers and optical fiber	2	85	75	H	-	H	-	-	-	-	-	-	-	-	-	-	-	-
CLO-6 :	Apply the concepts of electromagnetic theory and mechanics in real time applications	2	80	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Del, divergence, curl and gradient operations in vector calculus	Magnetization, permeability and susceptibility	Introduction to Quantum mechanics	Introduction to interference	Absorption and emission processes-two level
	SLO-2	Gauss-divergence and Stoke's theorem	Classification of magnetic materials	Explanation of wave nature of particles	Introduction to diffraction	Einstein's theory of matter radiation A and B coefficients
S-2	SLO-1	Electric field and electrostatic potential for a charge distribution	Ferromagnetism	Black body radiation, Concept of Photon	Fresnel diffraction	Characteristics of laser beams
	SLO-2	Gauss' law and its applications	Concepts of ferromagnetic domains	Photoelectric effect, Compton effect	Fraunhofer diffraction	Amplification of light by population inversion
S-3	SLO-1	Laplace's equations for electrostatic potential	Hard and soft magnetic materials	de Broglie hypothesis for matter waves	Fraunhofer diffraction at single slit	Threshold population inversion
	SLO-2	Poisson's equations for electrostatic potential	Energy product	Physical significance of wavefunction	Fraunhofer diffraction at double slit	Essential components of laser system and pumping mechanisms
S-4	SLO-1	Solving Problems	Solving Problems	Solving Problems	Solving Problems	Solving Problems
	SLO-2	Solving Problems	Solving Problems	Solving Problems	Solving Problems	Solving Problems
S 5-6	SLO-1	Basics of experimentation	Calibrate Ammeter using Potentiometer	Determine Planck's Constant	Determine wavelength of monochromatic light Newton's ring	Determine laser parameters – divergence and wavelength for a given laser source
	SLO-2					
S-7	SLO-1	Concepts of electric current	Ferrimagnetic materials	Time independent Schrödinger's wave equation	Fraunhofer diffraction at multiple slit	Nd: YAG laser
	SLO-2	Continuity equation	Ferrites-regular spinel and inverse spinel	Time independent Schrödinger's wave equation	Diffraction grating	Semiconductor laser
S-8	SLO-1	Laws of magnetism Faraday's law	Magnetic bubbles	Time dependent Schrödinger's wave equation	Characteristics of diffraction grating	CO_2 laser: Vibrational modes
	SLO-2	Ampere's law	Magnetic thin films	Time dependent Schrödinger's wave equation	Applications of diffraction grating	CO_2 laser: energy level

S-9	SLO-1	*Maxwell's equations*	*Spintronics*	*Particle in a 1 D box*	*Polarization by reflection*	*Optical fiber-physical structure*
	SLO-2	*Maxwell's equations*	*GMR*	*Normalization*	*Polarization by double refraction*	*Total internal reflection*
S-10	SLO-1	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*
	SLO-2	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*
S 11-12	SLO-1 SLO-2	*Determine Coulomb's potential and Coulomb's field of metal spheres*	*Calibrate Voltmeter using Potentiometer*	*Repeat/Revision of experiments*	*Determine particle size using laser*	*Study of attenuation and propagation characteristic-optical fiber*
S-13	SLO-1	*Polarizations, permeability and dielectric constant*	*TMR*	*Born interpretation of wave function*	*Scattering of light*	*Numerical aperture*
	SLO-2	*Polar and non-polar dielectrics*	*CMR*	*Verification of matter waves*	*Circular polarization*	*Acceptance angle*
S-14	SLO-1	*Types of polarization*	*Garnets*	*Concept of harmonic oscillator*	*Elliptical polarization*	*Losses associated with optical fibers*
	SLO-2	*Frequency and temperature dependence*	*Magnetoplumbites*	*Quantum harmonic oscillator*	*Optical activity*	*Classification of optical fibers*
S-15	SLO-1	*Internal field in a field*	*Multiferroic materials*	*Hydrogen atom problem*	*Fresnel's relation*	*Optical fiber communications system*
	SLO-2	*Clausius-Mossotti equation*	*Applications of multiferroic materials*	*Hydrogen atom problem*	*Brewster's angle*	*Optical sensors*
S-16	SLO-1	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*
	SLO-2	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*	*Solving Problems*
S 17-18	SLO-1 SLO-2	*Determine dielectric constant of the sample (Expt-2)*	*Determine magnetic susceptibility-Quincke's method*	*Study of I-V characteristics of a light dependent resistor (LDR)*	*Determine Wavelength- diffraction grating*	*Mini project*

Learning Resources	*1.David Jeffery Griffiths, Introduction to Electrodynamics, Revised Edition, Pearson, 2013* *2.Ajay Ghatak, Optics, Tata McGraw Hill Education, 5th Edition, 2012*	*3.David Halliday, Fundamentals of Physics, 7th edition, John Wiley & Sons Australia, Ltd, 2004* *4. Eisberg and Resnick, Quantum Physics: Of Atoms, Molecules, Solids, Nuclei and Particles, John Wiley & Sons, 2nd Edition, 1985*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
Level 2	Apply Analyze	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
Level 3	Evaluate Create	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

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Dr. Vinay Kumar Gupta, National Physical Laboratory, guptavinay@nplindia.org	*Prof .C. Vijayan, IITM, Chennai, cvijayan@iitm.ac.in*	*Dr. C. Preferencial Kala, SRMIST*
	Prof. S. Balakumar, Univ of Madras, balakumar@unom.ac.in	*Dr. M. Krishnamohan, SRMIST*

Course Code	18PYB102J	Course Name	PHYSICS: MECHANICS AND MECHANICS OF SOLIDS	Course Category	B	Basic Sciences	L	T	P	C
							3	1	2	5

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Physics and Nanotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Utilize the principles pertaining to vector mechanics			
CLR-2 :	Utilize the knowledge on rigid body mechanics			
CLR-3 :	Apply knowledge on statics			
CLR-4 :	Identify the theory of elasticity at a basic level			
CLR-5 :	Apply the concept of friction and its applications			
CLR-6 :	Utilize the concepts in physics for the understanding of engineering and technology			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

					Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Identify the principle of mechanics	2	80	70	H	H	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	Determine the resultants of force systems acting on rigid bodies	2	85	75	H	H	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	Establish the equations of equilibrium for a rigid body	2	75	70	H	-	-	H	-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	Analyze the internal forces in engineering structures composed of simple trusses	2	80	75	H	H	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-5 :	Apply the concepts of stress and strain in different bodies	2	75	70	H	-	H	-	-	-	-	-	-	-	-	-	-	-	-
CLO-6 :	Apply the concepts of mechanics and mechanics of solids in real time applications	2	80	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Introduction to vector analysis	Definition and motion of a rigid body in the plane	Introduction to rigid body	Concept of stress at a point	Force analysis -axial force
	SLO-2	Scalar quantities & vector quantities	Rotation in the plane	Free body diagrams with examples	Planet stress	Force analysis -shear force, bending moment
S-2	SLO-1	Transformation of scalars and vectors	Kinematics in a coordinate system rotating in the plane	Reactions at Supports and connections for a two dimensional structure	Transformation of stresses at a point	Twisting moment diagrams of slender members
	SLO-2	Transformation of scalars and vectors under rotation transformation	Kinematics in a coordinate system translating in the plane	Examples on modeling of typical joints	Principal stresses and Mohr's circle	Twisting moment diagrams of slender members (without singularity function)
S-3	SLO-1	Forces in nature	Angular momentum about a point of a rigid body in planar motion	Equilibrium of a rigid body in two dimensions	Displacement field	Torsion of circular shafts- Definition of torsion, effects of torsion
	SLO-2	Newton's laws	Euler's laws of motion	Condition for equilibrium in two dimensions	Concept of strain at a point	Generation of shear stresses
S-4	SLO-1	Solving Problems	Solving Problems	Solving Problems	Solving Problems	Solving Problems
	SLO-2	Solving Problems	Solving Problems	Solving Problems	Solving Problems	Solving Problems
S 5-6	SLO-1	Basics of experimentation	Determine acceleration due to gravity- Compound bar pendulum	Determine Moment of inertia and angular acceleration with precision pivot bearing	Measurement of free fall-Dynamics method	Determine Young's modulus-non-uniform bending
	SLO-2					
S-7	SLO-1	Form invariance of Newton's second law	Independence of Euler's laws from Newton's laws	Equilibrium of a rigid body in three dimensions	Plane strain- transformation of strain at a point	Torsion of thin walled tubes
	SLO-2	Solving Newton's equations of motion in polar coordinates	Describing rigid body motion	Condition for equilibrium in three dimensions	Principal strains	Shear test by torsion of tube
S-8	SLO-1	Fundamentals of simple harmonic motion	Precession of a body	Friction- limiting cases	Mohr's circle	Moment-curvature relation in pure bending of beams with symmetric cross-section

	SLO-2	*Harmonic oscillator*	*Precession of a spinning top*	*Friction- non limiting cases*	*Strain Rosettes*	*Moment-curvature relation in pure bending of beams with symmetric cross-section*
S-9	SLO-1	*Damped harmonic motion*	*Introduction to three-dimensional rigid body motion*	*Force-displacement relationship*	*Concepts of elasticity, plasticity*	*Bending stress, Shear stress*
	SLO-2	*Different cases-over critically and lightly damped oscillators*	*Distinction from two-dimensional motion*	*Simple illustration of force displacement*	*Strain hardening, work hardening*	*Cases of combined stresses*
S-10	SLO-1	*Solving problems*	*Solving problems*	*Solving problems*	*Solving problems*	*Solving problems*
	SLO-2	*Solving problems*	*Solving problems*	*Solving problems*	*Solving problems*	*Solving problems*
S 11-12	SLO-1	*Determine acceleration due to gravity using Bifilar pendulum*	*Determine spring constant-Expansion of a helical spring*	*Repeat/Revision of experiments*	*Determine rigidity modulus-Torsional pendulum*	*Determine Young's Modulus-Uniform Bending*
	SLO-2					
S-13	SLO-1	*Fundamentals of vibrations*	*Two- dimensional motion in terms of angular velocity vector, its rate of change*	*Geometric compatibility for small deformations*	*Failure of materials*	*Concept of strain energy*
	SLO-2	*Vibration model*	*Two- dimensional motion in terms of Moment of inertia tensor*	*Illustrations based on axially loaded members*	*Concepts of fracture and yielding*	*Yield criteria, Deflection due to bending*
S-14	SLO-1	*Forced oscillations*	*Three-dimensional motion of a rigid body - coplanar manner*	*Introduction to trusses*	*Idealization of one dimensional stress-strain curve*	*Deflection due to bending-integration of the moment*
	SLO-2	*Magnification factor of forced oscillations*	*Rod executing conical motion with center of mass fixed*	*Types of trusses*	*Generalized Hooke's law with thermal strains for isotropic materials*	*curvature relationship for simple boundary conditions*
S-15	SLO-1	*Resonance*	*Rod executing conical motion-two dimension and three dimension*	*Method of joints*	*Characteristics of elasticity*	*Integration of the moment-curvature relationship. Method of superposition*
	SLO-2	*Application of resonance*	*Failure of two-dimensional formulation*	*Method of section*	*Complete equations of elasticity*	*Strain energy and complementary strain energy for simple structural elements*
S-16	SLO-1	*Solving problems*	*Solving problem*	*Solving problem*	*Solving problem*	*Solving problem*
	SLO-2	*Solving problems*	*Solving problem*	*Solving problem*	*Solving problem*	*Solving problem*
S 17-18	SLO-1	*Newton's 2nd law-Demonstration track with measure Dynamics*	*Determine Static friction, sliding friction and rolling friction*	*Determine moment of inertia and angular acceleration- Gyroscope*	*Mechanical conservation of energy-Maxwell's wheel with measure Dynamics*	*Mini Project*
	SLO-2					

Learning Resources	*1.Mahendra K Verma, Introduction to Mechanics, Universities Press (India) Pvt. Ltd., 2016* *2.J. L. Meriam, Engineering Mechanics – Dynamics, 7th Edition, Vol. 2, Wiley Publishers, 2012*	*3.J. P. Den Hartog, Mechanics, Dover Publications Inc., 1961* *4.E.P. Popov, Engineering Mechanics of Solids, Prentice Hall India Learning Private Limited; 2nd Edition, 2002.*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Dr. D.K. Aswal, National Physical Laboratory, dkaswal@nplindia.org	*Prof. V. Subramaniam, IITM, Chennai, manianvs@iitm.ac.in*	*Dr. C. Preferencial Kala, SRMIST*
	Prof. C. Venkateswaran, Univ of Madras, venkateswaran@unom.ac.in	*Dr. M. Krishnamohan, SRMIST*

Course Code	18PYB103J	Course Name	PHYSICS: SEMICONDUCTOR PHYSICS	Course Category	B	Basic Sciences	L	T	P	C
							3	1	2	5

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Physics and Nanotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Introduce band gap and fermi level in semiconductors			
CLR-2 :	Explain the concept of carrier transport mechanism in p-n and metal semiconductor junction			
CLR-3 :	Provide an insight on semiconductor optical transitions and photovoltaic effect			
CLR-4 :	Procure knowledge of electrical and optical measurements in semiconductor			
CLR-5 :	Develop necessary skills for low dimensional semiconductor material processing and characterization			
CLR-6 :	Utilize the concepts in physics for the understanding of engineering and technology			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Identify the energy band in solids and electron occupation probability	2	85	75	H	H	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	Analyze the working of optoelectronic devices	2	75	70	H	H	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	Apply the knowledge to the development of new and novel optoelectronic devices	2	80	75	H	-	-	H	-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	Identify the working mechanism of electrical and optical measurements	2	75	70	H	H	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-5 :	Utilize the knowledge of the low dimensional semiconductor material fabrication and characterization.	2	80	70	H	-	H	-	-	-	-	-	-	-	-	-	-	-	-
CLO-6 :	Apply the concepts of semiconductor physics in real time applications	2	80	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Duration (hour)		18	18	18	18	18
S-1	SLO-1	Classical Free electron theory	Intrinsic semiconductor	Concept of optical transitions in bulk semiconductors	Concept of electrical measurements	Density of states in 2D
	SLO-2	Quantum Free electron theory	Fermi level on carrier-concentration and temperature in Intrinsic semiconductor	optical absorption process	Two-point probe technique	Density of states in 1D and 0 D
S-2	SLO-1	Density of states	Extrinsic semiconductors	Concept of recombination process	Four-point probe technique-linear method	Introduction to low dimensional systems
	SLO-2	Energy band in solids	Fermi level on carrier-concentration and temperature in extrinsic semiconductors	Optical recombination process	Four-point probe technique-Van der Pauw method	Quantum well
S-3	SLO-1	Kronig-Penney model	Explanation for carrier generation	Explanation for spontaneous emission	Significance of carrier density	Quantum wire and dots
	SLO-2	Kronig-Penney model	Explanation for recombination processes	Explanation for stimulated emission	Significance of resistivity and Hall mobility	Introduction to novel low dimensional systems
S-4	SLO-1	Solving problems	Solving problem	Solving problem	Solving problem	Solving problem
	SLO-2	Solving problems	Solving problem	Solving problem	Solving problem	Solving problem
S 5-6	SLO-1	Basics of experimentation	Study of I-V characteristics of a light dependent resistor (LDR)	Characterization of pn junction diode (Forward Bias)	Determine Particle Size of Semiconductor Laser	Determine of efficiency of solar cell
	SLO-2					
S-7	SLO-1	E-k diagram	Carrier transport - diffusion and drift current	Joint density of states in semiconductor	Hot-point probe measurement	CNT- properties and synthesis
	SLO-2	Direct and Indirect band gap	Continuity equation	Density of states for photons	capacitance-voltage measurements	Applications of CNT
S-8	SLO-1	Concept of phonons	p-n junction	Explanation of transition rates	Extraction of parameters in a diode	Fabrication technique-CVD
	SLO-2	Concept of Brillouin Zone	Biasing concept in p-n junction	Fermi's golden rule	I-V characteristics of a diode	Fabrication technique-PVD

