

Annexure 1

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23MA1T1	CALCULUS AND DIFFERENTIAL EQUATIONS	3	1	0	4

PRE-REQUISITES	-----
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COURSE OBJECTIVES	
1	To classify the concept of matrices to solve engineering problems.
2	To make use of the concepts of differentiation for problems under multivariable functions.
3	To identify suitable integral techniques to find area and volume.
4	To interpret the concepts of vector point functions and related identities for solving problems under vector calculus.
5	To solve linear differential equations and apply for physical situations.

COURSE CONTENT		
Unit – I	MATRICES	9 + 3
Eigen values and Eigen vectors – properties (without proof) – Cayley Hamilton theorem (Without proof) –Diagonalization using orthogonal transformation.		
Unit – II	FUNCTIONS OF SEVERAL VARIABLES	9 + 3
Partial derivatives – Total derivative – Jacobians - Taylor's series expansion – Extreme values of functions of two variables – Lagrange's multipliers method.		
Unit – III	MULTIPLE INTEGRALS	9 + 3
Double integrals– Change of order of integration – Triple integrals – Applications in area and volumes.		
Unit – IV	LINE AND SURFACE INTEGRALS	9 + 3
Gradient, Divergence and curl– Directional Derivative – Irrotational and solenoidal vector fields – Green's theorem – Green's theorem in a plane – Gauss divergence theorem – Stokes theorem (excluding proof).		
Unit - V	ORDINARY DIFFERENTIAL EQUATION	9 + 3
Second and higher order linear differential equations with Constant coefficients – Variable coefficients – Euler Cauchy equation – Legendre's equation – Method of variation of Parameters – Simple Applications.		
Lecture: 45 Periods		Tutorial: 15 Periods
		Total: 60 Periods

TEXT BOOKS

1	Jain R.K and Iyengar S.R.K, “Advanced Engineering Mathematics”, 5 rd Edition, Narosa Publishing House, New Delhi, Reprint 2019.
2	Ramana B.V., “Higher Engineering Mathematics”, Tata Mcgraw Hill Publishing Company, New Delhi, 2017.
3	Kreyszig E., “Advanced Engineering Mathematics”, 10th Edition, John Wiley Sons, 2012.(E-BOOK)
4	Glyn James., “Advanced Modern Engineering Mathematics”, Pearson Education Limited, 2018.
5	N P Bali, Manish Goyal, “A Text Book of Engineering Mathematics”, 9rd Edition, Laxmi Publication Private Limited, 2010.

BOOK REFERENCES

1	K.K.Vadivelu, “Engineering Mathematics – I”, VRP Publishers Pvt Ltd, New Edition - 2017-18, Chennai.
2	Prof. A. Chandrasekar – “Engineering Mathematics – I” , Vishnu prints Media , New Edition -2017-18, Chennai.
3	Dr.S.Chitra, Dr.S.Isaiyarasi- “Engineering Mathematics – I”,Sri Krishna Hitech Publishing Company Pvt Ltd, Revised Edition 2018-19, Chennai
4	Dr.S.Vallinayagam, Dr.S.Annadurai, Dr. T.Kalyani, “Engineering Mathematics – I”, Airwalk Publications, Third Edition – 2019, Chennai.
5	Prof. A. Chandrasekar – “Engineering Mathematics – II” , Vishnu prints Media , Revised Edition -2019-20, Chennai.

E-RESOURCES

1	https://www.slideshare.net/mailrenuka/matrices-and-application-of-matrices
2	https://youtu.be/wtuq1oSBuE
3	https://www.slideshare.net/abhinavsomani3/applications-of-maths-in-our-daily-life-41607055

COURSE OUTCOMES (CO)

After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Classify the concept of matrices to solve engineering problems.	K3	1
CO2	Make use of the concepts of differentiation for problems under multivariable functions.	K2	2
CO3	Identify suitable integral techniques to find area and volume.	K3	3
CO4	Interpret the concepts of vector point functions and related identities for solving problems under vector calculus.	K2	4
CO5	Solve linear differential equations and apply for physical situations.	K3	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 - Creating			

COURSE ARTICULATION MATRIX (CAM)													
COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	-	-	1	3	3	-	2	-	-
CO2	3	3	3	3	-	-	1	3	3	-	2	-	-
CO3	3	3	3	3	-	-	1	3	3	-	2	-	-
CO4	3	3	3	3	-	-	1	3	3	-	2	-	-
CO5	3	3	3	3	-	-	1	3	3	-	2	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

CO WISE DIRECT ASSESSMENT PATTERN										
Assessments			Maximum Marks					Total Marks	Marks Conversion	
			CO1	CO2	CO3	CO4	CO5			
CIA	CAT I	Part A	8	8	4	--	--	20	200 to 30	<u>CIA:</u> 40
		Part B	32	32	16	--	--	80		
		Total (a)	40	40	20	--	--	100		
	CAT II	Part A	--	--	4	8	8	20		
		Part B	--	--	16	32	32	80		
		Total (b)	--	--	20	40	40	100		
	Other Assessment	Total (c)	8	8	8	8	8	40	40 to 10	
ESE	End Semester Examinations – Theory	Part A	4	4	4	4	4	20	100 to 60	<u>ESE:</u> 60
		Part B	16	16	16	16	16	80		
		Total (d)	20	20	20	20	20	100		
Total Marks (a + b + c + d)			68	68	68	68	68	340	100	

INDIRECT ASSESSMENT	COURSE END SURVEY
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Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23EN1LT2	COMMUNICATIVE ENGLISH	3	0	2	4

PRE-REQUISITES	-----
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COURSE OBJECTIVES	
1	To Infer the communication skills with error-free strategies.
2	To Construct the effectiveness of soft skills.
3	To Classify the stress and intonation in public speaking.
4	To Enhance in reading and writing skills.
5	To Take part in Public speaking