S-9	SLO-1	*Energy band structure of semiconductor-Brillouin zone*	*Metal-semiconductor junction -Ohmic contact*	*Concept of optical loss*	*Principle of Deep-level transient spectroscopy (DLTS)*	*Characterizations techniques for low dimensional systems*
	SLO-2	*Concept of effective mass*	*Metal-semiconductor junction - Schottky junction*	*Concept of optical gain*	*Instrumentation of DLTS*	*XRD-Powder method*
S-10	SLO-1	*Solving problems*	*Solving problem*	*Solving problem*	*Solving problem*	*Solving problem*
	SLO-2	*Solving problems*	*Solving problem*	*Solving problem*	*Solving problem*	*Solving problem*
S 11-12	SLO-1	*Determine Hall coefficient of Semiconductor material*	*Determine Band Gap of semiconductor-Four probe method*	*Repeat/Revision of experiments*	*Attenuation, propagation characteristic of optical fiber cable using laser source*	*Determine lattice parameters using powder XRD*
	SLO-2					
S-13	SLO-1	*Classification of electronic materials*	*Semiconductor materials of interest for optoelectronic devices*	*Basic concepts of Photovoltaics*	*Significance of band gap in semiconductors*	*Principle of electron microscopy*
	SLO-2	*Fermi level*	*Photocurrent in a P-N junction diode*	*Photovoltaic effect*	*Concept of absorption and transmission*	*Scanning electron microscopy*
S-14	SLO-1	*Probability of occupation*	*Light emitting diode*	*Applications of Photovoltaic effect*	*Fundamental laws of absorption*	*Transmission electron microscopy*
	SLO-2	*Influence of donors in semiconductor*	*Classification of Light emitting diode*	*Determination of efficiency of a PV cell*	*Instrumentation of UV-Vis spectroscopy*	*Atomic force microscope*
S-15	SLO-1	*Influence of acceptors in semiconductor*	*Optoelectronic integrated circuits*	*Theory of Drude model*	*Determination of band gap by UV-Vis spectroscopy*	*Heterojunctions*
	SLO-2	*Non-equilibrium properties of carriers*	*Organic light emitting diodes*	*Determination of conductivity*	*Concept of Photoluminescence*	*Band diagrams of heterojunctions*
S-16	SLO-1	*Solving problems*	*Solving problem*	*Solving problem*	*Solving problem*	*Solving problem*
	SLO-2	*Solving problems*	*Solving problem*	*Solving problem*	*Solving problem*	*Solving problem*
S 17-18	SLO-1	*Determine Band Gap of semiconductor-Post Office Box method*	*Study of V-I and V-R characteristics of a solar cell*	*To verify Inverse square law of light using a photo cell.*	*Characteristic of p-n junction diode under reverse bias*	*Mini Project*
	SLO-2					

Learning Resources	*1. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc.1995.* *2. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., 2007.*	*3. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley 2008.* *4. A. Yariv and P. Yeh, Photonics:Optical Electronics in Modern Communications, Oxford University Press, New York 2007.*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Dr. Vinay Gupta, National Physical Laboratory, guptavinay@nplindia.org	*Prof. C. Vijayan, IITM, Chennai, cvijayan@iitm.ac.in*	*Dr. C. Preferencial Kala, SRMIST*
	Prof. S. Balakumar, University of Madras, balakumar@unom.ac.in	*Dr. M. Krishnamohan, SRMIST*

Course Code	18CYB101J	Course Name	CHEMISTRY	Course Category	B	Basic Sciences	L	T	P	C
							3	1	2	5

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Chemistry	Data Book / Codes/Standards	Periodic Table		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Utilize the atomic and molecular manipulation towards the design of new materials*			
CLR-2 :	*Employ various spectroscopic techniques in identifying the structure and correlate it with their properties*			
CLR-3 :	*Exploit the periodic properties of elements for bulk property manipulation towards technological advancement*			
CLR-4 :	*Address concepts related to electrochemistry, such as corrosion, using thermodynamic principles*			
CLR-5 :	*Employ various organic reactions towards the design of fine chemical and drug molecules for industries*			
CLR-6 :	*Utilize the basic chemistry principles applied in various engineering problems and identify appropriate solutions*			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)															
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Analyze atomic, molecular orbitals of organic, inorganic molecules to identify structure, bonding, molecular energy levels*	2	70	65	H	-	H	-	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	*Utilize the principles of spectroscopic technique in analysing the structure and properties of molecules*	2	80	70	H	-	-	H	H	-	-	-	-	-	-	-	-	-	-
CLO-3 :	*Rationalize bulk properties using thermodynamic considerations and periodic properties of elements*	2	75	60	-	H	-		-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	*Utilize the concepts of thermodynamics in understanding thermodynamically driven chemical reactions*	2	70	70	H	H	-	H	-	-	-	-	-	-	-	-	-	-	-
CLO-5 :	*Perceive the importance of stereochemistry in synthesizing organic molecules applied in pharmaceutical industries*	2	80	70	-	H	H	-	-	-	-	-	-	-	-	-	-	-	-
CLO-6 :	*Utilize concepts in chemistry for technological advancement based on electronic, atomic and molecular level modification*	2	75	65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Duration (hour)		18	18	18	18	18
S-1	SLO-1	*Schrodinger equation- introduction*	*Crystal field theory-Explanation*	*surface characterization techniques – XPS - Introduction*	*Hard soft acids and bases*	*Optical activity, absolute configurations*
	SLO-2	*Schrodinger equation-Derivation*	*Crystal field theory-Explanation*	*surface characterization techniques – XPS - Explanation*	*Hard soft acids and bases*	*conformational analysis*
S-2	SLO-1	*Particle in a box solutions*	*Energy level diagrams for transition metal ions*	*Diffraction and scattering of solids*	*Thermodynamic functions: energy*	*Isomerism in transitional metal compounds-Introduction*
	SLO-2	*Applications for conjugated molecules*	*Energy level diagrams for transition metal ions*	*Explanation*	*Entropy and free energy*	*Isomerism in transitional metal compounds-Types*
S-3	SLO-1	*Forms of the hydrogen atom wave functions*	*Magnetic properties of transition compounds*	*Ionic, dipolar interactions*	*Estimation of entropy*	*Introduction to reactions involving substitution*
	SLO-2	*plots of these functions to explore their spatial variations*	*Magnetic properties of transition compounds*	*Van der Waals interactions*	*Estimation of free energies.*	*Addition reaction*
S-4	SLO-1	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*
	SLO-2	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*
S 5-6	SLO-1	*Lab Introduction*	*Estimate of amount of chloride content in a water sample.*	*Determine strength of a mixture of acetic and hydrochloric acid by conductometry.*	*Determine adsorption of oxalic/acetic acid from aqueous soln. by activated charcoal*	*Experiment - Repeat - 2*
	SLO-2					
S-7	SLO-1	*Molecular orbitals of diatomic molecules-Homonuclear*	*Principles of spectroscopy-Introduction*	*Equations of state of real gases*	*Free energy and emf. Cell potentials*	*Elimination reaction*
	SLO-2	*Heteronuclear diatomic molecules*	*Principles of spectroscopy-Explanation*	*critical phenomena*	*The Nernst equation and applications*	*Oxidation reaction*
S-8	SLO-1	*Equations for atomic orbitals*	*Selection rules-Introduction*	*Effective nuclear charge, penetration of orbitals*	*Acid base, oxidation reduction*	*Reduction reaction*
	SLO-2	*Equations for molecular orbitals*	*selection rules-Explanation*	*variations of s, p, d and f orbital energies of atoms in the periodic table*	*Solubility equilibria*	*Examples*

S-9	SLO-1	*Energy level diagrams of diatomic-introduction*	*Electronic spectroscopy -Introduction*	*Electronic configurations, atomic and ionic sizes*	*Water chemistry*	*Cyclization*
	SLO-2	*Energy level diagrams of diatomic-explanation*	*Electronic spectroscopy-Explanation*	*Electronic configurations, atomic and ionic sizes*	*Water chemistry*	*Ring opening reactions*
S-10	SLO-1	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*
	SLO-2	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*
S 11-12	SLO-1	*Determine amount of sodium carbonate, sodium hydroxide in a mixture by titration*	*Determine strength of an acid using pH meter*	*Determine ferrous ion using potassium dichromate by potentiometric titration*	*Determine rate constant of Acid hydrolysis of an ester*	*Experiment - Repeat - 3*
	SLO-2					
S-13	SLO-1	*π-molecular orbitals of butadiene*	*Rotational spectroscopy of diatomic molecules*	*ionization energies, electron affinity and electronegativity*	*Corrosion*	*Synthesis of a commonly used drug molecule-Introduction*
	SLO-2	*π-molecular orbitals of benzene*	*Rotational spectroscopy of diatomic molecules*	*ionization energies, electron affinity and electronegativity*	*Corrosion*	*Synthesis of a commonly used drug molecule-Examples*
S-14	SLO-1	*Aromaticity-Introduction*	*Vibrational spectroscopy of diatomic molecules.*	*Polarizability, oxidation states*	*Representations of 3 dimensional structures*	*Synthesis of a commonly used drug molecule-Introduction*
	SLO-2	*Aromaticity-explanation*	*Applications of vibrational and rotational spectroscopy of diatomic molecule*	*Polarizability, oxidation states*	*structural isomers and stereoisomers*	*Synthesis of a commonly used drug molecule-Examples*
S-15	SLO-1	*Crystal field theory-Introduction*	*Nuclear magnetic resonance - Introduction*	*Coordination numbers and geometries*	*Configurations and symmetry and chirality*	*Question & Answer*
	SLO-2	*Crystal field theory-Introduction*	*Nuclear magnetic resonance - Explanation*	*Coordination numbers and geometries*	*enantiomers, diastereomers*	*Question & Answer*
S-16	SLO-1	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*
	SLO-2	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*
S 17-18	SLO-1	*Determine hardness (Ca^{2+}) of water using EDTA – complexometry method*	*Determine strength of an acid by conductometry*	*Determine molecular weight of a polymer by viscosity average method*	*Experiment - Repeat - 1*	*Demonstration Practical Session*
	SLO-2					

Learning Resources	*1. B. H. Mahan, R. J. Meyers, University Chemistry, 4th ed., Pearson publishers, 2009.* *2. M. J. Sienko, R. A. Plane, Chemistry: Principles and Applications, 3rd ed., McGraw-Hill publishers, 1980* *3. C. N. Banwell, Fundamentals of Molecular Spectroscopy, 5th ed., McGraw-Hill publishers, 2013*	*4. B. L. Tembe, Kamaluddin, M. S. Krishnan, Engineering Chemistry (NPTEL Web-book) http://nptel.ac.in/downloads/122101001/* *5. Peter W. Atkins, Julio de Paula, James Keeler, Physical Chemistry, 11th ed., Oxford publishers, 2018* *6. K. P. C. Vollhardt, N. E. Schore, Organic Chemistry: Structure and Function 7thed., Freeman, 2014*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Dr. Sudarshan Mahapatra, Encube Ethicals Pvt. Ltd, sudarshan.m@encubeethicals.com	*1. Prof. G. Sekar, IIT Madras, gsekar@iitm.ac.in*	*1. Prof. M. Arthanareeswari, SRMIST*
2. Dr. Shanmukhaprasad Gopi, Dr. Reddy' s Laboratories, shanmukhaprasadg@drreddys.com	*2. Prof. Vivek Polshettiwar, TIFR Mumbai, vivekpol@tifr.res.in*	*2. Dr. K. K. R. Datta, SRMIST*

Course Code	18CYB102J	Course Name	CONCEPTS IN CHEMISTRY	Course Category	B	Basic Sciences	L	T	P	C
							3	1	2	5

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Chemistry	Data Book / Codes/Standards	Periodic Table		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Utilize the atomic and molecular manipulation towards the design of new materials*			
CLR-2 :	*Use the concepts of coordination and organometallic chemistry in designing new compounds*			
CLR-3 :	*Employ stereochemical aspects in the design of fine chemical and drug molecules for industries*			
CLR-4 :	*Synthesis of new organic molecules by controlling kinetic and thermodynamic factors*			
CLR-5 :	*Employ various organic reaction mechanism towards the synthesis of organic molecules*			
CLR-6 :	*Utilize the basic chemistry principles applied in various engineering problems and identify appropriate solutions*			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Analyze atomic, molecular orbitals of organic, inorganic molecules to identify structure, bonding, molecular energy levels*	2	80	60	H	-	H	-	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	*Perceive the concepts of structure and bonding of inorganic complexes*	2	75	65	H	-	-	H	H	-	-	-	-	-	-	-	-	-	-
CLO-3 :	*Perceive the importance of stereochemistry in synthesizing organic molecules*	2	70	65	-	H	-		-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	*Perceive kinetic and thermodynamic factors that control the reactivity organic molecules*	2	75	65	H	H	-	H	-	-	-	-	-	-	-	-	-	-	-
CLO-5 :	*Utilize various organic reaction mechanism to synthesize new organic molecules*	2	85	60	-	H	H	-	-	-	-	-	-	-	-	-	-	-	-
CLO-6 :	*Utilize concepts in chemistry for technological advancements based on the electronic, atomic, molecular level modification*	2	75	65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Duration (hour)		18	18	18	18	18
S-1	SLO-1	*Schrodinger equation*	*Structure, bonding and energy levels - polyatomic molecules - I*	*Organometallic chemistry - Compounds*	*factors influencing basicity of molecules*	*Reactive intermediates*
	SLO-2	*Derivation*	*polyatomic molecules - I*	*Organometallic chemistry - Compounds*	*factors influencing basicity of molecules*	*Reactive intermediates*
S-2	SLO-1	*Structure and spectra of Hydrogen atom -I*	*Structure, bonding and energy levels - polyatomic molecules - II*	*Introduction to stereo chemistry*	*factors influencing basicity of molecules*	*Substitution reactions*
	SLO-2	*Structure and spectra of Hydrogen atom -I*	*polyatomic molecules - II*	*Stereodescriptors – R, S, E and Z*	*factors influencing basicity of molecules*	*Substitution reactions*
S-3	SLO-1	*Structure and spectra of Hydrogen atom -II*	*Coordination Chemistry - Introduction*	*Enantiomers and Diastereoisomers*	*factors influencing nucleophilicity of molecules*	*Substitution reactions*
	SLO-2	*Structure and spectra of Hydrogen atom -II*	*Coordination Chemistry - Introduction*	*Enantiomers and Diastereoisomers*	*factors influencing nucleophilicity of molecules*	*Substitution reactions*
S-4	SLO-1	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*
	SLO-2	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*
S 5-6	SLO-1	*Lab Introduction*	*Estimate the amount of chloride content of a water sample.*	*Determine strength of a mixture of acetic acid, hydrochloric acid by conductometry*	*Determine adsorption of oxalic/acetic acid from aqueous soln. by activated charcoal.*	*Experiment - Repeat - 2*
	SLO-2					
S-7	SLO-1	*Atomic orbitals and their energies -I*	*Coordination Chemistry - Structure*	*Racemates and their resolution*	*factors influencing nucleophilicity of molecules*	*Elimination reactions*
	SLO-2	*Atomic orbitals and their energies -I*	*Coordination Chemistry - Structure*	*Racemates and their resolution*	*factors influencing nucleophilicity of molecules*	*Elimination reactions*
S-8	SLO-1	*Atomic orbitals and their energies –II*	*Coordination Chemistry – Complexes*	*Racemates and their resolution*	*kinetic vs. thermodynamic control of reactions*	*Elimination reactions*
	SLO-2	*Atomic orbitals and their energies -II*	*Coordination Chemistry – Complexes*	*Racemates and their resolution*	*kinetic vs. thermodynamic control of reactions*	*Elimination reactions*

S-9	SLO-1	*Structure of many-electron atoms - Introduction*	*Electronic spectra of complexes*	*Conformations of cyclic systems*	*kinetic vs. thermodynamic control of reactions*	*Rearrangement reactions*
	SLO-2	*Structure of many-electron atoms - Explanation*	*Electronic spectra of complexes*	*Conformations of cyclic systems*	*kinetic vs. thermodynamic control of reactions*	*Rearrangement reactions*
S-10	SLO-1	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*
	SLO-2	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*
S 11-12	SLO-1	*Determine amount of sodium carbonate, sodium hydroxide in a mixture by titration*	*Determine strength of an acid using pH meter*	*Determine ferrous ion using potassium dichromate by potentiometric titration.*	*Determine rate constant of Acid hydrolysis of an ester*	*Experiment - Repeat - 3*
	SLO-2					
S-13	SLO-1	*Introduction to molecular orbital theory*	*Magnetic properties of complexes*	*Conformations of acyclic systems*	*Kinetic vs. thermodynamic control of reactions*	*Rearrangement reactions*
	SLO-2	*Introduction to molecular orbital theory*	*Magnetic properties of complexes*	*Conformations of acyclic systems*	*Kinetic vs. thermodynamic control of reactions*	*Rearrangement reactions*
S-14	SLO-1	*Structure, bonding and energy levels - Homonuclear diatomic molecules*	*Organometallic chemistry - Bonding*	*Factors influencing acidity of molecules*	*Reactive intermediates*	*Role of solvents*
	SLO-2	*Homonuclear diatomic molecules*	*Organometallic chemistry - Bonding*	*Factors influencing acidity of molecules*	*Reactive intermediates*	*Role of solvents*
S-15	SLO-1	*Structure, bonding and energy levels - Heteronuclear diatomic molecules*	*Organometallic chemistry - Ligands*	*Factors influencing acidity of molecules*	*Reactive intermediates*	*Kinetic and thermodynamic aspects*
	SLO-2	*Heteronuclear diatomic molecules*	*Organometallic chemistry - Ligands*	*Factors influencing acidity of molecules*	*Reactive intermediates*	*Kinetic and thermodynamic aspects*
S-16	SLO-1	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*
	SLO-2	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*	*Tutorial Session*
S 17-18	SLO-1	*Determination of hardness (Ca^{2+}) of water using EDTA – complexometry method*	*Determination of strength of an acid by conductometry*	*Determination of molecular weight of polymer by viscosity average method*	*Experiment - Repeat - 1*	*Demonstration Practical Session*
	SLO-2					

Learning Resources	*1. B. H. Mahan, R. J. Meyers, University Chemistry, 4th ed., Pearson publishers, 2009.* *2. M. J. Sienko, R. A. Plane, Chemistry: Principles and Applications, 3rd ed., McGraw-Hill publishers, 1980* *3. C. N. Banwell, Fundamentals of Molecular Spectroscopy, 5th ed., McGraw-Hill publishers, 2013*	*4. B. L. Tembe, Kamaluddin, M. S. Krishnan, Engineering Chemistry (NPTEL Web-book) http://nptel.ac.in/downloads/122101001/* *5. Peter W. Atkins, Julio de Paula, James Keeler, Physical Chemistry, 11th ed., Oxford publishers, 2018* *6. K. P. C. Vollhardt, N. E. Schore, Organic Chemistry: Structure and Function 7thed., Freeman publ., 2014*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Dr. Sudarshan Mahapatra, Encube Ethicals Pvt. Ltd, sudarshan.m@encubeethicals.com	*1. Prof. G. Sekar, IIT Madras, gsekar@iitm.ac.in*	*1. Prof. M. Arthanareeswari, SRMIST*
2. Dr. Shanmukhaprasad Gopi, Dr. Reddy' s Laboratories, shanmukhaprasadg@drreddys.com	*2. Prof. Vivek Polshettiwar, TIFR Mumbai, vivekpol@tifr.res.in*	*2. Dr. N. Abirami, SRMIST*

Course Code	18MAB101T	Course Name	CALCULUS AND LINEAR ALGEBRA	Course Category	B	Basic Sciences	L	T	P	C
							3	1	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mathematics	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Application of Matrices in problems of Science and Engineering*			
CLR-2 :	*Utilize Taylor series, Maxima minima, composite function and Jacobian in solving rea- time application problems*			
CLR-3 :	*Apply the concept of Differential Equations in problems of Science and Engineering*			
CLR-4 :	*Utilize the concepts of radius of curvature, evolute, envelope in problems of Science and Engineering*			
CLR-5 :	*Application of Sequences and Series in all problems involving Science and Engineering*			
CLR-6 :	*Utilize appropriate mathematical techniques for the different solutions required in Science and Engineering applications*			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Apply Matrices, Eigenvalues and Eigen Vectors Reduce to Quadratics form in Science and Engineering problem solving*	2	80	80	H	-	H	-	-	-	-	-	H	-	-	H	-	-	-
CLO-2 :	*Apply Maxima and Minima, Jacobian, and Taylor series to solve problems in Science and Engineering*	2	85	80	H	-	-	H	H	-	-	-	-	-	-	-	-	-	-
CLO-3 :	*Solve the different types of Differential Equations in Science and Engineering applications*	2	85	80	-	H	-		-	-	-	-	H	-	-	H	-	-	-
CLO-4 :	*Identify Radius, Centre, envelope and Circle of of curvature and apply them in the problem solving*	2	90	90	H	H	-	H	-	-	-	-	H	-	-	H	-	-	-
CLO-5 :	*Apply convergence and divergence of series using different test and apply sequences and Series in the problem solving*	2	90	80	-	H	H	-	-	-	-	-	H	-	-	H	-	-	-
CLO-6 :	*Identify, Analyze and Apply mathematical techniques to arrive at solutions in Science and Engineering*	2	90	90	H		H	-	-	-	-	-	H	-	-	H	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	*Characteristic equation*	*Functions of two variables – Partial derivatives*	*Linear equations of second order with constant coefficients when PI=0 or exp.*	*Radius of Curvature – Cartesian coordinates*	*Series of Positive terms – Test of Convergence-*
	SLO-2	*Eigen values of a real matrix*	*Total differential*	*Linear equations of second order with constant coefficients when PI=sinx or cosx*	*Radius of Curvature – Cartesian coordinates*	*Comparison test – Integral test-*
S-2	SLO-1	*Eigen vectors of a real matrix*	*Total differential*	*Linear equations of second order with constant coefficients when PI=polynomial*	*Radius of Curvature – Polar coordinates*	*Comparison test – Integral test-*
	SLO-2	*Eigen vectors of a real matrix*	*Taylor's expansion with two variables up to second order terms*	*Linear eqn. of second order with constant coefficients when PI=exp. with sinx / Cosx*	*Radius of Curvature – Polar coordinates*	*Comparison test – Integral test-.*
S-3	SLO-1	*Properties of Eigen values*	*Taylor's expansion with two variables up to third order terms*	*Linear eqn. of second order with constant coefficients when PI= exp.l with polynomial*	*Circle of curvature*	*D'Alemberts Ratio test,*
	SLO-2	*Cayley – Hamilton theorem*	*Maxima and Minima*	*Linear eqn. of 2nd order with const. coeff. when PI=polynomial with sinax or cosax*	*Circle of curvature*	*D'Alemberts Ratio test,*
S-4	SLO-1	*Problem solving using tutorial sheet 1*	*Problem solving using tutorial sheet 4*	*Problem solving using tutorial sheet 6*	*Problem solving using tutorial sheet 11*	*Problem solving using tutorial sheet 14*
	SLO-2	*Problem solving using tutorial sheet 1*	*Problem solving using tutorial sheet 4*	*Problem solving using tutorial sheet 6*	*Applications of Radius of curvature in engineering*	*Problem solving using tutorial sheet 14*
S-5	SLO-1	*Finding A inverse using Cayley – Hamilton theorem*	*Maxima and Minima*	*Linear equations of second order variable coefficients*	*Centre of curvature*	*Raabe's root test.*
	SLO-2	*Finging higher powers of A using Cayley – Hamilton theorem*	*Maxima and Minima*	*Linear equations of second order variable coefficients*	*Centre of curvature*	*Raabe's root test.*
S-6	SLO-1	*orthogonal reduction of a symmetric matrix to diagonal form*	*Maxima and Minima*	*Homogeneous equation of Euler type*	*Centre of curvature*	*Covergent of Exponential Series*
	SLO-2	*orthogonal reduction of a symmetric matrix to diagonal form*	*Constrained Maxima and Minima by Lagrangian Multiplier method*	*Homogeneous equation of Legendre's Type*	*Evolute of a parabola*	*Cauchy's Root test*
S-7	SLO-1	*orthogonal reduction of a symmetric matrix to diagonal form*	*Constrained Maxima and Minima by Lagrangian Multiplier method*	*Homogeneous equation of Legendre's Type*	*Evolute of an ellipse*	*Log test*

	SLO-2	*orthogonal reduction of a symmetric matrix to diagonal form*	*Constrained Maxima and Minima by Lagrangian Multiplier method*	*Equations reducible to homogeneous form*	*Envelope of standard curves*	*Log test*
S-8	SLO-1	*Problem solving using tutorial sheet 2*	*Problem solving using tutorial sheet 5*	*Problem solving using tutorial sheet 9*	*Problem solving using tutorial sheet 12*	*Problem solving using tutorial sheet 15*
	SLO-2	*Problem solving using tutorial sheet 2*	*Problem solving using tutorial sheet 5*	*Problem solving using tutorial sheet 9*	*Applications of Curvature in engineering*	*Problem solving using tutorial sheet 15*
S-9	SLO-1	*Reduction of Quadratic form to canonical*	*Jacobians of two Variables*	*Equations reducible to homogeneous form*	*Beta Gamma Functions*	*Alternating Series: Leibnitz test*
	SLO-2	*Quadratic form to canonical form by orthogonal transformations*	*Jacobians of Three variables*	*Variation of parameters*	*Beta Gamma Functions and Their Properties*	*Alternating Series: Leibnitz test*
S-10	SLO-1	*Quadratic form to canonical form by orthogonal transformations*	*Jacobians problems*	*Variation of parameters*	*Sequences – Definition and Examples*	*Series of positive and Negative terms.*
	SLO-2	*Orthogonal matrices*	*Jacobians Problems*	*Simultaneous first order equations with constant co-efficient.*	*Series – Types of Convergence*	*Series of positive and Negative terms.*
S-11	SLO-1	*Reduction of quadratic form to canonical form*	*Properties of Jacobians and Problems*	*Simultaneous first order equations with constant co-efficient.*	*Series of Positive terms – Test of Convergence-*	*Absolute Convergence*
	SLO-2	*Reduction of quadratic form to canonical form*	*Properties of Jacobians and problems*	*Simultaneous first order equations with constant co-efficient.*	*Comparison test – Integral test-*	*Conditional Convergence*
S-12	SLO-1	*Problem solving using tutorial sheet 3*	*Application of Taylor's series Maxima Minima Jacobians in Engineering*	*Problem solving using tutorial sheet 10*	*Problem solving using tutorial sheet 13*	*Problem solving using tutorial sheet 13*
	SLO-2	*Applications of Matrices in Engineering*	*Application of Taylor's series Maxima Minima Jacobians in Engineering*	*Applications of Differential Equation in engineering*	*Problem solving using tutorial sheet 13*	*Applications Convergence of series in engineering*

Learning Resources	*1. B. H. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.* *2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.* *3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi,2008*	*4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010* *5. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint, 2002* *6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	*40 %*	-	*30 %*	-	*30 %*	-	*30 %*	-	*30%*	-
Level 2	Apply Analyze	*40 %*	-	*40 %*	-	*40 %*	-	*40 %*	-	*40%*	-
Level 3	Evaluate Create	*20 %*	-	*30 %*	-	*30 %*	-	*30 %*	-	*30%*	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Mr. V. Maheshwaran, CTS, Chennai, maheshwaranv@yahoo.com	*1. Dr. K. C. Sivakumar, IIT, Madras, kcskumar@iitm.ac.in*	*1. Dr. A. Govindarajan, SRMIST*
2. Dr. Sricharan Srinivasan, Wipro Technologies, sricharanms@gmail.com	*2. Dr. Nanjundan, Bangalore University, nanzundan@gmail.com*	*2. Dr. Srinivasan, SRMIST*

Course Code	18MAB102T	Course Name	ADVANCED CALCULUS AND COMPLEX ANALYSIS	Course Category	B	Basic Sciences	L	T	P	C
							3	1	0	4

Pre-requisite Courses	18MAB101T	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mathematics	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Evaluate Double and triple Integral and apply them in problems in Engineering Industries			
CLR-2 :	Evaluate Surface, Volume Integral are Application of Gauss theorem, Stokes and Green's theorem in Engineering fields			
CLR-3 :	Transform engineering problems into ODE, PDE and Integrals and solve them using Laplace / complex analytic methods			
CLR-4 :	To know the properties of Complex functions and apply them in the all Engineering fields			
CLR-5 :	Evaluate improper integrals involving complex functions using Residue theorem and apply them in Engineering fields			
CLR-6 :	Identify how Engineering problems can be transformed in to simple mathematical constructs and solve the same			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Evaluate multiple integrals using change of variables	3	95	90	H	-	H	-	-	-	-	-	H	-	-	H	-	-	-
CLO-2 :	Apply techniques of vector calculus in problems involving Science and Engineering. Solving Ordinary Differential Equations	3	90	85	H	-	-	H	H	-	-	-	-	-	-	-	-	-	-
CLO-3 :	Apply techniques of Laplace Transforms and inverse transform for problems in Science and Engineering	2	85	80	-	H	-		-	-	-	-	H	-	-	H	-	-	-
CLO-4 :	Apply complex analytic functions and its properties in solving problems	3	80	80	H	H	-	H	-	-	-	-	H	-	-	H	-	-	-
CLO-5 :	Evaluate improper integrals using Residue theorem involving problems in Science and Engineering	2	80	90	-	H	H	-	-	-	-	-	H	-	-	H	-	-	-
CLO-6 :	Create mathematical constructs for engineering problems and identify solutions to solve them	3	90	80	H		H	-	-	-	-	-	H	-	-	H	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Evaluation of double integration Cartesian and plane polar coordinates	Review of vectors in 2,3 dimensions	Laplace Transforms of standard functions	Definition of Analytic Function – Cauchy Riemann equations	Cauchy's integral formulae - Problems
	SLO-2	Evaluation of double integration of plane polar coordinates	Gradient, divergence,	Transforms properties	Cauchy Riemann equations	Cauchy's integral formulae- Problems
S-2	SLO-1	Evaluation of double integration of plane polar coordinates	curl – Solenoidal	Transforms of Derivatives and Integrals	Properties of analytic function functions	Cauchy's integral formulae- Problems
	SLO-2	Evaluation of double integration of plane polar coordinates	Irrotational fields	Transform of derivatives and integrals	Determination of analytic function using – Milne-Thomson's method	Taylor's expansions with simple problems
S-3	SLO-1	Evaluation of double integral by changing of order of integration	Vector identities (without proof) – Directional derivatives	Initial value theorems (without proof) and verification for some problems	Determination of analytic function using – Milne-Thomson's method	Taylor's expansions with simple problems
	SLO-2	Evaluation of double integral by changing of order of integration	Line integrals	Final value theorems (without proof) and verification for some problems	Determination of analytic function using – Milne-Thomson's method	Laurent's expansions with simple problems
S-4	SLO-1	Problem solving using tutorial sheet 1	Problem solving using tutorial sheet 4	Problem solving using tutorial sheet 7	Problem solving using tutorial sheet 10	Problem solving using tutorial sheet 13
	SLO-2	Problem solving using tutorial sheet 1	Problem solving using tutorial sheet 4	Problem solving using tutorial sheet 7	Problem solving using tutorial sheet 10	Problem solving using tutorial sheet 13
S-5	SLO-1	Evaluation of double integral by changing of order of integration	Line integrals	Inverse Laplace transforms using partial fractions	Conformal mappings: magnification	Laurent's expansions with simple problems
	SLO-2	Area as a double integral (Cartesian)	Surface integrals	Inverse Laplace transforms using Partial fractions	Conformal mappings: rotation	Singularities
S-6	SLO-1	Area as a double integral (Cartesian)	Surface integrals	Inverse Laplace transforms using second shifting theorem	Conformal mappings: inversion	Types of Poles and Residues
	SLO-2	Area as a double integral (polar)	Volume Integrals	LT using Convolution theorem -problems only	Conformal mappings: inversion	Types of Poles and Residues

S-7	SLO-1	*Area as a double integral (polar)*	*Green's theorem (without proof),*	*LT using Convolution theorem -problems only*	*Conformal mappings: reflection*	*Cauchy's residue theorem (without proof)-*
	SLO-2	*Triple integration in Cartesian coordinates*	*Green's theorem (without proof),*	*ILT using Convolution theorem -problems only*	*Conformal mappings: reflection*	*Contour integration: Unit circle.*
S-8	SLO-1	*Problem solving using tutorial sheet 2*	*Problem solving using tutorial sheet 5*	*Problem solving using tutorial sheet 8*	*Problem solving using tutorial sheet 11*	*Problem solving using tutorial sheet 14*
	SLO-2	*Problem solving using tutorial sheet 2*	*Problem solving using tutorial sheet 5*	*Problem solving using tutorial sheet 8*	*Problem solving using tutorial sheet 11*	*Problem solving using tutorial sheet 14*
S-9	SLO-1	*Conversion from Cartesian to polar in double integrals*	*Gauss divergence theorem (without proof), verification*	*LT of periodic functions -problems only*	*bilinear transformation*	*Contour integration: Unit circle.*
	SLO-2	*Conversion from Cartesian to polar in double integrals*	*Gauss divergence theorem (without proof) applications to cubes.*	*LT of periodic functions -problems only*	*bilinear transformation*	*Contour integration: Unit circle*
S-10	SLO-1	*Triple integration in Cartesian coordinates*	*Gauss divergence theorem (without proof applications to parallelepiped.*	*Solve linear second order ordinary diff. equations with constant coefficient only*	*bilinear transformation*	*Contour integration: semicircular contour.*
	SLO-2	*Triple integration in Cartesian coordinates*	*Stoke's theorems (without proof) – Verification*	*Solve linear second order ordinary diff. equations with constant coefficient only*	*bilinear transformation*	*Contour integration: semicircular contour.*
S-11	SLO-1	*Triple integration in Cartesian coordinates*	*Stoke's theorems (without proof) – Applications to cubes*	*Solution of Integral equation and integral equation involving convolution type*	*Cauchy's integral theorem (without proof)*	*Contour integration: semicircular contour.*
	SLO-2	*Volume using triple Integral*	*Stoke's theorems (without proof) – Applications to parallelepiped only.*	*Solution of Integral equation and integral equation involving convolution type*	*Cauchy's integral theorem applications*	*Contour integration: semicircular contour.*
S-12	SLO-1	*Problem solving using tutorial sheet 3*	*Problem solving using tutorial sheet 6*	*Problem solving using tutorial sheet 9*	*Problem solving using tutorial sheet 12*	*Problem solving using tutorial sheet 15*
	SLO-2	*Application of Multiple integral in engineering*	*Application of Line and Volume Integrals in engineering*	*Application of Laplace Transform in engineering*	*Application of Bilinear Transformation and Cauchy Integral in engineering*	*Application Contour integration in engineering*