THEORY COURSE CONTENT		
Unit – I	LANGUAGE INTROSPECTION	9
GRAMMAR COMPONENTS: Vocabulary Building - Word Formation – Prefixes and Suffixes– ‘Wh’ questions and Yes or No questions. LINGUISTIC FUNCTIONS: Short comprehension Passages –Skimming and Scanning-Developing hints		
Unit – II	SOFT SKILLS	9
GRAMMAR COMPONENTS: Sentence structures- Punctuation – Kinds of sentences - Subject-verb Agreement. LINGUISTIC FUNCTIONS: Introducing and Sharing Information from Newspaper including Dialogues and Conversations– Short Narrative Descriptions – Paragraph Writing – Greeting- Jumbled Sentences		
Unit – III	CAREER GUIDANCE	9
GRAMMAR COMPONENTS: Single-word substitutes –Pronouns – Degrees of Comparison LINGUISTIC FUNCTIONS: Reading Comprehension – Verbal and Non-verbal Communication – Public Speaking - Describing and Classification of Different Kinds of Innovation – Narration Act. (Language through Literature)- Negotiation Skills.		
Unit – IV	TECHNICAL WRITING	9
GRAMMAR COMPONENTS: Articles-Modal Verbs – Uses of Prepositions (of Time, Place, Direction and Spatial Relations) LINGUISTIC FUNCTIONS: Preparing Instructions and Manuals - Reporting Events and Research – Writing Recommendations – Interpreting Diagrammatic Representations, esp. Bar Graphs and Pie Charts.		
Unit - V	BUSINESS CORRESPONDENCE	9
GRAMMAR COMPONENTS: Numerical Adjectives –Phrases and Clauses- Synonyms and Antonyms- Different Tense Forms of Verbs. LINGUISTIC FUNCTIONS: Writing short Essays- Dialogue Writing- Technical and Business Proposals – Role play – Narrating Incidents – Extempore and persuasive speech- Conversations - Telephonic Conversations.		
Lecture: 45 Periods		Tutorial: -
		Theory Total: 45 Periods

LABORATORY COURSE CONTENT		
Ex.No.	Experiment / Exercise	CO
1	Self-introduction and introducing others	CO2
2	Negotiation Skills	CO3
3	Public Speaking	CO3
4	Body Language	CO3
5	Narrating incidents	CO3
6	Telephonic Conversation	CO5
7	Representations	CO4
8	Technical Proposals	CO5
Practical: 30 Periods		Laboratory Total: 30 Periods

TEXT BOOKS

1	Communicative English by KN Shoba Lourdes Joavani Rayen., 2017
2	Objective Advanced Student's Book with answers, Felicity O'Dell Annie Broadhead.,2019
3	Interchange by Jack C. Richards with Jonathan Hull and Susan Proctor., 2019
4	Communicative English, DR. J. Anbazhagan., 2020
5	Professional English – I, Dr. R. Rajeswari, Dr. Peter Dominic Ryan, Dr. K. Krishnamoorthy., 2022

REFERENCE BOOKS

1	Communicative English I Paperback – 1 January 2020by <u>Dr.A.Ganesan</u> (Author), <u>P.LovelyVinoliya Paul</u> (Author)
2	Teaching Communicative English By <u>Dr.N.BadhriPh.D(Eng.),Ph.D(Edn.)</u> , 2021.
3	Communicative English By S. KannanPadmasani , 2019.
4	Technical English 1 Paperback – 15 December 2019 by Prof. RavindraNath Tiwari (Author)
5	Developing English Language Skills-I: (NEP 2020 for the University of Delhi) by Pooja Khanna
6	Technical English – I by Prof. RavindraNath Tiwari,2020.

E-RESOURCES

1	https://youtu.be/x60GHpQ8gJk?list=PLWPirh4EWFpFIEISxpIDIEhRDZHkBD-0n
2	https://youtu.be/BO7j-X87rM8
3	https://youtu.be/cyXADWE7KP0

COURSE OUTCOMES (CO)				
After Successful completion of the course, the students should be able to		RBT Level	Theory Unit	Lab Ex.
C01	Infer the communication skills with error-free strategies.	K2	1	1
C02	Construct the effectiveness of soft skills.	K3	2	6, 8
C03	Classify the stress and intonation in public speaking.	K4	3	4, 7
C04	Enhance in reading and writing skills.	K3	4	5
C05	Take part in Public speaking	K4	5	3
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 – Creating				

COURSE ARTICULATION MATRIX (CAM)													
COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01									3		3		
C02									3		3		
C03									3		3		
C04									3		3		
C05									3		3		
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23PH1LT3	ENGINEERING PHYSICS	3	1	2	5

PRE-REQUISITES	-----
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COURSE OBJECTIVES	
1	To apply fundamental concepts and techniques of crystals.
2	To develop the extensive properties of solid materials.
3	To show the principles of thermodynamics and relate with real time applications.
4	To analyze the properties of the Laser beam
5	To explain the advanced technical methods by assessing the fibre optics.