Learning Resources	*1. B. H. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.* *2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.* *3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi,2008*	*4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010* *5. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint, 2002* *6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*40 %*	-	*30 %*	-	*30 %*	-	*30 %*	-	*30%*	-
	Understand										
Level 2	Apply	*40 %*	-	*40 %*	-	*40 %*	-	*40 %*	-	*40%*	-
	Analyze										
Level 3	Evaluate	*20 %*	-	*30 %*	-	*30 %*	-	*30 %*	-	*30%*	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Mr. V. Maheshwaran, CTS, Chennai, maheshwaranv@yahoo.com	*1. Dr. K. C. Sivakumar, IIT, Madras, kcskumar@iitm.ac.in*	*1. Dr. A. Govindarajan, SRMIST*
2. Dr. Sricharan Srinivasan, Wipro Technologies, sricharanms@gmail.com	*2. Dr. Nanjundan, Bangalore University, nanzundan@gmail.com*	*2. Dr. Srinivasan, SRMIST*

ACADEMIC CURRICULA

Engineering Science Courses

Regulations - 2018

SRM
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University u/s 3 of UGC Act, 1956)

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

(Deemed to be University u/s 3 of UGC Act, 1956)

Kattankulathur, Kancheepuram, Tamil Nadu, India

Course Code	18MES101L	Course Name	ENGINEERING GRAPHICS AND DESIGN	Course Category	S	*Engineering Sciences*	L	T	P	C
							1	0	4	3

Pre-requisite Courses	*Nil*	**Co-requisite Courses**	*Nil*	**Progressive Courses**	*Nil*
Course Offering Department	*Mechanical Engineering*	**Data Book / Codes/Standards**		*Nil*	

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Utilize engineering graphic fundamentals. apply the same to draw/evaluate engineering curves and projection of objects*			
CLR-2 :	*Draw projection of solid objects like prisms, cylinders, pyramids and cones used in various engineering objects*			
CLR-3 :	*Draw the projection of combination of solids, and section of solids. Create building plans for construction*			
CLR-4 :	*Create 3D part models. Develop its surfaces using solid-modeling software for effectiveness, clarity, accuracy, portability*			
CLR-5 :	*Evaluate the assembly of engineering component parts. Create 2D drawings for assembly of engineering components*			
CLR-6 :	*Draw, Create, Evaluate, Interpret engineering 2D and 3D surfaces of engineering components using modeling software*			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - I	PSO - II	PSO – III
CLO-1 :	*Identify engineering graphics. Draw objects like points, lines, planes, and solids in perspective & orthographic projections*	*3*	*90*	*85*	*H*	*H*	*L*	*L*	*L*	*H*	*L*	*H*	*L*	*H*	*L*	*L*	*L*	*L*	*L*
CLO-2 :	*Draw projection of solids like prism, cylinder, pyramid and cone inclined in general positions, obtain auxiliary views*	*2*	*95*	*90*	*M*	*M*	*L*	*L*	*M*	*H*	*H*	*L*	*L*	*H*	*L*	*L*	*L*	*L*	*L*
CLO-3 :	*Draw projection of combination of solids made out of primitives, draw the section of solids, create building plans*	*3*	*90*	*85*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*	*M*	*H*	*L*	*H*	*L*	*L*	*L*
CLO-4 :	*Create 3D part models. Develop its surfaces with solid modeling software for effectiveness, clarity, accuracy, portability*	*3*	*90*	*85*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*L*	*H*	*H*	*L*	*H*	***M***	*L*	***M***
CLO-5 :	*Evaluate the assembly of parts including interference of parts. Create 2D drawings of assembly of parts*	*3*	*85*	*80*	*H*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*L*	*H*	*L*	*H*	*L*	***M***	*L*
CLO-6 :	*Draw graphics of engineering pans with point, line, plane, solids, in perspective and orthographic projections*	*2*	*90*	*85*	*M*	*M*	*L*	*M*	*L*	*L*	*L*	*H*	*L*	*L*	*L*	*L*	*L*	*L*	*L*

		Engineering graphics and Projection	*Projection of solids using CAD software*	*Projections of combination of solids*	*Part Modeling and Drawing*	*Assembly Modeling and Drawing*
Duration (hour)		**15**	**15**	**15**	**15**	**15**
S-1	SLO-1	*Principles, Standards, Conventions*	*Introducing CAD Software, layers, dimensions, tolerance, annotations*	*Combinations of solids, Constructive Solid Geometry(CSG), Boolean operations*	*3D modelling, parametric, non- parametric, parts of CSG, surface, wireframe, shaded*	*Part/ component model creation for assembly.*
	SLO-2	*Angle Projection, Symbols, Dimensions*	*Create, modify, customize, print using CAD*	*Creating combination of solids, isometric, perspective views, shaded, wire-frame*	*Rendered models, background, shadows, multi-view, isometric, perspective views*	*Study of various widely used assembly of parts like flanged joint, universal joint etc.*
S-2	SLO-1	*2D Geometric Constructions*	*Demo: Menu, Toolbars, Drawing Area, Dialog box, windows, Shortcut menus*	*Constructive Solid Geometry, Boolean operations, Creating combination of solids*	*3D modelling, parametric, non- parametric, parts of CSG, surface, wireframe, shaded*	*Creation of parametric parts for assembly*
	SLO-2	*2D Geometric Constructions*	*Command Line, Status Bar, Different zoom methods, Create, Select, Erase objects*	*isometric, perspective, shaded, wire-frame*	*Rendered models, background, shadows, multi-view, isometric, perspective views*	*non- parametric parts for assembly*
S-3	SLO-1	*Conic Curves ellipse by eccentricity method*	*Draw straight lines, rectangle, polar, absolute, relative*	*Constructive Solid Geometry, Boolean operations, Creating combination of solids*	*Viewing models in multi-view, isometric, and perspective views*	*Creation of parametric parts for assembly*
	SLO-2	*Conic Curves ellipse by eccentricity method*	*Orthographic constraints, Ortho ON, snap to objects manually, automatically*	*isometric, perspective, shaded, wire-frame*	*Viewing models in multi-view, isometric, and perspective views*	*non- parametric parts for assembly*
S-4	SLO-1	*Cycloids, Epicycloids*	*drawing lines, arcs, circles, polygons, create, edit, use layers, extend lines*	*Constructive Solid Geometry, Boolean operations, Creating combination of solids*	*Modelling industrial part drawings*	*Creation of parametric parts for assembly*
	SLO-2	*Hypocycloid*	*Dimensioning objects, annotations*	*isometric, perspective, shaded, wire-frame*	*Modelling industrial part drawings*	*non- parametric parts for assembly*
S-5	SLO-1	*Involute of a Square, Circle*	*Demo: drawing page, print, units/ scale/ limits settings, standards for dimensioning*	*Constructive Solid Geometry, Boolean operations, Creating combination of solids*	*Design new components as a team*	*Creation of parametric parts for assembly*
	SLO-2	*Spirals*	*ISO, ANSI Std. dimensioning, tolerancing*	*isometric, perspective, shaded, wire-frame*	*Design new components as a team*	*non- parametric parts for assembly*
S-6	SLO-1	*Introduction to perspective projection with terminologies and concepts*	*Projection of solid prisms and cylinders inclined to both the planes*	*Section of right regular solid with axis perpendicular to one principal planes and*	*3D Part to 2D Drawings geometric dimensioning and tolerancing annotations*	*Simple assembly of parts,*
	SLO-2	*Orthographic multiview and isometric projection*	*change of position method, reference line method / auxiliary projections,*	*cutting plane perpendicular to any one principle plane true shape of the section*	*generating 2D from 3D models, printing drawings, generating sectional views*	*associated part and assembly*
S-7	SLO-1	*Perspective projection of a point, line*	*Projection of solid prisms and cylinders inclined to both the planes*	*Section of right regular solid with axis perpendicular to one principal planes and*	*Geometric dimensioning and tolerancing annotations*	*Simple assembly of parts,*
	SLO-2	*Perspective projection of a planes, solids*	*Change of position method*	*cutting plane perpendicular to any one principle plane true shape of the section*	*Geometric dimensioning and tolerancing annotations*	*associated part and assembly*

S-8	SLO-1	*Orthographic multiview of point, line*	*Projection of solid prisms and cylinders inclined to both the planes*	*Section of right regular solid with axis perpendicular to one principal planes and cutting plane perpendicular to any one principle plane true shape of the section*	*Generating 2D drawings from 3D models*	*Simple assembly of parts,*
	SLO-2	*Orthographic multiview of planes, solids*	*Reference line method*		*Generating 2D drawings from 3D models*	*associated part and assembly*
S-9	SLO-1	*Isometric projection of a point, line*	*Auxiliary projections*	*Section of solids with axis inclined to both the planes and cutting plane perpendicular to any one principal plane only.*	*Generating sectional views*	*Simple assembly of parts,*
	SLO-2	*Isometric projection of planes, solids*	*Auxiliary projections*		*Generating sectional views*	*associated part and assembly*
S-10	SLO-1	*Isometric to orthographic multiview sketching*	*Viewing isometric and perspective views, shaded, wire-frame models*	*Sectional plan elevation, and sectional side-view of Building/ dwelling, include windows, doors, fixtures, etc.*	*Printing drawings to printer or as .pdf*	*Simple assembly of parts,*
	SLO-2	*Orthographic multiview to isometric sketch*	*Oblique prismatic solids and its projections*		*Printing drawings to printer or as .pdf*	*associated part and assembly*
S-11	SLO-1	*Orthographic multiview projection of lines inclined to both planes*	*Projection of solid pyramids and cones inclined to both the planes*	*Building/ Dwelling drawing, Terminology, conventions, sectional plan and side-view of Building/ dwelling, include windows, doors, fixtures,*	*Development of surfaces: un-cut, & cut right / oblique regular solids*	*Assembly Drawings: exploded view with assembly annotations part details*
	SLO-2	*Orthographic multiview projection of planes inclined to planes, auxiliary projection*	*change of position method and reference line method / auxiliary projections,*		*Simple position with cutting planes perpendicular to any one principal plane*	*Printing assembly drawings to printer and as pdf*
S-12	SLO-1	*Projection of lines inclined to both the planes*	*Projection of solid pyramids and cones inclined to both the planes*	*Sectional plan elevation, and sectional side-view of Building/ dwelling, include windows, doors, fixtures, etc.*	*Development of surfaces: un-cut, & cut right / oblique regular solids*	*Exploded view with assembly annotations part details*
	SLO-2	*true length, true inclinations, traces of lines*	*Change of position method*		*Simple position with cutting planes perpendicular to any one principal plane*	
S-13	SLO-1	*Projection of lines inclined to both the planes*	*Projection of solid pyramids and cones inclined to both the planes*	*Sectional plan elevation, and sectional side-view of Building/ dwelling, include windows, doors, fixtures, etc.*	*Development of surfaces: un-cut, & cut right / oblique regular solids*	*Exploded view with assembly annotations part details*
	SLO-2	*true length, true inclinations, traces of lines*	*Change of reference line method*		*Simple position with cutting planes perpendicular to any one principal plane*	
S-14	SLO-1	*Finding shortest distance between a point and a plane*	*Auxiliary projections*	*Sectional plan elevation, and sectional side-view of Building/ dwelling, include windows, doors, fixtures, etc.*	*Design of real time surface-development*	*Exploded view with assembly annotations part details*
	SLO-2	*Shortest distance between two lines*	*Auxiliary projections*		*Design of real time surface-development*	
S-15	SLO-1	*shortest distance between point and plane*	*Viewing isometric and perspective views, shaded, wire-frame models*	*Sectional plan elevation, and sectional side-view of Building/ dwelling, include windows, doors, fixtures, etc.*	*Design of real time surface-development*	*Printing assembly drawings*
	SLO-2	*shortest distance between point and plane*	*Oblique pyramidal solids and projections*		*Design of real time surface-development*	*Printing assembly drawings*

Learning Resources

1. *Bhatt, N.D., Engineering Drawing (First Angle Projection),53rd ed., Charotar Publishing House, 2017*
2. *Bethunc, J., Engineering Graphics with AutoCAD 2017, Pearson Education, 2016*
3. *Khristofor Artemyevich Arustamov, Problems in projective geometry, MIR Publishers, Moscow, 1972*
4. *Natarajan, K.V., A Text Book of Engineering Graphics, 21st Edition, Dhanalakshmi Pub., 2012*
5. *Shah. M. B.,Rana, B. C, Engineering Drawing, Pearson Education, Pvt. Ltd., 2005*
6. *Jeyapoovan. T., Engineering Drawing and Graphics using AutoCAD, Vikas Pub. House, 2015*
7. *Narayanan, K. L., Kannaiah, V., Engineering Graphics, Scitech Publications,2010*
8. *Luzzader, Warren J., Duff John M., Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Prentice Hall of India Pvt. Ltd,, 2005.*
9. *Mohammad Dastbaz, Chris Gorse, Alice Moncaster (eds.), Building Information Modelling, Building Performance, Design and Smart Construction, Springer 2017*
10. *User Manual of Respective CAD Softwares*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	-	*40%*	-	*30%*	-	*30%*	-	*30%*	-	*30%*
	Understand										
Level 2	Apply	-	*40%*	-	*40%*	-	*40%*	-	*40%*	-	*40%*
	Analyze										
Level 3	Evaluate	-	*20%*	-	*30%*	-	*30%*	-	*30%*	-	*30%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1.Dr. R. Kalimuthu, ISRO,	*1. Dr. Ramkumar P, IIT Madras, ramkumar@iitm.ac.in*	*1. Mr. D. Kumaran, SRMIST*
2.Dr. A. Velayutham, DRDO,	*2. Dr. Sourav Rakshit, IIT Madras, srakshit@iitm.ac.in*	*2. Mr. S. Balamurugan, SRMIST*

Note: *For all B.Tech Programmes other than Civil, Mechanical, Automobile, Aerospace and Mechatronics, the entire course would be conducted using CAD Software only.*

Course Code	18MES102J	Course Name	BASIC CIVIL AND MECHANICAL ENGINEERING	Course Category	S	Engineering Sciences	L	T	P	C
							3	1	2	5

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Civil Engineering & Mechanical Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Learn about building materials and identify the components of a building*			
CLR-2 :	*Know the Transportation system, bridges and dams*			
CLR-3 :	*Learn about Water supply system, solid waste management and Surveying. Know the working of IC engines and identify the sub system requirements*			
CLR-4 :	*Apply the concept of harnessing energy from various energy sources*			
CLR-5 :	*Apply manufacturing processes; casting, forming. List machining operations; lathe, drilling. Identify process of welding*			
CLR-6 :	*Utilize the basic civil and mechanical engineering knowledge for a broader perspective of engineering around us*			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

					Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Characterize building materials and its applications*	*1*	*90*	*85*	*H*	-	*L*	*H*	*H*	*H*	*M*	-	-	-	-	*H*	-	-	-
CLO-2 :	*Understand the building components and its applications*	*1*	*90*	*85*	*H*	*M*	*M*	*M*	*H*	*H*	*M*	-	*H*	-	-	*H*	-	-	-
CLO-3 :	*Identify different transportation systems, water and waste water treatment and its applications Identify the working of IC engines and understand the need of various auxiliary systems*	*1*	*90*	*85*	*H*	*M*	*M*	*M*	*H*	*H*	*H*	*H*	*L*	*L*	*H*	*M*	*M*	*L*	*M*
CLO-4 :	*List the basic components and analyze the working of major power plants*	*2*	*90*	*85*	*H*	*L*	*L*	*L*	*L*	*M*	*H*	*L*	*L*	*L*	*L*	*M*	*M*	*L*	*M*
CLO-5 :	*Identify manufacturing processes; casting, forming. List machining operations; lathe, drilling. Identify process of welding*	*2*	*90*	*85*	*H*	*L*	*M*	*L*	*M*	*L*	*L*	*L*	*L*	*L*	*L*	*M*	*M*	*L*	*M*
CLO-6 :	*Apply the basic knowledge of civil and mechanical engineering*	*2*	*90*	*85*	*H*	*L*	*L*	*L*	*L*	*M*	*H*	*L*	*L*	*L*	*L*	*M*	*M*	*L*	*M*