THEORY COURSE CONTENT		
Unit – I	CRYSTAL PHYSICS	9+3
Unit cell-Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - growth of single crystals: solution and melt growth techniques.		
Unit – II	PROPERTIES OF MATTER	9+3
Hooke's Law - Stress-Strain Diagram - Elastic moduli - Poisson's Ratio - Expression for bending moment of beam and depression of Cantilever - Expression for Young's modulus by Non-uniform bending and its experimental determination.		
Unit – III	THERMAL PHYSICS	9+3
Transfer of heat energy - thermal conduction, convection and radiation – heat conduction in solids – thermal conductivity - Lee's disc method - theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.		
Unit – IV	LASER TECHNOLOGY	9+3
Laser characteristics -Spontaneous emission and stimulated emission-Einstein's coefficients-Pumping methods- Components of a laser -CO ₂ laser-Solid state laser(Nd:YAG)-Semiconductor diode lasers –Application of laser in science and technology.		
Unit - V	FIBER OPTICS	9+3
Fiber optical communication system – Structure of an optical fiber- Numerical aperture and acceptance angle- Classification of optical fibers (Materials, modes and refractive index profile)- Displacement and temperature sensor- Medical Endoscopy.		
Lecture: 45 Periods		Tutorial: 15 Periods
		Total: 60 Periods

LABORATORY COURSE CONTENT		
Ex.No.	Experiment / Exercise	CO
1	Determination of young's modulus by non- uniform bending.	CO2
2	Determination of young's modulus by uniform bending.	CO2
3	Torsional pendulum - determination of moment of inertia and rigidity modulus.	CO2

4	Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.	CO1
5	Determination of Wavelength, and particle size using Laser.	CO4
6	Determination of band gap of a semiconductor.	CO3
7	Air wedge – determination of thickness of a thin wire.	CO5
8	Determination of acceptance angle and numerical aperture of an optical fiber.	CO5
Practical: 30 Periods		Laboratory Total: 30 Periods

TEXT BOOKS

1	Avadhanulu M N, Kshirsagar P G and Arun Murthy TVS, “A Text book of Engineering Physics”, 2 nd Edition, S Chand Publishing, New Delhi, 2022
2	Dr.P.Mani “ A Text book of Engineering Physics”, Dhanam Publications., Chennai., 2022.
3	Dr.G.Senthilkumar “ Engineering Physics-1” Revised & Animated Version, VRB Publishers Pvt.Ltd., 2017
4	Dr.R.Suresh “ A Text book of Engineering Physics”, 2 nd Edition, Sri Krishna Hi-tech Publishing Pvt, Ltd., Chennai, 2019.
5	Dr.M.Arumugam “ A Text book of Engineering Physics”, Anuradha Publications., Chennai., 2020.

REFERENCE BOOKS

1	Bhattacharya, D.K. & Poonam, T. “Engineering Physics”. Oxford University Press, 2015
2	Halliday, D., Resnick, R. & Walker, J. “Principles of Physics”. Wiley, 2015.
3	Serway, R.A. & Jewett, J.W. “Physics for Scientists and Engineers”. Cengage Learning, 2010.
4	Tipler, P.A. & Mosca, G. “Physics for Scientists and Engineers with Modern Physics”. W.H. Freeman, 2007.

E-RESOURCES

1	https://nptel.ac.in/courses/115/105/115105099/
2	https://nptel.ac.in/courses/115/106/115106061/
3	https://www.youtube.com/watch?v=_JOchLyNO_w
4	https://www.journals.elsevier.com > Journals
5	https://nptel.ac.in/courses/118/104/118104008/

COURSE OUTCOMES (CO)

After Successful completion of the course, the students should be able to		RBT Level	Theory Unit	Lab Ex.
CO1	Apply the fundamental concepts and techniques for synthesizing crystals.	K3	1	4
CO2	Develop the extensive properties of solid materials to use it in material fabrication field.	K3	2	1,2,3
CO3	Clarifying the principles of thermodynamics and apply it in real systems.	K2	3	6

CO4	Analyze the properties of the Laser beam and apply it in industrial and medical field.	K4	4	5
CO5	Explain the advanced technical methods by assessing the fiber optics.	K2	5	7,8
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 – Creating				

COURSE ARTICULATION MATRIX (CAM)													
COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1	2	-	1	3	2	1	2	-	-
CO2	3	2	2	2	2	-	1	3	2	1	2	-	-
CO3	3	2	2	1	2	-	1	3	2	1	2	-	-
CO4	3	2	2	2	2	-	1	3	2	1	2	-	-
CO5	3	2	2	1	2	-	1	3	2	1	2	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23CY1LT4	ENGINEERING CHEMISTRY	3	1	2	5

PRE-REQUISITES	23CY1LT4 – ENGINEERING CHEMISTRY
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COURSE OBJECTIVES	
1	To recognize water hardness, its treatments and solutions for boiler-related issues.
2	To explain the types of fuels, properties and their applications.
3	To describe the working principles and their applications of energy storage devices.
4	To apply various spectroscopic techniques for the identification and analysis of chemical compounds.
5	To understand the properties and applications of polymers, plastics, and nanomaterials for industrial and engineering uses.

THEORY COURSE CONTENT		
Unit – I	WATER CHEMISTRY	9 + 3
Hardness of water – Types – Units – Boiler troubles (Scale and Sludge, Priming and Foaming and Caustic Embrittlement) – Treatment of boiler feed water – Internal treatment (Phosphate, Colloidal and Calgon conditioning) and External treatment (Ion exchange process and Zeolite process) – Desalination of brackish water – Reverse Osmosis.		
Unit – II	FUELS	9 + 3
Fuels: Introduction - Classification of fuels – Coal – Analysis of coal (Proximate and Ultimate Analysis) - Carbonization - Manufacture of metallurgical coke (Otto Hoffmann method) - Petroleum – Bergius Process - Knocking - Octane number - Diesel oil - Cetane number - Natural gas - Compressed natural gas (CNG) - Liquefied petroleum gases (LPG) - Power alcohol.		
Unit – III	BATTERIES AND FUEL CELLS	9 + 3
Batteries - Types of batteries – primary battery - dry cell. Secondary battery - lead acid battery, Nickel- Cadmium battery - Lithium Batteries - Fuel cells – Hydrogen -Oxygen fuel cell. - Solar energy conversion - solar cells – Application.		
Unit – IV	SPECTROSCOPY	9 + 3
Introduction – Laws of spectroscopy - Block diagram, Instrumentation, Working and application of Visible spectroscopy and Ultra Violet spectroscopy – Infrared spectroscopy – Flame photometry – Atomic adsorption spectroscopy.		
Unit - V	ENGINEERING MATERIALS	9 + 3
Polymer – Types of polymerization – Preparation, properties, uses of Nylon (6,6), Poly Vinyl Chloride (PVC). Plastics – Types - Rubbers – SBR – Nanomaterials – Synthesis and its applications of Nanomaterials. Abrasives – Classification, Properties - Manufacture of SiC.		
Lecture: 45 Periods	Tutorial: 15 Periods	Total: 60 Periods

LABORATORY COURSE CONTENT		
Ex.No.	Experiment / Exercise	CO
1	Estimation of total hardness in water by EDTA method.	1
2	Determination of viscosity coefficient of a given oil/polymer / using Ostwald viscometer.	5
3	Estimation of ferrous ammonium sulphate (FAS) using potassium dichromate solution potentiometrically.	3
4	Estimation of sodium / potassium present in water using photometer.	4
5	Synthesis of polymer (phenol formaldehyde or urea formaldehyde resins).	5
6	Coductometric estimation of strong acid and weak acid from a given mixture.	3
7	Determination of chloride content of water sample by Argentometric method.	1
8	Determination of strength of given hydrochloric acid using PH meter.	3
Practical: 30 Periods		Laboratory Total: 30 Periods

TEXT BOOKS

1	P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
2	Michael.J.Hollas, "Modern spectroscopy", 4th Edition, John Wiley & Sons, Ltd. 2004
3	Robert O. Ebewe, "Polymer science and technology", CRC press LLC, New York, 2000
4	S.S Dara and S.S. Umare ` A Textbook of Engineering Chemistry for Anna University', S.Chand Publication, 2020
5	Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019

REFERENCE BOOKS

1	"Engineering Chemistry" by Dr.A.Ravikrishna, Sri Krishna Hi Tech Publishing Company, 2021
2	"Experiments In Engineering Chemistry" – Payal B Joshi, I.K. International Publishing House. 2016
3	Group Theory and Spectroscopy by Pragati Prakashan Alka L Gupta and Mukesh Kumar Alka L Gupta and Mukeshkumar ,2021
4	Anil Kumar P.V Polymer Chemistry, First Edition -2021
5	Agarwal Shikha, Engineering Chemistry, Cambridge University Publications 2015.

E-RESOURCES

1	https://sctevtodisha.nic.in/wp-content/uploads/2021/03/Engineering-Chemistry-1ST-YEAR-LM.pdf
2	https://www.youtube.com/watch?v=Fyq4Q5yWDDU&list=PLyqSpQzTE6M927gXIZdVbbsyj9cmxam-b
3	https://www.youtube.com/watch?v=nh2xbyOaERw
4	https://archive.nptel.ac.in/courses/104/106/104106122/
5	https://nptel.ac.in/courses/118104008

COURSE ARTICULATION MATRIX (CAM)

COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	3	3	1	2	-	2	1	2	2	2	2	-	-
C02	3	2	1	1	-	2	1	2	2	2	2	-	-
C03	3	2	2	1	-	3	1	2	2	2	2	-	-
C04	3	2	2	1	1	1	1	2	2	2	2	-	-
C05	3	2	1	2	-	1	1	2	2	2	2	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	23HS1T6	HERITAGE OF TAMILS	1	0	0	1

PRE-REQUISITES	-
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COURSE OBJECTIVES	
1	To understand the extensive literature of Tamil and its classical nature.
2	To summarize the heritage of sculpture, painting and musical instruments of ancient people.
3	To recognize the folk and material arts of Tamil people.
4	To describe the thinai concepts trade and victory of chozha dynasty.
5	To categorize the contribution of tamils in Indian freedom struggle, self-esteem movement and siddha medicine.

COURSE CONTENT		
Unit – I	LANGUAGE AND LITERATURE	3
Language Families in India – Dravidan Languages – Tamil as a Classical Language – Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature-Management Principles in Thirukural – Tamil Epics and Impact of Buddhism and Jainism in Tamil Land – Bakthi Literature Azhwars and Nayanmars – Forms of Minor Poetry – Development of Modern Literature in Tamil- Contribution of Bharathiyar and Bharathidhasan		
Unit – II	HERITAGE –ROCK ART PAINTINGS TO MODERN ART-SCULPTURE	3
Hero stone to modern sculpture – Bronze icons – Tribes and their handicrafts – Art of Temple car making – Massive Terracotta sculptures, Villages deities, Thiruvalluvar Statue at Kanyakumari, Making of Musical instruments – Mirudhangam , Parai, Veenai , Yath and Nadhaswaram – Role of Temples in Social and Economic Life of Tamils		
Unit – III	FOLK AND MARTIAL ARTS	3
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance – Sports and Games of Tamils		
Unit – IV	THINAI CONCEPT OF TAMILS	3
Flora and Fauna of Tamils & Aham and Puram concept from Tholkappiyam and Sangam Literature – Aram concept of Tamils – Education And Literacy during Sangam Age – Ancient Cities and Ports of Sangam Age – Export and Import during Sangam Age – Overseas Conquest of Cholas		
Unit - V	CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE	3
Contribution of Tamils to Indian Freedom Struggle – The Cultural Influence of Tamils over the other parts of India – Self –Respect movement - Role of Siddha Medicine in Indigenous Systems of Medicine –		

Inscriptions and Manuscripts – Print History of Tamil Books			
Lecture: 15 Periods		Tutorial: 0 Periods	Total: 15 Periods