		Building Materials, Foundations	*Civil Engineering Constructions*	*Waste Management, IC Engines*	*Power Plants*	*Manufacturing Processes*
Duration (hour)		**18**	**18**	**18**	**18**	**18**
S-1	SLO-1	*Introduction to Civil Engineering, Building Materials, History*	*Cement concrete flooring, Mosaic Flooring, Marble flooring*	*Disinfection of water and its methods.*	*Coal based thermal Power Plant: layout, components description*	*Casting introduction and history Expendable mold casting process*
	SLO-2	*Disciplines in Civil Engineering, Early constructions and development over time*	*Terrazzo flooring, Granite flooring, Ceramic tile flooring*	*Water distribution system and methods*	*Coal based thermal Power Plant: working, advantages, disadvantages*	*Production steps in a typical sand-casting process, terms including patterns and core*
S-2	SLO-1	*Ancient Monuments: Peruvudaiyar or Brihadeeswarar Temple, Kallanai dam*	*Roofs: Types of roofs, madras terrace roof*	*Sewage collection, treatment, disposal*	*Hydro Electric power plant: layout, components description*	*Other expendable mold casting: shell molding, vacuum molding*
	SLO-2	*Grand Anicut, Taj Mahal, Golconda fort, Angkor Wat, Pyramids of Giza, Colosseum*	*Reinforced concrete roofs, pitched roof, trussed roof*	*Methods of collection, sewerage systems*	*Hydro Electric power plant: working, advantages and disadvantages*	*expanded polystyrene process, Investment casting*
S-3	SLO-1	*Building Materials - Stone – Classification of Rocks,*	*Roof coverings: classification, types*	*Septic tank, principle*	*Nuclear power plant: Nuclear fission and fusion reactions*	*Metal forming, forging*
	SLO-2	*Quarrying, Dressing, Properties and Uses of Stone*	*Weathering course: Classification, Types*	*Working and construction details*	*Nuclear reactor, components description*	*Rolling, extrusion, drawing*
S-4	SLO-1	*Tutorial 1 : Pictures of Ancient Monuments and their Pictures*	*Tutorial 4: Flooring and roof coverings available in market*	*Tutorial 7: Water distribution system*	*Tutorial 10: Comparison of different Power Plants*	*Tutorial 13: Casting Processes*
	SLO-2					
S 5-6	SLO-1	*Lab 1: Learn the Building Materials and Properties (Strength of Materials Lab)*	*Lab 4: Learn types of floors and roofs (Structural Engineering Lab)*	*Lab 7: Site Visit: Sewage treatment plant*	*Lab 10: Site Visit: Power Producing Plant*	*Lab 13: Basic Lathe operation: facing, turning, step turning*
	SLO-2					
S-7	SLO-1	*Mortar, Plain and Reinforced Cement*	*Stress and strain, types*	*Solid waste management: Sources and types of solid waste*	*Layout, working, merits and demerits of boiling water reactor*	*Sheet metal working, applications. Cutting operations: shearing, blanking, punching,*
	SLO-2	*Concrete Grade and properties and uses*	*Stress & strain curve for mild steel*	*Sources and types of solid waste*	*Layout, working, merits and demerits of pressurized water reactor*	*cutoff, parting, slotting, perforating, notching, trimming, shaving, fine blanking*
S-8	SLO-1	*Special Concretes*	*Three moduli of elasticity, poisson's ratio,*	*Solid waste: Collection*	*Gas turbine power plants: components description*	*Material removal processes: Conventional lathe with its main components*

	SLO-2	*Fiber reinforced concrete and Ferro cement, Pre-stressed concrete*	*Ductility, stiffness, simple problems*	*Solid waste: Transfer and Disposal.*	*Working and types gas turbines, methods to improve performance*	*three and four-jaw chuck, tool and work holding devices*
S-9	SLO-1	*Construction chemicals*	*Transportation: Introduction, classification, Highways: design elements, cross section*	*Surveying, Levelling: Objectives*	*Layout and working of open cycle and closed cycle plants*	*Lathe operations: facing, turning*
	SLO-2	*Recycling: construction, demolition wastes*	*Classification of Roads, Administrative and Structural*	*Classifications of Surveying, Instruments used*	*Plants with inter-cooling, reheating and regeneration*	*drilling, boring and thread cutting*
S-10	SLO-1	*Tutorial 2 : Identify various fibers and construction chemicals used in market*	*Tutorial 5: Three Moduli problems*	*IC Engine: Classification, Comparisons Engine operations: 2 stroke & 4 stroke*	*Tutorial 11: Layout of a Power Plant*	*Tutorial 14: Lathe operations*
	SLO-2					
S 11-12	SLO-1	*Lab 2: Learning Building Materials Properties (Concrete & Highway Lab)*	*Lab 5: Stress & Strain Curve for Mild steel (Strength of Materials Lab)*	*Lab 8 Study of two stroke and four stroke cycle engines,*	*Lab 11: Practical study of mold, molding and casting processes*	*Lab 14: Lathe operation: Taper turning, grooving, thread cutting*
	SLO-2					
S-13	SLO-1	*Buildings, Classification of Buildings, Selection of site for a building*	*Railways – Zone and Headquarters, permanent way and its requirement*	*Comparison of SI & CI engines, Numerical Problems*	*Solar Thermal power plant: layout of Flat plate collector based plant*	*Overview of radial drilling machine with its main components*
	SLO-2	*Components of Buildings, Soil, General types of soil, Classification*	*Bridges: Components of bridge, classification, types, structure*	*Engine starting system: battery ignition system, Magneto ignition system*	*Solar Thermal power plant: central receiver type plant, advantages, disadvantages*	*Overview of upright drilling machine with its main components*
S-14	SLO-1	*Bearing Capacity, Factors affecting bearing capacity, Methods to improve*	*Dams: Purpose, Classification, Selection of Site, Gravity, Advantages, Limitations*	*Fuel supply systems of SI Engine : working of carburettor*	*Wind energy conversion system – wind turbine types*	*Metal joining process-welding, types*
	SLO-2	*Foundations: Functions, General types of foundation, Shallow foundations*	*Water supply system, Per capita demand, Factors affecting, Sources of water supply*	*Fuel supply systems of CI Engine: fuel injector, working of Common Rail Diesel Injection*	*Working, advantages and disadvantages*	*Welding equipment, tools and accessories*
S-15	SLO-1	*Deep Foundations*	*Water Treatment: Standards of Drinking water, Layout of treatment plant*	*Lubrication systems: Functions, working of mist and forced feed lubrication system*	*Ocean Thermal Energy Conversion system: layout of open cycle*	*Types of weld joints: butt, corner, lap, tee, edge joint*
	SLO-2	*Machine Foundations*	*Treatment plant, Slow Sand filter, Rapid Sand filter*	*Cooling Systems: Air and Water Cooled Engines*	*Layout of closed cycle, advantages, disadvantages*	*Types of welds: fillet, groove, plug, spot, seam weld*
S-16	SLO-1	*Tutorial 3: Making model for Building Components*	*Tutorial 6: Model making - Sand Filters*	*Tutorial 9: Alternate fuels for IC Engines Properties, Limitations, Emission Standards*	*Tutorial 12: Energy Conversion Methods*	*Tutorial 15: Metal Joining Processes*
	SLO-2					
S 17-18	SLO-1	*Lab 3: learn different types of Soils and Foundations (Soil Mechanics Lab)*	*Lab 6: Water standards and treatment methods (Environment Lab)*	*Lab 9: Practical study of I.C engine auxiliary system components*	*Lab 12: Casting operation: pattern and core*	*Lab 15: Drilling, boring, counter boring, counter sinking, reaming, tapping*
	SLO-2					

Learning Resources

1. *Rangwala .S.C, Engineering Materials, Charotar Publishing House, Anand, 2012*
2. *Patil, B.S. Legal Aspects of Building and Engineering Contract, 1974*
3. *Raju K.V.B, Ravichandran P.T, Basics of Civil Engineering, Ayyappa Publications, Chennai, 2012*
4. *M.S. Shetty, Concrete Technology, S.Chand Publications, 2006*
5. *Howard S Peavy, Donald R Rowe, George Tchobanoglous, Environmental Engineering, McGraw-Hil, 1985*
6. *Serope Kalpakjian, Steven Schmid, Manufacturing Processes for Engineering Materials, Pearson, 2016*
7. *Drbal, Larry F. Boston, Patricia G. Westra, Kayla L. Black, Veatch, Power Plant Engineering, Kluwer, 1995*
8. *Andy Walker, "Solar Energy", John Wiley & Sons, 2013*
9. *John B. Heywood, Internal Combustion Engine Fundamentals, Tata McGraw Hill Education, 2017*
10. *Kumar. T, Leenus Jesu Martin, Murali. G, Basic Mechanical Engineering, Suma Publications, 2007*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Mr. Vivekabhayankar, Afcons, vivek.abhyankar@afcons.com	*1. Dr. K, Ramamurthy, IIT Madras, vivek@iitm.ac.in*	*1. Mr. S. Pradeep, SRMIST*
2. Dr. R. Kalimuthu, ISRO	*2. Dr. Sourav Rakshit, IIT Madras, srakshit@iitm.ac.in*	*2. Dr. K. Suresh Kumar, SRMIST*

Course Code	18EES101J	Course Name	BASIC ELECTRICAL & ELECTRONICS ENGINEERING	Course Category	S	Engineering Sciences	L	T	P	C
							3	1	2	5

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Electrical & Electronics Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Analyze given electric circuits consisting of active and passive components			
CLR-2 :	Identify the parts, functions and working of motors, generators and transformers that function in AC and DC			
CLR-3 :	Utilize the basic electronic devices and circuits			
CLR-4 :	Utilize transducers for measuring displacement, pressure, flow, sound, light, temperature, chemical changes etc.,			
CLR-5 :	Build simple logical circuits using Boolean expressions. Identify elements in a communication system			
CLR-6 :	Utilize the basic electrical circuits, machines, electronic devices, transducers and digital system principles and operations			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Analyze basic theory utilized in electrical circuits and its circuits	3	75	70	H	M	L	L	M	-	M	M	M	M	-	M	-	-	-
CLO-2 :	Identify working principle of direct current and alternative current machines such as transformers, motors and generators	2	75	70	H	M	L	L	M	-	M	M	M	M	-	M	-	-	-
CLO-3 :	Operate the basic electronic devices. Identify their uses and construction features	3	75	70	H	-	L	L	M	-	M	M	M	M	-	M	-	-	-
CLO-4 :	Identify the different types of transducers used in measurement of various physical parameters	3	75	70	H	-	L	M	M	-	M	M	M	M	-	M	-	-	-
CLO-5 :	Apply binary logic and Boolean expressions for digital circuit design, Identify elements in a communication Systems	3	75	70	H	M	M	M	M	-	M	M	M	M	-	M	-	-	-
CLO-6 :	Identify the basic electrical circuits, machines, electronic devices, transducers and digital system principles and operations	3	75	70	-	-	L	M	M	-	M	M	M	M	-	M	-	-	-

		Electrical Circuits	D.C Machines & A.C Machines	Electronic Devices	Transducers	Digital Systems
Duration (hour)		18	18	18	18	18
S-1	SLO-1	Introduction to DC and AC circuits	Sinusoids, Generation of AC, Average, RMS values, Form and peak factors	Safety measures in electrical systems	Transducer function and requirements	Number systems, binary codes
	SLO-2	Active and Passive two terminal elements	Analysis of single phase AC circuit, Real, Reactive, Apparent power, Power factor	Types of wiring, wiring accessories	Classification: Active and Passive	Binary arithmetic
S-2	SLO-1	Ohms law, Voltage-Current relation, Power, Energy	Magnetic materials, B-H Characteristics Simple magnetic circuits	House wiring for staircase, fluorescent lamp, LED lamp & corridor wiring	Displacement: Capacitive, Inductive, Variable Inductance	Boolean algebra, laws and theorems
	SLO-2	R,L,C Circuits, Voltage and Current Sources	Faraday's laws, induced emfs and inductances.	Basic principles of earthing, Types of earthing. Grounding in DC circuits	Linear Variable Differential Transformer	Simplification of Boolean expression
S-3	SLO-1	Kirchoff's current law	1 - phase transformers: Construction, types, ideal, practical transformer	Basic principles and classification of instruments	Electromechanical: Pressure, Flow, Accelerometer, Potentiometer etc.	Logic Gates and Operations
	SLO-2	Kirchoff's voltage law	EMF equation, Regulation, Efficiency	Moving coil and moving iron instruments	Strain Gauge	Simplification of Boolean expression
S-4	SLO-1 SLO-2	Problem Solving Session	Problem Solving Session	Problem Solving Session	Problem Solving Session	Problem Solving Session
S 5-6	SLO-1 SLO-2	Lab 1: Verification of Kirchoff's Law	Lab 4: Transformer Operation, Efficiency	Lab 7: Types of wiring (fluorescent lamp wiring, staircase wiring, godown wiring)	Lab 10: Measurement using LVDT and Strain Gauge	Lab 13: Verification of Boolean expression using logic gates
S-7	SLO-1	Mesh Current Analysis	Construction, working of DC Generators	Overview of Semiconductors	Chemical: pH probes, Electro galvanic Sensor etc.,	SOP and POS Expressions
	SLO-2	Nodal Voltage Analysis	Types of DC generators	PN junction diode	Electroacoustic: Mic, Speaker, Piezoelectric, Sonar, Ultrasonic	Standard forms of Boolean expression
S-8	SLO-1	Thevenin's Theorem	Characteristics of Generators	Zener diode	Tactile, Geophones, Hydrophone	Simplify using Boolean Expressions
	SLO-2	Norton's Theorem	Armature reaction, Losses	Diode circuits: rectifiers, half and full wave	Electrooptical: LED, Laser, Photodiode, Photoresistor, Phototransistor	Minterm and Maxterm
S-9	SLO-1	Maximum Power Transfer Theorem	Power stages of DC generators	Bridge type rectifier, filter circuit	Photoconductive cell, photovoltaic cell, solar cell	K-Map Simple ReductionTechnique
	SLO-2	Star- Delta Transformation	Working and types of DC motors, Characteristics, Starters	Clippers and clampers	LED, infrared emitters, LCD, optocouplers	Two, Three and Four Variable K-Map

S-10	SLO-1 SLO-2	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*
S 11-12	SLO-1 SLO-2	*Lab 2: Verification of all Theorems*	*Lab 5: Demo of DC Machine & Parts*	*Lab 8: Characteristics of semiconductor devices*	*Lab 11: Measurement using Electro acoustic and Electrooptical transducers*	*Lab 14: Reduction using Digital Logic Gates*
S-13	SLO-1	*Resistive Circuit Analysis*	*Construction, working of AC Generators*	*BJT construction, operation*	*Thermoelectric: Resistance Temperature Detectors*	*Principles of Communication*
	SLO-2	*Superposition, Convolution*	*Types of AC generators*	*BJT characteristics (CB, CE and CC configurations) and uses*	*Thermocouple*	*Block diagram of a Communication System*
S-14	SLO-1	*RL Circuit Transient Analysis*	*Characteristics of AC Generators, Losses*	*JFET construction, operation*	*Thermister*	*Amplitude Modulation*
	SLO-2	*RC & RLC Transient Analysis*	*Single Phase and Three Phase Machines*	*JFET characteristics (CS configuration) and uses.*	*Electrostatic: Electrometer*	*Frequency Modulation*
S-15	SLO-1	*Three Phase Systems, Connections*	*Working and types of AC motors*	*MOSFET construction, operation*	*Electromagnetic: Antenna, Hall effect, Magnetic Cartridge etc.,*	*Phase Modulation*
	SLO-2	*Relation between Line and Phase*	*Induction, Squirrel Cage, Synchronous*	*MOSFET characteristics (CS configuration) and uses*	*Radioacoustic: Geiger Muller Tubes, Radio receiver, Radio transmitter*	*Demodulation*
S-16	SLO-1 SLO-2	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*	*Problem Solving Session*
S 17-18	SLO-1 SLO-2	*Lab 3: Time Domain Analysis (RL, RC)*	*Lab 6: Demo of AC Machine & Parts*	*Lab 9: Wave shaping circuits*	*Lab 12: Measurement using Thermoelectric and Electromagnetic*	*Lab 15: Demo of Transmission and Reception using MODEM*

Learning Resources	*1. Dash.S.S, Subramani.C, Vijayakumar.K, Basic Electrical Engineering, 1st ed.,Vijay Nicole, 2013* *2. Jegatheesan .R, Analysis of Electric Circuits, Tata McGraw-Hill, 2014* *3. P. S. Bimbhra, ElectricalMachinery, 7th ed,. Khanna Publishers, 2011*	*4. R. Muthusubramanian, S. Salivahanan,"Basic Electrical and Electronics Engineering, Tata McGraw-Hill, 2012* *5. Moris M. Mano, Digital Design, 3rd ed.,Pearson, 2011*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
Level 2	Apply Analyze	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
Level 3	Evaluate Create	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Dr. S. Paramasivam, Danfoss, Industries Pvt Ltd., paramsathya@yahoo.com	*1. Dr. K. S. Swarup, IIT Madras, ksswarup@iitm.ac.in*	*1. Dr. K. Vijayakumar, SRMIST*
2. Dr. Sricharan Srinivasan, Wipro Technologies, sricharanms@gmail.com	*2. Dr. Rajeev Sukumaran, IIT Madras, rajeev@wmail.iitm.ac.in*	*2. Dr. S. S. Dash, SRMIST*