BOOK REFERENCES	
1	Social Life of Tamils(Dr.K.K.Pillai) A joint publication of TNTB and ESC and RMRL – (in print)
2	Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) Published by International Institute of Tamil Studies.
3	The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi) Published by International Institute of Tamil Studies.
4	□□□□□ □□□□ □□ □□□□□□ □□□□ □□ □□ □□□□□□ □□□□□□□□ □□□□ □□□□□□□□
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COURSE OUTCOMES (CO)			
After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Understand the extensive literature of Tamil and its classical nature.	K2	1
CO2	Summarize the heritage of sculpture, painting and musical instruments of ancient people.	K2	2
CO3	Recognize the folk and material arts of Tamil people.	K2	3
CO4	Describe the thinai concepts trade and victory of chozha dynasty.	K2	4
CO5	Categorize the contribution of tamils in Indian freedom struggle, self-esteem movement and siddha medicine.	K2	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 - Creating			

COURSE ARTICULATION MATRIX (CAM)													
COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	3	3	-	2	-	-	-
CO2	-	-	-	-	-	-	3	3	-	2	-	-	-
CO3	-	-	-	-	-	-	3	3	-	2	-	-	-
CO4	-	-	-	-	-	-	3	3	-	2	-	-	-
CO5	-	-	-	-	-	-	3	3	-	2	-	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

CO WISE DIRECT ASSESSMENT PATTERN			
Assessments	Maximum Marks	Total	Marks

			CO1	CO2	CO3	CO4	CO5	Marks	Conversion	
CIA 30 + 10 = 40	CAT I	Part A	8	8	4	--	--	20	200 to 30	<u>CIA:</u> 40
		Part B	32	32	16	--	--	80		
		Total (a)	40	40	20	--	--	100		
	CAT II	Part A	--	--	4	8	8	20		
		Part B	--	--	16	32	32	80		
		Total (b)	--	--	20	40	40	100		
	Other Assessment	Total (c)	8	8	8	8	8	40	40 to 10	
ESE 60	End Semester Examinations – Theory	Part A	4	4	4	4	4	20	100 to 60	<u>ESE:</u> 60
		Part B	16	16	16	16	16	80		
		Total (d)	20	20	20	20	20	100		
			68	68	68	68	68	340	100	

INDIRECT ASSESSMENT	COURSE END SURVEY
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Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. / B.Tech., Common to all	23EN2T1	TECHNICAL ENGLISH	3	0	0	3

PRE-REQUISITES	COMMUNICATIVE ENGLISH
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COURSE OBJECTIVES	
1	To improve personality Interactions.
2	To build self-confidence.
3	To improve social communication skills.
4	To show true personality for strong interactions
5	To speak confidently in any situation.

COURSE CONTENT		
Unit – I	Language Skills	9
<p>GRAMMAR COMPONENTS: Mixed Tenses • Homophones • Homonyms • Words often Confused • Pairs of Words • Texting and SMS language</p> <p>LINGUISTIC FUNCTIONS: -- Professional emails, Email etiquette • Paragraph Construction • Introduction to Presentation • Communication • Note Making • Reading advertisements</p>		
Unit – II	Technical Leadership	9
<p>GRAMMAR COMPONENTS: Abbreviations and Acronyms • Concord • Collocations – Fixed and Semi Fixed Expressions.</p> <p>LINGUISTIC FUNCTIONS: Letters / emails of complaint • Telephoning Skills • Leadership and Team Management • Qualities of a Good Leader • Leadership Styles • Decision Making • Problem Solving • Technical Report Writing</p>		
Unit – III	Business Communication	9
<p>GRAMMAR COMPONENTS: Direct Indirect Speech • Active Passive Voice • Conditional Sentences</p> <p>LINGUISTIC FUNCTIONS: Group Discussions • Letter to the Editor • Checklists • Reading Comprehension Memo • Notices/Circulars Agenda and Minutes of a Meeting.</p>		
Unit – IV	Excel in Interviews	9
<p>GRAMMAR COMPONENTS: Misspelled words • Spot the errors • Vocabulary Development • Guessing Meanings of Words.</p> <p>LINGUISTIC FUNCTIONS: • Recommendations Interviews: Types of Interviews • Preparing Resumes & CV • Covering Letter • Brainstorming.</p>		
Unit - V	Presentation Skills	9

LINGUISTIC FUNCTIONS: Mock Presentation • Job / Internship application – Cover letter & Resume • Casual Conversation • Participating in a Group Discussion • Speeches for special Occasions			
Lecture: 45 Periods		Tutorial: 0 Periods	Total: 45 Periods

TEXT BOOKS

1	Technical Communication by Meenakshi Raman Sangeeta Sharma., 2007
2	Basic Communication Skills, P. Kiranami Dutt Geetha Rajeevan., 2009
3	Complete CAE Student's Books and Answers., 2012
4	Interchange by Jack C. Richards with Jonathan Hull and Susan Proctor., 2018
5	Technical English, DR. J. Anbazhagan., 2018

BOOK REFERENCES

1	Teaching Communicative English By <u>Dr.N.Badhri</u> Ph.D(Eng.),Ph.D(Edn.),. 2021.
2	Communicative English By S. Kannan Padmasani , 2019.
3	Technical English – II by Prof. Ravindra Nath Tiwari,2020.
4	Communication Skills (Sem-2) Edition/Reprint: 2022Author(s): Neelkamal JhalniPublisher: JHUNJHUNUWALAProduct ID: 526288
5	English Communication ISBN: 9789385879036Edition/Reprint: 2023Author(s): Pooja Khanna Publisher: VIKASH PUB HOUSE PVT LTDPProduct ID: 625971

E-RESOURCES

1	https://youtu.be/RkOb-IjkBbw
2	https://youtu.be/8SyZWgzLQSo
3	https://youtu.be/0E9deF06NUU
4	https://youtu.be/CAU2zx2Ri_M?si=jWLM7ZGegmKwO8Ii
5	https://youtube.com/playlist?list=PLyViUDdoFYKypuYyhNF2ZC9xEUE8zDmzx&si=uYKTb1eZGCWwDVon

COURSE OUTCOMES (CO)

After Successful completion of the course, the students should be able to	RBT	Unit
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		Level	
CO1	Learn about personality development to enhance interactions.	K2	1
CO2	Improve skills by cultivating self-confidence.	K4	2
CO3	Increase social abilities by mastering communication.	K2	3
CO4	Reveal true personality for stronger interactions.	K6	4
CO5	Develop the ability to speak confidently in any situation	K6	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 - Creating			

COURSE ARTICULATION MATRIX (CAM)													
COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	-	-
CO2	-	-	-	-	-	-	-	1	2	3	-	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	-	-
CO5	-	-	-	-	-	-	-	1	-	3	-	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

CO WISE DIRECT ASSESSMENT PATTERN										
Assessments			Maximum Marks					Total Marks	Marks Conversion	
			CO1	CO2	CO3	CO4	CO5			
CIA 30 + 10 = 40	CAT I	Part A	8	8	4	--	--	20	200 to 30	CIA: 40
		Part B	32	32	16	--	--	80		
		Total (a)	40	40	20	--	--	100		
	CAT II	Part A	--	--	4	8	8	20		
		Part B	--	--	16	32	32	80		
		Total (b)	--	--	20	40	40	100		
	Other Assessment	Total (c)	8	8	8	8	8	40	40 to 10	
ESE 60	End Semester Examinations – Theory	Part A	4	4	4	4	4	20	100 to 60	ESE: 60
		Part B	16	16	16	16	16	80		
		Total (d)	20	20	20	20	20	100		
				68	68	68	68	68		

INDIRECT ASSESSMENT	COURSE END SURVEY
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Sem	Programme	Course Code	Course Name	L	T	P	C
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II	B.E. / B.Tech., Common to all	23HS2T2	ENVIRONMENTAL SCIENCES	3	0	0	0
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PRE-REQUISITES	23HS2T2 – ENVIRONMENTAL SCIENCES
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COURSE OBJECTIVES	
1	To describe the components of different ecosystems and their interdependencies.
2	To explain the significance of biodiversity and conservation methods.
3	To summarize various types of environmental pollution and propose effective control measures.
4	To develop solutions for managing natural resources sustainably and mitigating over-exploitation issues.
5	To understand the sustainable practices, regulatory framework, including environmental laws and ethics.

COURSE CONTENT		
Unit – I	ENVIRONMENT AND ECOSYSTEMS	9
<p>Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs – Introduction, types, characteristic features, structure and function of the forest ecosystem and aquatic ecosystems (ponds, river and marine).</p> <p>Activity: Study of the ecosystem structure in Cauvery River.</p>		
Unit – II	BIODIVERSITY	9
<p>Introduction to biodiversity - definition: genetic, species and ecosystem diversity – values of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity – endangered and endemic species of India – In-situ and ex- situ conservation of biodiversity.</p> <p>Activity: Study of common plants, insects, birds.</p>		
Unit – III	ENVIRONMENTAL POLLUTION	9
<p>Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Thermal pollution (d) Noise pollution – solid waste management: causes, effects and control measures of municipal solid wastes – Hazardous and biomedical waste management - pollution case studies.</p> <p>Activity: Study of air and water pollution in industry</p>		
Unit – IV	NATURAL RESOURCES	9
<p>Forest resources: over-exploitation, deforestation, – Water resources: Rain water harvesting - watershed management - utilization of surface and ground water, conflicts over water, dams-benefits and problems Food resources: effects of modern agriculture, fertilizer - pesticide problems - Principles of Green Chemistry- Case studies</p> <p>Activity: Tree plantation and maintenance within the campus</p>		
Unit - V	SUSTAINABILITY AND POPULATION	9
<p>From unsustainable to sustainable development – Environmental Impact Assessment (EIA) –environmental ethics: Issues and possible solutions – climate change, acid rain, ozone layer depletion, and case studies – Environment Protection Act 1986 – Air</p>		

(Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act - Environment and Human Health – Value Education – HIV / AIDS – Women and Child Welfare. Activity: Small group meetings about environment and human health in local area peoples and making poster and short films about HIV / AIDS – women and child welfare.		
Lecture: 45 Periods		Total: 45 Periods

TEXT BOOKS	
1	Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science", Pearson International Edition, December 2006.
2	R. Rajagopalan, "Fundamentals of Environmental Studies", OUP India, 2015.
3	Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2015.
4	Daniel B. Botkin and Edward A. Keller, "Environmental Science: Earth as a Living Planet", Wiley, 2005.
5	Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill Education, New Delhi, 2014.

REFERENCE BOOKS	
1	Erach Bharucha, "Environmental Studies for Undergraduate Courses", Third Edition, Orient Blackswan Pvt Ltd (8 March 2021).
2	Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill Education, New Delhi, 2017.
3	E-book: The Sustainable Use of Natural Resources: The Governance Challenge Jennifer Bansard Mika Schröder April 2021.
4	E-book: The Climate Solution: India's Climate-Change Crisis and What We Can Do about it, Mridula Ramesh May 2018.
5	E-book : Biodiversity with Practical Paperback August 2022by Dr. Kalyan Das

E-RESOURCES	
1	https://www.youtube.com/watch?v=LjFt7rICU84&t=6s
2	https://archive.nptel.ac.in/courses/120/108/120108004/
3	https://archive.nptel.ac.in/courses/120/108/120108002/
4	https://archive.nptel.ac.in/courses/103/107/103107215/
5	https://archive.nptel.ac.in/courses/127/106/127106004/

COURSE OUTCOMES (CO)