Course Code	18MES103L	Course Name	CIVIL AND MECHANICAL ENGINEERING WORKSHOP	Course Category	S	Engineering Sciences	L	T	P	C
							1	0	4	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Civil Engineering & Mechanical Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Practice machining and glass cutting shop floor trade*			
CLR-2 :	*Practice arc & gas welding, and fitting and make new assemblies according to various dimensions and tolerances*			
CLR-3 :	*Practice basic carpentry joints and sheet metal shop floor practices.*			
CLR-4 :	*Practice casting, moulding, & smithy trades*			
CLR-5 :	*Practice and make G.I & P.V.C. plumbing trade*			
CLR-6 :	*Practice machining, glass cutting, welding, fitting, carpentry, sheet metal, casting, moulding, smithy and plumbing*			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Machine in a lathe. Drill using drilling machines. Cut glass. Create new components according to specifications*	*1*	*90*	*85*	*H*	*L*	*H*	*L*	*M*	*H*	*H*	*L*	*M*	*L*	*L*	*H*	*L*	*L*	*L*
CLO-2 :	*Weld joints using arc & gas welding. Fit pipes and fixtures. Make new assembly for given dimensions, and tolerances*	*1*	*90*	*85*	*H*	*L*	*H*	*L*	*H*	*H*	*H*	*L*	*H*	*L*	*L*	*H*	*M*	*M*	*M*
CLO-3 :	*Practice basic carpentry joints used in house hold furniture items, and sheet metal items used shop floor practices*	*1*	*90*	*85*	*H*	*L*	*H*	*L*	*M*	*M*	*H*	*L*	*M*	*L*	*L*	*M*	*L*	*L*	*L*
CLO-4 :	*Practice casting, moulding, & smithy trades*	*2*	*90*	*85*	*H*	*L*	*M*	*L*	*M*	*H*	*H*	*L*	*L*	*L*	*L*	*M*	*L*	*L*	*L*
CLO-5 :	*Make G.I & P.V.C. pipe line connections used in the plumbing trade*	*2*	*90*	*85*	*H*	*L*	*H*	*L*	*M*	*H*	*M*	*L*	*L*	*L*	*L*	*M*	*L*	*L*	*L*
CLO-6 :	*Practice basic skills of machining, glass cutting, welding, fitting, carpentry, sheet metal, casting, mouldings, smithy and plumbing*	*2*	*90*	*85*	*H*	*L*	*H*	*L*	*M*	*H*	*H*	*L*	*M*	*L*	*L*	*M*	*L*	*L*	*L*

		Machining, Drilling, Tapping, Glass cutting	*Welding (Arc and Gas) and fitting*	*Carpentry and Sheet metal*	*Casting, moulding and smithy*	*Plumbing (G.I and P.V.C)*
Duration (hour)		**15**	**15**	**15**	**15**	**15**
S-1	SLO-1	*Machining: Basics of Machining Processes Equipment's*	*Basics of Metal Arc welding operations, Equipment's*	*Basics of Carpentry operations, Equipment's*	*Basics of Casting, processes, Equipment's*	*Basics of Plumbing practices for G.I and P.V.C.*
	SLO-2	*Tools and demonstration of machining to produce models*	*Tools and demonstration of producing models*	*Tools and demonstration of producing models*	*Tools and demonstration of producing models*	*Tools and demonstration of producing models*
S 2-5	SLO-1	*Simple turning of cylindrical surface on MS rod using lathe machine tool*	*Butt joint of two metal plates using arc welding process*	*Cross halving joint of two wooden pieces at perpendicular direction*	*To make the mould using stepped flange*	*Plumbing of bathroom/ kitchen fittings using G.I. fittings*
	SLO-2	*Simple turning of cylindrical surface on MS rod using lathe machine tool*	*Lap joint of two metal plates overlapping on one another using arc welding process.*	*To make duster from wooden piece using carpentry tools.*	*To make the mould using stepped flange*	*Plumbing of bathroom/ kitchen fittings using G.I. fittings*
S-6	SLO-1	*Basics of drilling and tapping processes, Equipment's, tools*	*Basics of gas welding operations, Equipment's,*	*Basics of Sheet metal operations, Equipment's*	*Basics of injection moulding and processes, Equipment's,*	*PVC Plumbing of bathroom/ kitchen fittings using P.V.C. fittings*
	SLO-2	*Demonstration of drilling and tapping to produce models.*	*Tools and demonstration of producing models*	*Tools and demonstration of producing sheet metal models*	*Tools and demonstration of producing models*	*Tools and demonstration of producing models*
S 7-10	SLO-1	*Generate hole on a metal piece*	*MIG welding of metal plates*	*To make Rectangular shaped tray using GI sheet*	*To make plastic models using injection moulding of simple part*	*Plumbing of bathroom/ kitchen fittings using P.V.C. fittings*
	SLO-2	*Generate internal thread on a metal piece*	*TIG welding of metal plates*	*To make bigger size scoop using GI sheet.*	*To make plastic models using injection moulding of simple part*	*Plumbing of bathroom/ kitchen fittings using P.V.C. fittings*
S-11	SLO-1	*Basics of Glass cutting processes, Equipment's.*	*Basics of fitting practice, tools and method of producing models*	*Basics of different geometrical shapes in Sheet metal operations*	*Basics of Smithy processes, Equipment's,*	*Basics of Plumbing practices for G.I pipe lines and fittings for pumps and machines*
	SLO-2	*Tools and demonstration of producing models*	*Tools and demonstration of producing models*	*Equipment's, tools and demonstration of producing models*	*Tools and demonstration of producing models*	*Equipment's, tools and demonstration of producing models.*
S 12-15	SLO-1	*Make glass panels for boxes*	*Step fitting of two metal plates using fitting tools*	*To make geometrical shape like frustum, Cone and Prism using G.I sheet*	*To forge chisel from MS rod using black smithy*	*Plumbing of pipe lines and fitting for Pumps using G.I fittings*
	SLO-2					

Learning Resources	*1. Jeyachandran K., Natarajan S. & Balasubramanian S., A Primer on Engineering Practices Laboratory, Anuradha Publications, 2007* *2. Jeyapoovan T., Saravanapandian M. & Pranitha S., Engineering Practices Lab Manual, Vikas Publishing House Pvt.Ltd, 2006.* *3. Bawa H.S., Workshop Practice, Tata McGraw, 2007.* *4. Rajendra Prasad A. & Sarma P.M.M.S., Workshop Practice, Sree Sai Publication, 2002.*	*5. Kannaiah P. & Narayana K.L., Manual on Workshop Practice, Scitech Publications, 1999.* *6. Hajra Choudhury S.K., Hajra Choudhury A.K., Nirjhar Roy S.K., Elements of Workshop Technology, Vol.I & Vol.II 2010, Media promoters and publishers private limited, Mumbai.* *7. Rao P.N., Manufacturing Technology, Vol. I & Vol. II, Tata McGrawHill,2017.* *8. Gopal T.V, Kumar. T, Murali. G, A first course on workshop practice – Theory, Practice and Work Book, Suma Publications, Chennai, 2005.*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	-	*40%*	-	*30%*	-	*30%*	-	*30%*	-	*30%*
	Understand										
Level 2	Apply	-	*40%*	-	*40%*	-	*40%*	-	*40%*	-	*40%*
	Analyze										
Level 3	Evaluate	-	*20%*	-	*30%*	-	*30%*	-	*30%*	-	*30%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1.Dr. R. Kalimuthu, ISRO,	*1. Dr. Ramkumar P, IIT Madras, ramkumar@iitm.ac.in*	*1. Mr. A. Thirugnanam, SRMIST*
2.Dr. A. Velayutham, DRDO,	*2. Dr. Sourav Rakshit, IIT Madras, srakshit@iitm.ac.in*	*2. Dr. S. Prabhu, SRMIST*

Course Code	18EES102L	Course Name	ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP	Course Category	S	Engineering Sciences	L	T	P	C
							1	0	4	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Electrical and Electronics Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Design a layout of residential wiring and introduction to PV powered house*			
CLR-2 :	*Impart knowledge on measurements of various electrical quantities*			
CLR-3 :	*Gain knowledge on troubleshooting various electrical and electronic equipment*			
CLR-4 :	*Understand the basic working of Electrical machines, transformers*			
CLR-5 :	*Gain knowledge on fabrication of Printed Circuit Boards and IC fabrication*			
CLR-6 :	*Understand the basics of illumination and study the various components of Power System*			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Comprehend the basics of residential wiring and understand the design of the solar system for small homes*	*1*	*85*	*80*	*H*	-	*H*	-	-	*H*	*H*	-	-	-	-	*H*	-	-	-
CLO-2 :	*Understand the measurement of the various electrical quantities (like voltage, current, power, power factor)*	*1*	*85*	*80*	*H*	-	*H*	-	*H*	*H*	*H*	-	*H*	-	-	*H*	-	-	-
CLO-3 :	*Gain knowledge on working and troubleshooting of various electrical and electronic circuits in real time application*	*1*	*85*	*80*	*H*	-	-	-	-	-	*H*	-	-	-	-	-	-	-	-
CLO-4 :	*Understand the constructional details and principle of operation of DC machines and Transformers*	*2*	*85*	*80*	*H*	-	-	-	-	-	*H*	-	-	-	-	-	-	-	-
CLO-5 :	*Familiarized with PCB design and fabrication process*	*2*	*85*	*80*	*H*	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CLO-6 :	*Acquire knowledge on illumination and power system components*	*2*	*85*	*80*	*H*	-	-	-	-	-	*H*	-	-	-	-	-	-	-	-

		Wiring and Earthing	*Solar Panels and Wiring*	*Electrical & Electronic Equipment*	*DC, AC Machines, PCB Design*	*Panels, 3D Printing*
Duration (hour)		**15**	**15**	**15**	**15**	**15**
S-1	SLO-1	*I.E. rules for electrical wiring as per 2003 act.-Prepare Layout, load calculation*	*Wiring layout using simulation software*	*Measurement of energy*	*Principles of DC machines*	*Illumination concepts*
	SLO-2	*Estimation and costing of domestic installation. (Residential, lab, hall etc.,)*	*Examples of Wiring*	*Single-phase and Three-phase energy meter*	*Principles of AC machines*	*lighting calculation*
S 2-5	SLO-1	*Lab 1: Residential Wiring: Energy meter,*	*Lab 4: Design of Wiring layout using simulation software*	*Lab 7: Measurement of energy using single-phase, three-phase energy meter*	*Lab 10: DC machine: commutator, brush AC: induction-squirrel cage, synchronous*	*Lab 4: Experiment and test: inverse square law of illumination, photometer experiment*
	SLO-2	*fuses, switches, indicator, lamps, etc.,*				
S-6	SLO-1	*Types of wiring: fluorescent lamp wiring*	*Study of PV cells characteristics (series, parallel connections, partial shading, etc..)*	*Troubleshooting electrical equipment: fan, iron box*	*Assembly of choke*	*Power system components: Circuit Breakers, switchgears*
	SLO-2	*Staircase, godown wiring*	*Design of PV system*	*Troubleshooting electrical equipment: mixer and grinder*	*Small transformer and winding of machines*	*Control panel, relays*
S 7-10	SLO-1	*Lab 2: Wiring: fluorescent lamp, stair*	*Lab 5: Design of Solar system for small houses*	*Lab 8: Troubleshooting of equipment: fan, iron-box, mixer, grinder*	*Lab 11: Assembly of choke, transformer and winding practices in electrical machines*	*Lab 5: Design of control panels*
	SLO-2	*case, godown wiring etc.,*				
S-11	SLO-1	*Study of Earthing*	*Measurement of electrical quantities: voltage, current,*	*Electronic components: active & passive, Electronic Instruments: CRO*	*PCB Design*	*3D Printing and its components*
	SLO-2	*Measurement of Earth resistance.*	*Power, Power factor in RLC circuits)*	*Function generator, Power Supply, Multi-meter, IC tester and Solder practice*	*PCB Fabrication*	*Advantages and Uses of 3D printing*
S 12-15	SLO-1	*Lab 3: Study of Earthing and Measurement*	*Lab 6: Measurement of electrical voltage, current, power, power factor*	*Lab 9: Trouble shooting of electronic circuits and Soldering practices*	*Lab 12: PCB Design and fabrication*	*Lab 6: 3D Printing demonstration*
	SLO-2	*to Earth resistance.*				

Learning Resources	*1. Subhransu Sekhar Dash & K. Vijayakumar, Electrical Engineering Practice Lab Manual. Vijay Nicole, 2013*	*2. Laboratory Manual for Electrical and Electronic Engineering Practices, SRMIST*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	-	*40%*	-	*30%*	-	*30%*	-	*30%*	-	*30%*
	Understand										
Level 2	Apply	-	*40%*	-	*40%*	-	*40%*	-	*40%*	-	*40%*
	Analyze										
Level 3	Evaluate	-	*20%*	-	*30%*	-	*30%*	-	*30%*	-	*30%*
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Dr. S. Paramasivam, Danfoss, Industries Pvt Ltd., paramsathya@yahoo.com	*1. Dr. K. S. Swarup, IIT Madras, ksswarup@iitm.ac.in*	*1. Dr. K. Vijayakumar, SRMIST*
2. Dr. Sricharan Srinivasan, Wipro Technologies, sricharanms@gmail.com	*2. Dr. Rajeev Sukumaran, IIT Madras, rajeev@wmail.iitm.ac.in*	*2. Dr. S. S. Dash, SRMIST*

Course Code	18CSS101J	Course Name	PROGRAMMING FOR PROBLEM SOLVING	Course Category	S	Engineering Sciences	L	T	P	C
							3	0	4	5

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Think and evolve a logically to construct an algorithm into a flowchart and a pseudocode that can be programmed			
CLR-2 :	Utilize the logical operators and expressions to solve problems in engineering and real-time			
CLR-3 :	Store and retrieve data in a single and multidimensional array			
CLR-4 :	Utilize custom designed functions that can be used to perform tasks and can be repeatedly used in any application			
CLR-5 :	Create storage constructs using structure and unions. Create and Utilize files to store and retrieve information			
CLR-6 :	Create a logical mindset to solve various engineering applications using programming constructs in C			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Identify methods to solve a problem through computer programming. List the basic data types and variables in C	2	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-2 :	Apply the logic operators and expressions. Use loop constructs and recursion. Use array to store and retrieve data	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Analyze programs that need storage and form single and multi-dimensional arrays. Use preprocessor constructs in C	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Create user defined functions for mathematical and other logical operations. Use pointer to address memory and data	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Create structures and unions to represent data constructs. Use files to store and retrieve data	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Apply programming concepts to solve problems. Learn about how C programming can be effectively used for solutions	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-

Duration (hour)		21	21	21	21	21
S-1	SLO-1	Evolution of Programming & Languages	Relational and logical Operators	Initializing and Accessing 2D Array	Passing Array Element to Function	Initializing Structure, Declaring structure variable
	SLO-2	Problem solving through programming	Condition Operators, Operator Precedence	Initializing Multidimensional Array	Formal and Actual Parameters	Structure using typedef, Accessing members
S-2	SLO-1	Creating algorithms	Expressions with pre / post increment operator	Array Programs – 2D	Advantages of using Functions	Nested structure Accessing elements in a structure array
	SLO-2	Drawing flowcharts	Expression with conditional and assignment operators	Array Contiguous Memory	Processor Directives and #define Directives	Array of structure Accessing elements in a structure array
S-3	SLO-1	Writing pseudocode	If statement in expression	Array Advantages and Limitations	Nested Preprocessor Macro	Passing Array of structure to function
	SLO-2	Evolution of C language, its usage history	L value and R value in expression	Array construction for real-time application Common Programming errors	Advantages of using Functions	Array of pointers to structures
S 4-7	SLO-1 SLO-2	Lab 1: Algorithm, Flow Chart, Pseudocode	Lab 4: Operators and Expressions	Lab 7: Arrays - Multidimensional	Lab 10: Functions	Lab 13: Structures & Unions
S-8	SLO-1	Input and output functions: Printf and scanf	Control Statements – if and else	String Basics	Pointers and address operator	Bit Manipulation to structure and Pointer to structure
	SLO-2	Variables and identifiers	else if and nested if, switch case	String Declaration and Initialization	Size of Pointer Variable and Pointer Operator	Union Basic and declaration
S-9	SLO-1	Expressions	Iterations, Conditional and Unconditional branching	String Functions: gets(), puts(), getchar(), putchar(), printf()	Pointer Declaration and dereferencing pointers	Accessing Union Members Pointers to Union
	SLO-2	Single line and multiline comments	For loop	String Functions: atoi, strlen, strcat, strcmp	Void Pointers and size of Void Pointers	Dynamic memory allocation, mallaoc, realloc, free