After Successful completion of the course, the students should be able to		RBT Level	Unit
C01	Describe the components of different ecosystems and their interdependencies.	K2	1
C02	Explain the significance of biodiversity and conservation methods.	K2	2
C03	Summarize various types of environmental pollution and propose effective control measures.	K2	3
C04	Develop solutions for managing natural resources sustainably and mitigating over-exploitation issues.	K3	4
C05	Understand the sustainable practices, regulatory framework, including environmental laws and ethics.	K2	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 – Creating			

COURSE ARTICULATION MATRIX (CAM)													
COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	1	-	-	2	-	3	2	3	2	-	2	-	-
C02	1	-	-	2	-	3	2	3	2	-	2	-	-
C03	1	-	-	2	-	3	2	3	2	-	2	-	-
C04	1	-	-	2	-	3	2	3	2	-	2	-	-
C05	1	2	2	3	-	3	2	3	2	-	2	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. / B.Tech., Common to all	23HS2T3	TAMILS AND TECHNOLOGY	1	0	0	1

PRE-REQUISITES	-
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COURSE OBJECTIVES	
1	To understand the weaving ceramic technology of ancient Tamil people nature.
2	To understand the construction technology, building materials in Sangam period and case studies.
3	To infer the metal process, coin and beads manufacturing with relevant archeological evidence.
4	To realize the agriculture methods, irrigation technology and pearl driving.
5	To understand the knowledge of scientific tamil and tamil computing.

COURSE CONTENT		
Unit – I	WEAVING AND CERAMIC TECHNOLOGY	3
Weaving Industry during Sangam Age-Ceramic technology-Black and Red Ware Potteries(BRW)-Graffiti on Potteries		
Unit – II	DESIGN AND CONSTRUCTION TECHNOLOGY	3
Designing and Structural construction House & Designs in household materials during Sangam Age-Building materials and Hero stones of Sangam Age-Details of Stage Constructions in Silappathikaram-Sculptures and Temples of Mamallapuram-Great Temples of Cholas and other worship places-Temples of Nayaka Period-Type study (Madurai Meenakshi Temple)-Thirumalai Nayakar Mahal-Chetti Nadu Houses,Indo-Saracenic architecture at Madras during British Period		
Unit – III	MANUFACTURING TECHNOLOGY	3
Art of Ship Building-Metallurgical studies-Iron industry- Iron smelting steel-Copper and gold-Coins are source of history- Minting of Coins-Beads making-industries Stone beads- Glass beads- Terracotta beads- Shell beats/bone beats-Archeological evidences-Gem stone types described in Silapathigaram		
Unit – IV	AGRICULTURE AND IRRIGATION TECHNOLOGY	3
Dam ,Tank, ponds, sluice, Significance of Kumizhi Thoempu of Chola Period, Animal Husbandry- Wells designed for cattle use- Agriculture and Agro Processing-Knowledge of Sea- Fisheries-Pearl- Conche diving-Ancient Knowledge of Ocean-Knowledge Specific Society		

Unit - V	SCIENTIFIC TAMIL & TAMIL COMPUTING			3
Development of Scientific Tamil- Tamil computing- Digitalization of Tamil Books- Development of Tamil Software- Tamil Virtual Academy- Tamil Digital Library- Online Tamil Dictionaries- Sorkuvai Project				
Lecture: 15 Periods		Tutorial: 0 Periods		Total: 15 Periods

BOOK REFERENCES	
1	Social Life of Tamils(Dr.K.K.Pillai) A joint publication of TNTB and ESC and RMRL – (in print)
2	Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) Published by International Institute of Tamil Studies.
3	கீழடி வைகை நதி கரையில் சங்க கால நகர நாகரிகம் தொல்லியல் துறை வெளியீடு
4	தமிழக வரலாறு –மக்களும் பண்பாடும் கேகே பிள்ளை (வெளியீடு : தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
5	கணினித் தமிழ் – முனைவர். இல. சுந்தரம் (விகடன் பிரசுரம்)

COURSE OUTCOMES (CO)			
After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Understand the weaving ceramic technology of ancient Tamil people nature.	K2	1
CO2	Understand the construction technology, building materials in Sangam period and case studies.	K2	2
CO3	Infer the metal process, coin and beads manufacturing with relevant archeological evidence.	K2	3
CO4	Realize the agriculture methods, irrigation technology and pearl driving.	K2	4
CO5	Understand the knowledge of scientific tamil and tamil computing.	K2	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 – Creating			

COURSE ARTICULATION MATRIX (CAM)

COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	-	-	-	-	-	-	3	3	-	2	-	-	-
C02	-	-	-	-	-	-	3	3	-	2	-	-	-
C03	-	-	-	-	-	-	3	3	-	2	-	-	-
C04	-	-	-	-	-	-	3	3	-	2	-	-	-
C05	-	-	-	-	-	-	3	3	-	2	-	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

INDIRECT ASSESSMENT	COURSE END SURVEY
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Sem	Programme	Course Code	Course Name	L	T	P	C
II	B.E. CSE / B.Tech IT & AIDS	23MA2T4	ALGEBRA AND NUMBER THEORY	3	1	0	4

PRE-REQUISITES	23MA1T1 – CALCULUS AND DIFFERENTIAL EQUATIONS
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COURSE OBJECTIVES	
1	To understand the fundamental concepts of vector algebra and their role in modern mathematics.
2	To apply orthogonalization method to solve the problems on linear transformation.
3	To determine the accurate and efficient use of advanced algebraic techniques.
4	To use Chinese remainder theorem to solve with two or more simultaneous linear congruences.
5	To apply classical theorems to solve multiplicative functions.