S-10	SLO-1	*Constants, Keywords*	*While loop*	*String Functions: sprint, sscanf, strrev, strcpy, strstr, strtok*	*Arithmetic Operations*	*Allocating Dynamic Array*
	SLO-2	*Values, Names, Scope, Binding, Storage Classes*	*do while, goto, break, continue*	*Arithmetic Characters on Strings*	*Incrementing Pointers*	*Multidimensional array using dynamic memory allocation.*
S 11-14	SLO-1 SLO-2	*Lab 2: Input and Output Statements*	*Lab 5: Control Statements*	*Lab 8: Strings*	*Lab 11: Pointers*	*Lab 14: Structures & Unions*
S-15	SLO-1	*Numeric Data types: integer*	*Array Basic and Types*	*Functions declaration and definition*	*Constant Pointers*	*file: opening, defining, closing, File Modes, File Types*
	SLO-2	*Numeric Data types: floating point*	*Array Initialization and Declaration*	*Types: Call by Value, Call by Reference*	*Pointers to array elements and strings*	*Writing contents into a file*
S-16	SLO-1	*Non-Numeric Data types: char and string*	*Initialization: one Dimensional Array*	*Function with and without Arguments and no Return Values*	*Function Pointers*	*Reading file contents*
	SLO-2	*Increment and decrement operator*	*Accessing, Indexing one Dimensional Array Operations*	*Function with and without Arguments and Return Values*	*Array of Function Pointers*	*Appending an existing file*
S-17	SLO-1	*Comma, Arrow and Assignment operator*	*One Dimensional Array operations*	*Passing Array to Functions with return type*	*Accessing Array of Function Pointers*	*File permissions and rights*
	SLO-2	*Bitwise and Sizeof operator*	*Array Programs – 1D*	*Recursion Functions*	*Null Pointers*	*Changing permissions and rights*
S 18-21	SLO-1 SLO-2	*Lab 3: Data Types*	*Lab 6: Arrays – One Dimensional*	*Lab 9: Functions*	*Lab 12: Pointers*	*Lab 15: File Handling*

Learning Resources	*1. Zed A Shaw, Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (Like C), Addison Wesley, 2015* *2. W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2nd ed. Prentice Hall, 1996*	*3. Bharat Kinariwala, Tep Dobry, Programming in C, eBook* *4. http://www.c4learn.com/learn-c-programming-language/*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
Level 2	Apply Analyze	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
Level 3	Evaluate Create	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Dr. Sainarayanan Gopalakrishnan, HCL Technologies, sai.jgk@gmail.com	*1. Prof. Janakiram D, IIT Madras, djram@iitm.ac.in*	*1. Dr. Christhu Raj M R, SRMIST*
2. Dr. Sricharan Srinivasan, Wipro Technologies, sricharanms@gmail.com	*2. Dr. Rajeev Sukumaran, IIT Madras, rajeev@wmail.iitm.ac.in*	*2. Dr. B. Amutha, SRMIST*

Course Code	18MES104L	Course Name	ACTIVE LEARNING LABORATORY	Course Category	S	Engineering Sciences	L	T	P	C
							0	0	2	1

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mechanical Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLR-1 :	*Identify the equilibrium of forces using Lami's theorem*																		
CLR-2 :	*Identify the equilibrium of forces using Lami's theorem with single and two unknown weights*																		
CLR-3 :	*Identify the friction between any two surfaces that contacts and slide against each other in the horizontal plane*																		
CLR-4 :	*Identify the friction between any two surfaces that contacts and slide against each other in an inclined plane*																		
CLR-5 :	*Identify the relative motion between members in a four-bar mechanism*																		
CLR-6 :	*Apply and utilize the basic concepts using learning through discovery method*																		
Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*																		
CLO-1 :	*Verify Lam's theorem using distance and angle methods*	*2*	*90*	*85*	*L*	*H*	*H*	*H*	*L*	*L*	*L*	*M*	*H*	*L*	*L*	*H*	*L*	*L*	*L*
CLO-2 :	*Calculate unknown weights using Lami's angle method theorem*	*2*	*90*	*85*	*L*	*H*	*H*	*H*	*L*	*L*	*L*	*M*	*H*	*L*	*L*	*H*	*L*	*L*	*L*
CLO-3 :	*Determine the coefficient of friction between same and different materials in the horizontal plane*	*3*	*90*	*85*	*L*	*H*	*H*	*H*	*L*	*L*	*L*	*M*	*H*	*L*	*L*	*H*	*L*	*L*	*L*
CLO-4 :	*Determine the coefficient of friction between same and different materials in an inclined plane*	*2*	*90*	*85*	*L*	*H*	*H*	*H*	*L*	*L*	*L*	*M*	*H*	*L*	*L*	*H*	*L*	*L*	*L*
CLO-5 :	*Verify Grashof's law in a four-bar mechanism*	*3*	*90*	*85*	*L*	*H*	*H*	*H*	*L*	*L*	*L*	*M*	*H*	*L*	*L*	*H*	*L*	*L*	*L*
CLO-6 :	*Practice basic concepts using learning through discovery method*	*2*	*90*	*85*	*L*	*H*	*H*	*H*	*L*	*L*	*L*	*M*	*H*	*L*	*L*	*H*	*L*	*L*	*L*

Duration (hour)		6	6	6	6	6
S 1-2	SLO-1	*Lami's theorem – verification methods*	*Lami's theorem –Calculate unknown weight*	*Friction in horizontal plane*	*Friction in an Inclined plane*	*Four bar mechanism*
	SLO-2					
S 3-4	SLO-1	*Verifying Lami's theorem using Distance method*	*Determine unknown weight using Lami's theorem (Angle method)*	*Determine coefficient of friction between same materials with horizontal plane*	*Determine coefficient of friction between same materials with inclined plane*	*Verify Grashof's Law*
	SLO-2					
S 5-6	SLO-1	*Verifying Lami's theorem using Angle method*	*Determine two unknown weights using Lami's theorem (Angle method)*	*Determine coefficient of friction between different materials with horizontal plane*	*Determine coefficient of friction between different materials with inclined plane*	*Inversion of Four bar mechanism*
	SLO-2					

Learning Resources

1. *Ferdinand. P. Beer. E, Russell Johnston Jr., David Mazurek, Philip J Cornwell, Vector Mechanics for Engineers: Statics and Dynamics, 10th ed. McGraw Hill, 2013.*
2. *Rattan, S. S, Theory of Machines, 4th ed. McGraw Hill, 2015*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember / Understand	-	*40%*	-	*30%*	-	*30%*	-	*30%*	-	*30%*
Level 2	Apply / Analyze	-	*40%*	-	*40%*	-	*40%*	-	*40%*	-	*40%*
Level 3	Evaluate / Create	-	*20%*	-	*30%*	-	*30%*	-	*30%*	-	*30%*
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1.Dr. R. Kalimuthu, ISRO,	*1. Dr. Ramkumar P, IIT Madras, ramkumar@iitm.ac.in*	*1. Mr. D. Raja, SRMIST*
2.Dr. A. Velayutham, DRDO,	*2. Dr. Sourav Rakshit, IIT Madras, srakshit@iitm.ac.in*	*2. Dr. M. Kamaraj, SRMIST*

Course Code	18AUS101L	Course Name	ARTIFACT DISSECTION LABORATORY	Course Category	S	Engineering Sciences	L	T	P	C
							0	0	2	1

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Automobile Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Identify the commonly used tools in a household and its usages. Develop abilities to repair a bicycle			
CLR-2 :	Identify the parts in a sewing machine and drilling machine. Develop abilities to repair the same			
CLR-3 :	Identify the parts in a two stroke and four stroke engines. Develop abilities to identify faults			
CLR-4 :	Investigate about the working of household machines. Develop abilities to repair the same			
CLR-5 :	Identify the parts in electrical machines. Develop abilities to repair the same			
CLR-6 :	Develop abilities to dismantle and assemble common household machines and use handheld tools			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Study the function of commonly used and special tools. Dismantle and assemble a bicycle	2	90	85	L	L	L	L	M	L	L	M	H	M	L	M	H	M	H
CLO-2 :	Dismantle and study a sewing machine and a drilling machine and identify its working from parts. Assemble the parts	3	90	85	M	M	L	L	L	L	L	M	H	M	L	M	H	M	H
CLO-3 :	Dismantle and study two and four stroke engines and identify its working from parts. Assemble the parts	3	90	85	M	M	L	M	M	L	L	M	H	M	L	H	H	M	H
CLO-4 :	Dismantle and study wet grinder, mixer-grinder, washing machine and identify its working from parts. Assemble the parts	3	90	85	H	M	L	M	H	L	L	M	H	M	L	H	H	M	H
CLO-5 :	Dismantle and study ceiling fan and identify its working from parts. Assemble the parts	3	90	85	H	M	L	H	H	L	M	M	H	M	L	H	H	M	H
CLO-6 :	Study the common household machines and its parts	2	90	85	H	M	L	H	H	L	M	M	H	M	L	H	H	M	H

		Study of Common & Special tool usage	Study of Sewing and Drilling Machine	Study of Two and Four Stroke Engines	Study of Household Machines	Study of Electrical Machines
Duration (hour)		6	6	6	6	6
S 1-2	SLO-1	Study of common tools	Dismantle sewing machine and study its working	Dismantle two stroke engine and study its working. Assemble the dismantled engine	Dismantle wet grinding machine and study the working. Assemble the machine.	Dismantle Ceiling fan
	SLO-2	Study of special tools				
S 3-4	SLO-1	Dismantle the bicycle and study of working parts	Assemble the Sewing Machine	Dismantle kick starter assembly of two stroke engine and study its working	Dismantle mixer grinding machine and study the working. Assemble the machine.	Study the working of various parts
	SLO-2					
S 5-6	SLO-1	Assemble the given bicycle	Dismantle and Assemble a Drilling Machine	Assemble the kick starter assembly of two stroke engine	Dismantle washing machine and study the working of various parts	Assemble the Ceiling fan
	SLO-2					

Learning Resources

1. V. Ganesan, Internal Combustion Engines, Tata McGraw-Hill Education. 2004.
2. Karen E. Kunkel "The Complete Sewing Machine Handbook " Sterling, 1999
3. B. L. Theraja "Fundamentals of Electrical Engineering and Electronics", S. Chand, 1997
4. Bosch service manual for corded drills

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	-	40%	-	30%	-	30%	-	30%	-	30%
	Understand										
Level 2	Apply	-	40%	-	40%	-	40%	-	40%	-	40%
	Analyze										
Level 3	Evaluate	-	20%	-	30%	-	30%	-	30%	-	30%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Dr. Ramakrishnan Ekambaram, Robert Bosch, Coimbatore.	1 .Dr. K.Arunachalam, MIT, Chrompet, karunachalam@mitindia.edu	1. Mr.T.Kaviyarasu, SRMIST

ACADEMIC CURRICULA

Mandatory Courses

Regulations - 2018

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

(Deemed to be University u/s 3 of UGC Act, 1956)

Kattankulathur, Kancheepuram, Tamil Nadu, India

Course Code	18PDM101L	Course Name	PROFESSIONAL SKILLS AND PRACTICES	Course Category	M	Mandatory	L	T	P	C
							0	0	2	0

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Career Development Centre	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Utilize success habits to improve achievement in life			
CLR-2 :	Develop inter personal skills and be an effective goal oriented team player to achieve success			
CLR-3 :	Utilize professionalism with idealistic, practical and moral values that govern the behavior			
CLR-4 :	Become an expert in communication and problem solving skills			
CLR-5 :	Re-engineer attitude required to succeed and understand its influence on behavior to achieve professionalism			
CLR-6 :	Enhance holistic development of students and improve their employability skills			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Identify success habits	2	80	75	-	-	-	-	-	-	H	H	H	H	-	H	-	-	-
CLO-2 :	Acquire inter personal skills and be an effective goal oriented team player	2	75	70	-	-	-	-	-	-	H	H	H	H	-	H	-	-	-
CLO-3 :	Develop professionalism with idealistic, practical and moral values	2	80	75	-	-	-	-	-	-	H	H	H	H	-	H	-	-	-
CLO-4 :	Acquire communication and problem solving skills.	2	75	70	-	-	-	-	-	-	H	H	H	H	-	H	-	-	-
CLO-5 :	Re-engineer their attitude and understand its influence on behavior	2	85	80	-	-	-	-	-	-	H	H	H	H	-	H	-	-	-
CLO-6 :	Apply behavior changing elements to construct professionalism in character and behavior	2	85	80	-	-	-	-	-	-	H	H	H	H	-	H	-	-	-

Duration (hour)		6	6	6	6	6
S-1	SLO-1	Personality profiling	Etiquette and Grooming	Surveying and Reporting	Profile building	Innovation
	SLO-2	Being Proactive	Etiquette and Grooming	Surveying and Reporting	Profile building	Innovation
S-2	SLO-1	Begin with the end in mind	Collaborative skills	Projects	Personal Branding	Innovation
	SLO-2	Putting first things first	Collaborative skills	Projects	Personal Branding	Innovation
S-3	SLO-1	Thinking Win-Win	Networking skills	Paper presentations	Personal Branding	Creativity and out of box thinking
	SLO-2	Seeking first to understand and then to be understood	Networking skills	Paper presentations	Personal Branding	Creativity and out of box thinking
S-4	SLO-1	Synergizing	Team work and Support	Introduction to design thinking	USP	Creativity and out of box thinking
	SLO-2	Sharpening the saw	Team work and Support	Introduction to design thinking	USP	Creativity and out of box thinking
S-5	SLO-1	Character building	Leadership Skills	Generate ideas that are potential solutions to the problem identified	Developing profile	Six thinking hats
	SLO-2	IKIGAI	Leadership Skills	Generate ideas that are potential solutions to the problem identified	Developing profile	Six thinking hats
S-6	SLO-1	Self-worth	Leadership Styles	Report writing	Developing profile	Six thinking hats
	SLO-2	Attitude	Leadership Styles	Report writing	Developing profile	Six thinking hats

Learning Resources	*1. Charles Harrington Elstor, Covey Sean, Seven Habits of Highly Effective Teens, New York, Fireside Publishers, 1998*	*2. Thomas A Harris, I am ok, You are ok, New York-Harper and Row, 1972* *3. Carol Dweck, Mindset, The New Psychology of Success, Random House Pub. 2006*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)								Final Examination	
		CLA – 1 (20%)		CLA – 2 (30%)		CLA – 3 (30%)		CLA – 4 (20%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	-	*40%*	-	*30%*	-	*30%*	-	*30%*	-	-
	Understand										
Level 2	Apply	-	*40%*	-	*40%*	-	*40%*	-	*40%*	-	-
	Analyze										
Level 3	Evaluate	-	*20%*	-	*30%*	-	*30%*	-	*30%*	-	-
	Create										
	Total	100 %		100 %		100 %		100 %		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts	
1. Ms. Sudha Mahadevan, Career Launcher, sudha.m@careerlauncher.com	*1. Mr. Nishith Sinha, dueNorth India Academics LLP, nsinha.alexander@gmail.com*	*1. Dr. T. Mythili, SRMIST*	*2. Mrs. B. Revathi, SRMIST*
2. Mr Ajay Zenner, Career Launcher, ajay.z@careerlauncher.com	*2. Dr. Dinesh Khattar, Delhi University, dinesh.khattar31@gmail.com*	*3. Mr. P. Priyanand, SRMIST*	*4. **Mrs.Kavitha Srisarann**,, SRMIST*

Course Code	18LEM101T	Course Name	CONSTITUTION OF INDIA	Course Category	M	Mandatory	L	T	P	C
							1	0	0	0

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Utilize the citizen's rights
CLR-2 :	Utilize the basic citizen's fundamental rights of freedom of speech, expression, equality, religion and privacy
CLR-3 :	Identify the Indian constitutional framework with union parliament, government and their functions and citizen's rights
CLR-4 :	Utilize the States functionality and provisions for the betterment of the individual and society
CLR-5 :	Identify the emergency provisions, the functions of election and public service commissions, identify the tax system
CLR-6 :	Utilize the rights of a citizen both individual and as a society by understanding the constitutional provision and rights

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Identify the basic provisions in the indian constitution	2	80	75	-	-	-	-	-	-	M	H	H	H	-	H	-	-	-
CLO-2 :	List the fundamental rights, rights to equality, freedom, religion, culture, education and the right against exploitation	2	75	70	-	-	-	-	-	-	M	H	H	H	-	H	-	-	-
CLO-3 :	Identify the fundamental duties of the Union of India, President, Vice-President, Union Ministers and Parliament functions	2	80	75	-	-	-	-	-	-	M	H	H	H	M	H	-	-	-
CLO-4 :	Identify the power of states, its legislature, Governors role and the state judiciary	2	75	70	-	-	-	-	-	-	M	H	H	H	M	H	-	-	-
CLO-5 :	List the special provisions and functionality of election commission, public service commission, individual tax and GST	2	85	80	-	-	-	-	-	-	M	H	H	H	H	H	-	-	-
CLO-6 :	Build knowledge on the various aspects in the Indian Constitution, its provisions and right of a citizen and the society	2	85	80	-	-	-	-	-	-	M	H	H	H	M	H	-	-	-

Duration (hour)		6	6	6	6	6
S-1	SLO-1	Meaning of the constitution law and constitutionalism	The Directive Principles of State Policy	President of India (with Powers and Functions)	Governor of the State (with Powers and Functions)	Local Self Government – Constitutional Scheme in India
	SLO-2	Historical perspective of the Constitution of India	Scheme of the Fundamental Right to Equality	Prime Minister of India (with Powers and Functions)	The Chief Minister of the State (with Powers and Functions)	Emergency Provisions : National, President Rule, Financial Emergency
S-2	SLO-1	Salient features and characteristics of the Constitution of India	Scheme of the Fundamental Right to certain Freedom under Article 19	Union Judiciary (Supreme Court) Jurisdiction of the Supreme Court	State Judiciary (High Courts)	Election Commission of India (with Powers and Functions)
	SLO-2	Citizenship	Scope of the Right to Life and Personal Liberty under Article 21	State Government	Union Territories, Panchayats,	The Union Public Service Commission (with Powers and Functions)
S-3	SLO-1	Scheme of the fundamental rights	Union Government, Union Legislature (Parliament)	State Legislature, Legislative Assembly, Legislative Council	Municipalities, Scheduled and Tribal Areas	Amendment of the Constitutional Powers and Procedure
	SLO-2	The scheme of the Fundamental Duties and its legal status	Lok Sabha and Rajya Sabha (with Powers and Functions), Union Executive	Powers and Functions of the State Legislature, State Executive	Co-operative Societies	Income Tax, Goods and Services Tax

Learning Resources	1. Durgadas Basu, Introduction to the Constitution of India,Lexis- Nexis, 2015 2. Subash C Kashyap, Our Parliament, National Books Trust, 2011	3. Kaushal Kumar Agarwal, India's No 1 book on Tax : Simple Language Advanced Problems: Income Tax, Kindle, 2017 4. Vivek K R Agarwal, GST Guide for students: Making GST – Good and Simple Tax, Neelam Book House, 2017

Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)								Final Examination	
		CLA – 1 (20%)		CLA – 2 (30%)		CLA – 3 (30%)		CLA – 4 (20%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*40%*	-	*30%*	-	*30%*	-	*30%*	-	-	-
	Understand										
Level 2	Apply	*40%*	-	*40%*	-	*40%*	-	*40%*	-	-	-
	Analyze										
Level 3	Evaluate	*20%*	-	*30%*	-	*30%*	-	*30%*	-	-	-
	Create										
	Total	100 %		100 %		100 %		100 %		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers				
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts		
1. Dr. Usha Kodandaraman, ABK AOTS, Chenna . drushak@gmail.com	*1 .Dr. S. P.Dhanavel, IITM, Chennai, dhanavelsp@iitm@ac.in*	*1. Dr. K. Anbazhagan, SRMIST*	*3. Dr. Sukanya Saha, SRMIST*	*5. S. Ramya, SRMIST*
2. Mr. Durga Prasad Bokka, TCS Chennai, durgaprasad@tcs.com	*2. Ms. Subashree, VIT, Chennai, subashree@vit.ac.in*	*2. Ms. Cauveri B, SRMIST*	*4. Dr. M. M.Umamaheswari, SRMIST*	

Course Code	18GNM101L	Course Name	PHYSICAL AND MENTAL HEALTH USING YOGA	Course Category	M	Mandatory	L	T	P	C
							0	0	2	0

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Centre for Applied Research in Education	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Utilize rich Indian heritage and knowledge for self-healing and self-protection from diseases*			
CLR-2 :	*Apply meditation for attaining happiness and balancing emotions and state of mind and body*			
CLR-3 :	*Intellectually develop oneself by identifying oneness with divine state and transform towards absolute oneness in space*			
CLR-4 :	*Socially transform into a meaningful and purposeful individual to both self and society*			
CLR-5 :	*Spiritually enlighten oneself by purifying the body, soul and have a blissful existence*			
CLR-6 :	*Achieve personal benefits of whole health and wellbeing by practicing yoga for physical, emotional and mental fitness*			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Identify Indian heritage, culture. Identify key anatomical structures in the human body and basic exercises for the same*	2	80	75	-	M	-	-	-	H	H	H	H	H	-	H	-	-	-
CLO-2 :	*Apply yoga meditation practices for emotional development and wellbeing*	2	75	70	-	M	-	-	-	H	H	H	H	H	-	H	-	-	-
CLO-3 :	*Identify educational and intellectual development methods using five sense realization and transformation*	3	80	75	-	M	-	-	-	H	H	H	H	H	-	H	-	-	-
CLO-4 :	*Demonstrate human values and emotions through thorough understanding about life, naturopathy and food habits*	3	75	70	-	M	-	-	-	H	H	H	H	H	-	H	-	-	-
CLO-5 :	*Impact self and society by peaceful coexistence with self-introspection and balanced diet charts*	3	85	80	-	M	-	-	-	H	H	H	H	H	-	H	-	-	-
CLO-6 :	*Demonstrate yoga exercises and postures to stretch and strengthen the body and mind*	3	85	80	-	M	-	-	-	H	H	H	H	H	-	H	-	-	-

		Physical Development	*Emotional Development*	*Intellectual Development*	*Social Development*	*Spiritual Development*
Duration (hour)		**6**	**6**	**6**	**6**	**6**
S-1	SLO-1	*Indian Heritage & Culture, Concept of Yoga, Objectives, Science & Art of Yoga*	*Brain Functions, Bio-Magnetism, Cognitive Mind*	*Education & Intelligence Development using Yoga. Improving Intelligence*	*Introduction: Social Intelligence*	*Spiritual Connect & Yoga: Self-Realization, Self-Awareness, Self-Actualization*
	SLO-2	*Women and Yoga Practice – Classification, Modern Age, Philosophy of Life*	*Emotional Intelligences, Managing Stress and Emotions*	*Learnability through Concentration, Intelligence through learning sense organs*	*Human values, Ethics & Morality*	*Cause and Effect Realization (Karma Yoga), Harmony in Life*
S-2	SLO-1	*Practice1: Standing exercise, Surya Namaskar*	*Practice4: Surya Namaskar, Standing asanas*	*Practice7: Yoga for Youthfulness (Kayakalpah Yoga)*	*Practice10: Kayakalpha, Bhandas, Meditation (Crown)*	*Practice13: Management of Physical problems (Yoga therapy)*
	SLO-2	*Meditation (Self Realization), Relaxation*	*Meditation (Five Sense Realization), Relaxation*	*Meditation (Five Sense Realization), Relaxation*	*Self-introspection Practice (Moralization of Desire) & Relaxation*	*Meditation (Nine centre) & Relaxation*
S-3	SLO-1	*Physical Health: Body Structure, Diseases and Causes, Science of Human Body*	*Meditation for Emotional development: Eyebrow Center (Agna) Meditation*	*Theory of Intellectual Transformation: Divine state origin, absolute space,*	*Exercises for Self-Introspection: Analysis of thoughts, Moralization of desires*	*Spiritual Enlightenment*
	SLO-2	*Yoga &Youthfulness. Benefits, Comparison between other exercises and Yoga*	*Genetic Centre (Santhi) Meditation. Stress Relaxation Exercises*	*Transformation of universe, living beings, Intelligence, Knowledge, Wisdom & Peace*	*Anger Management, Eradicating worries, concerns & challenges*	*Purifying the Body (Genetic center)*
S-4	SLO-1	*Practice2: Surya Namaskar, Sitting Exercises*	*Practice5: Surya Namaskar, Sitting asanas,*	*Practice8: Kayakalpha Yoga, Pranayama*	*Practice11: Kayakalpha Yoga, Krisya Yoga*	*Practice14: Project Submission*
	SLO-2	*Meditation (Self Realization) – Relaxation*	*Meditation (Agna) & Relaxation*	*Meditation (Agna) - Relaxation*	*Yoga Mudhras, Meditation (Santhi) & Relaxation*	*Meditation, Introspection, Sublimination*
S-5	SLO-1	*Exercises: Hands, Legs, Neuro-Muscular breathing, Eye, Ears, Nostrils, kidney, brain*	*Asanas (Postures) for Body Structure: Full Body Structure Maintenance*	*Exercises: Intellectual development Brain Crown Centre (Thuriyam) Meditation*	*Therapy for Social Development: Gestures Yoga (Mudhras) – Body locks (Bhandhas)*	*Spirituality for Stress Management*
	SLO-2	*digestive tract, stomach, lungs, spine, hip, neck. Pressure points in our body*	*Standing, Sitting, Prone & Supine Posture, Benefits of asanas*	*Five Senses (Panchendriya) Meditation, Consciousness and Law of nature*	*Indian Medical System: Naturopathy, Food, Nutrition, Diet Chart for Youthfulness*	*Yoga Practices for blissful existence*
S-6	SLO-1	*Practice3: Prone & Supine posture Exercises*	*Practice6: Surya Namaskar, Prone & Supine posture Asanas*	*Practice9: Kayakalpha, Mudhras, Self-introspection Practice (Thought Analysis)*	*Practice12: Balancing Asanas,*	*Practice15: Practical Exam*
	SLO-2	*Meditation (Self Realization) – Relaxation*	*Meditation (Shanthi) & Relaxation*	*Meditation (Santhi), & Relaxation*	*Meditation (Crown) & Relaxation*	*Meditation & Relaxation*

Learning Resources	1. *Sadhguru Jaggi Vasudev, Inner Engineering – A yogi's guide to joy, 2016* 2. *Shri Shri Ravi Shankar, The Art of stress-free Living, 2011* 3. *Swami Ramdev Ji Yog Its Philosophy and Practice, 2008* 4. *Yogiraj Vethathiri Maharishi, Yoga for Modern Age, Tenth edition, Vethathiri Publications, 2007* 5. *Yogiraj Vethathiri Maharishi, Simplified Physical Exercises, Forty Second edition, Jan-2014*	6. *Vivekananda Kenthria Prkasan Trust, Yogam, 2006* 7. *Swami Chetanananda, Meditation and Its Methods According to Swami Vivekananda, Jan 2001* 8. *Dr. Lakshminarain Sharma, Yoga for the cure of Common Diseases, Mar 2016* 9. *Swami Satyananda Saraswati, Asana Pranayama Mudra Bandha, Bihar School of Yoga, 1993* 10. *Dr. Asana Andiappan, Thirumoolar's Astanga Yoga, International Yoga Academy, 2017*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)								Final Examination	
		CLA – 1 (20%)		CLA – 2 (30%)		CLA – 3 (30%)		CLA – 4 (20%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	-	*40%*	-	*30%*	-	*30%*	-	*30%*	-	-
Level 2	Apply Analyze	-	*40%*	-	*40%*	-	*40%*	-	*40%*	-	-
Level 3	Evaluate Create	-	*20%*	-	*30%*	-	*30%*	-	*30%*	-	-
	Total	*100 %*		*100 %*		*100 %*		*100 %*		-	

 # CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Mr. K. Sivakumar, LIC of India, ksivalic1970@gmail.com	*1. Dr. R. Elangovan, Tamilnadu Physical Education and Sports University, relangovantnpesu@yahoo.co.in*	*1. Dr. V. Nithyananthan, SRMIST*
2. Mrs. R. Piramukutty, World Community Service Centre, piramukutty.gdvmvkm@gmail.com	*2.Dr. N. Perumal, Vethathiri Maharishi Institute for Spiritual and Intuitional Education, visionacademy@vethathiri.edu.in*	*2. Dr. S. Jahira Parveen SRMIST*

Course Code	18LEM102J	Course Name	VALUE EDUCATION	Course Category	M	Mandatory	L	T	P	C
							1	0	1	0

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English and Foreign Languages	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Connect the learners to their potential, identify their potential to create a new positive world*			
CLR-2 :	*Analyze the merits and demerits of different educational systems. Identify the different systems of education*			
CLR-3 :	*Draw attention towards the weaknesses they are susceptible to and inspire them through positive models*			
CLR-4 :	*Instill a sense of professional ethics which help them develop a safe comfortable and prosperous society*			
CLR-5 :	*Cultivate a spirit of willing accommodation in an increasingly diverse world*			
CLR-6 :	*Strengthen, enhance the spirit of positivity and facilitate positive contribution in various spheres of life*			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Equipped with an awareness of their positive energy and power*	2	80	75	L	M	-	-	M	H	-	H	H	H	-	H	-	-	-
CLO-2 :	*Identify the meaning of 'education'; have a clearer and better understanding in taking education to the masses*	2	75	70	M	H	M	-	H	H	M	M	H	H	-	H	-	-	-
CLO-3 :	*Assess their weaknesses; understand risks involved and rectify them through learning from positive and negative instances*	2	80	75	M	-	-	-	M	H	M	M	H	H	-	H	-	-	-
CLO-4 :	*Realize their professional responsibilities*	2	75	70	H	M	-	-	H	H	H	H	H	H	-	H	-	-	-
CLO-5 :	*Acquire the required values in an expanding pluralistic world not be swept off their feet due to the rapid changes*	2	85	80	M	-	-	-	H	H	H	H	H	H	-	H	-	-	-
CLO-6 :	*Equip with better understanding of themselves, society they live. Identify responsibilities in creating a peaceful world*	2	80	75	M	M	-	-	H	H	H	H	H	H	-	H	-	-	-

		Visions for Youth	*Youth and Education*	*Youth and Society*	*Youth as Professionals*	*Youth in Pluralistic Society*
Duration (hour)		**6**	**6**	**6**	**6**	**6**
S-1	SLO-1	*Introduction*	*Meaning and the significance of education*	*Need for social values in the present context*	*Introduction to professional values*	*Introduction to pluralistic society, forces of globalization*
	SLO-2	*Quiz*	*Brainstorming*	*Poem – "Where the mind is without fear" Write up on various instances from real life*	*Brainstorming through visual cues*	*Group Discussion*
S-2	SLO-1	*Two speeches by great personalities*	*Overview of different (traditional, modern) educational systems*	*Individual and group behavior, respect for others*	*Engineering societies in India*	*Science and technology intercultural proximity*
	SLO-2	*Oral presentations*	*Debate*	*Case study on recent happenings*	*Quiz*	*Narration of stories from various religions to illustrate the oneness of humanity*
S-3	SLO-1	*Quotes, proverbs relating to the power and potential of youth, Excerpts: Wings of Fire*	*Overview of different (traditional, modern) educational systems*	*Civic sense, bullying-substance abuse, uses of expletives*	*Challenges to be addressed by Engineers in India*	*Positive, Negative impact: religion, politics, gender, economic status, aesthetics*
	SLO-2	*Collecting proverbs highlighting the potential of youth*	*Debate*	*Case study on recent happenings*	*Case Study*	*Discussion on "To Kill a Mocking Bird"*
S-4	SLO-1	*Two news articles highlighting the initiatives for social causes by youth*	*Role of youth in education, Urban and Rural set up, dissemination*	*Hero worship, gender insensitivity, moral policing*	*Challenges in different sectors: agriculture*	*Values required to live in a global society*
	SLO-2	*Role play in a similar context*	*Student presentations*	*Case study on recent happenings*	*Case Study*	*Poster presentation on festivals of various religions*
S-5	SLO-1	*Two news articles highlighting the initiatives for social causes by youth*	*Designing and framing educational curriculum and materials*	*Positive contribution by youth in promoting social welfare*	*Challenges in different sectors: urban development, environment*	*Learning the etiquettes of various societies*
	SLO-2	*Role play in a similar context*	*Students' Presentation based on write ups*	*Short videos followed by discussions*	*Group activity (oral and written)*	*Poster presentation on festivals of various religions*
S-6	SLO-1	*One song exhibiting the positive energy of youth*	*The pressing challenges in current educational system*	*Positive contribution by youth in promoting social welfare*	*Challenges in different sectors: sustainable development, cyber security*	*Success of pluralistic society, enliven the society, religious harmony through literary*
	SLO-2	*Discussion on the song*	*Collage Design*	*Short videos followed by discussions*	*Case Study – from Newspapers*	*Writing the aspects of pluralistic society based on the text*

Learning Resources	*1. Kalam, APJ Abdul. Wings of Fire: AN Autobiography of APJ Abdul Kalam. Ed. Sangam Books Ltd., 1999* *2. "Banaras Hindu University Speech" and "To Students". The Voice of Truth. General Editor Shriman Narayan. Navajivan Publishing House. pp. 3-13 and pp. 425-30. www.mkgandhi.org* *3. Piroda, Sam. "Challenges in Science and Technology". www.nfdindia.org/loc19.htm*	*4. Thomas A Address to VTU Students by Narayana Murthy. https://www.karnataka.com/personalities/narayana-murthy/vtu-address-2006/* *5. World Economic forum. "India's top 7 challenged from skills to water scarcity*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)								Final Examination	
		CLA – 1 (20%)		CLA – 2 (30%)		CLA – 3 (30%)		CLA – 4 (20%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	*20%*	*20%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	-	-
	Understand										
Level 2	Apply	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	-	-
	Analyze										
Level 3	Evaluate	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	-	-
	Create										
	Total	100 %		100 %		100 %		100 %		-	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts		
1. Dr. Usha Kodandaraman, ABK AOTS, drushsk@gmail.com	*1. Dr. S. P.Dhanavel, IIT Madras, dhanavelsp@iitmac.in*	*1. Dr .K.Anbazhagan, SRMIST*	*2. Dr. B. Cauveri, SRMIST*	
2. Mr. Durga Prasad Bokka, TCS, durgaprasad@tcs.com	*2. Ms. Subashree, VIT, Chennai, subashree@vit.ac.in*	*3. Dr. M. M.Umamaheswari, SRMIST*	*4. Dr. Sukanya Saha, SRMIST*	*5. Ms .S. Ramya, SRMIST*

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

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Kattankulathur, Kancheepuram 603203, Tamil Nadu, India