COURSE CONTENT		
Unit – I	VECTOR SPACES	9 + 3
Vector spaces-Subspaces-Linear combinations and linear system of equations-Linear dependence and independence-Bases and dimensions		
Unit – II	LINEAR TRANSFORMATION AND INNER PRODUCT SPACES	9 + 3
Linear transformation-Null spaces and ranges-Dimension theorem-Matrix representation of a linear transformation-Inner product-Norms-Gram Schimdt orthogonalization process		
Unit – III	DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS	9 + 3
Division algorithm – Base - b representations – Number patterns – Prime and composite numbers – GCD– Euclidean algorithm – Fundamental theorem of arithmetic – LCM		
Unit – IV	DIOPHANTINE EQUATIONS AND CONGRUENCES	9 + 3
Linear Diophantine equations – Congruence's – Linear Congruence's - Applications: divisibility tests - Modular exponentiation-Chinese remainder theorem – 2 x 2 linear systems.		
Unit - V	CLASSICAL THEOREMS AND MULTIPLICATIVE FUNCTIONS	9 + 3
Wilson's theorem – Fermat's little theorem – Euler's theorem – Euler's Phi functions – Tau and Sigma functions.		
Lecture: 45 Periods		Tutorial: 15 Periods
		Total: 60 Periods

TEXT BOOKS	
1	Grimaldi, R. P and Ramana, B. V., “ Discrete and Combinatorial Mathematics”, Pearson Eduaction, 5 th Edition, New Delhi, 2007.
2	Koshy, T., —Elementary Number Theory with Applications, Elsevier publications , New Delhi - 2002
3	San Ling and Chaoping Xing, —Coding Theory – A first Course, Cambridge Publications, Cambridge, 2004.
4	David M. Burton , “Elementry Number Theory” Tata MCGRAW – HILL edition sixth edition

REFERENCE BOOKS

1	"Algebraic Number Theory", Second Edition, Richard A.Mollin, 2011.(E-Book)
2	J.H.van Lint, "Introduction to Coding Theory", Third Edition, Springer.
3	Martin Erickson & Anthony Vazzana, "Introduction to Number Theory", Chapman & Hall/CRC, 2007.
4	"Algebraic Number Theory", J.S. Milne, Version 3.08 July 19, 2020.(E-Book)

E-RESOURCES

1	https://www.youtube.com/watch?v=GSpbh94-Cjo
2	https://www.studocu.com/row/document/university-of-engineering-and-technology-lahore/principle-of-marketing/applications-of-complex-numbers-ppt/8436504
3	https://www.slideshare.net/sujathavvv/complex-analysis-208085345
4	https://slideplayer.com/slide/15496011/

COURSE OUTCOMES (CO)

After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Understand the fundamental concepts of vector algebra and their role in modern mathematics.	K2	1
CO2	Apply orthogonalization method to solve the problems on linear transformation.	K3	2
CO3	Determine the accurate and efficient use of advanced algebraic techniques.	K2	3
CO4	Use Chinese remainder theorem to solve a system with two or more simultaneous linear congruences.	K3	4
CO5	Apply classical theorems to solve multiplicative functions.	K3	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 – Creating			

CO WISE DIRECT ASSESSMENT PATTERN

Assessments			Maximum Marks					Total Marks	Marks Conversion	
			CO1	CO2	CO3	CO4	CO5			
CIA	CAT I	Part A	8	8	4	--	--	20	200 to 30	CIA: 40
		Part B	32	32	16	--	--	80		
		Total (a)	40	40	20	--	--	100		
	CAT II	Part A	--	--	4	8	8	20		
		Part B	--	--	16	32	32	80		
		Total (b)	--	--	20	40	40	100		
	Other Assessment	Total (c)	8	8	8	8	8	40	40 to 10	
ESE	End Semester	Part A	4	4	4	4	4	20	100	ESE:

	Examinations – Theory	Part B	16	16	16	16	16	80	to 60	60
		Total (d)	20	20	20	20	20	100		
Total Marks (a + b + c + d)			68	68	68	68	68	340	100	

INDIRECT ASSESSMENT	COURSE END SURVEY
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Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. EEE	23MA2T5	TRANSFORMS, COMPLEX VARIABLES AND FOURIER ANALYSIS	3	1	0	4

PRE-REQUISITES	23MA1T1 – CALCULUS AND DIFFERENTIAL EQUATIONS
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COURSE OBJECTIVES	
1	To apply the concepts of Laplace transformation in core engineering applications.
2	To solve linear differential equations using Laplace transform techniques.
3	To apply the concepts of analytic functions and conformal mapping to transform the functions from z- plane into w- plane.
4	To understand the concept of Z transforms to solve difference equations.
5	To demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications.

COURSE CONTENT		
Unit – I	LAPLACE TRANSFORMS	9 + 3
Laplace transform–Condition for existence– Transform of elementary function– Standard properties (Statement only)–Transform of unit step function– Impulse function –periodic function– Initial and final value theorem.		
Unit – II	INVERSE LAPLACE TRANSFORMS	9 + 3
Inverse Laplace transform – Convolution theorem (without proof) – Standard properties (Statement only) – Second order linear differential equations with constant coefficients.		
Unit – III	ANALYTIC FUNCTIONS	9 + 3
Analytic functions : Cauchy –Riemann equations (Cartesian form) and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Construction of analytic functions – Bilinear transformations-Conformal mapping $w = z + a, w = az, w = \frac{1}{z}$		
Unit – IV	Z TRANSFORMS	9 + 3
Z-transforms- Elementary properties (statement only)- Inverse Z-transform (using partial fractions and residues)- Initial and final value theorems- Convolution theorem (without proof)- Formation of difference equations-Solution of difference equations using Z-transform.		
Unit - V	FOURIER SERIES	9 + 3
Dirichlet's conditions- General Fourier series- Odd and even functions- Half range series- Parseval's identity- Harmonic analysis.		
Lecture: 45 Periods		Tutorial: 15 Periods
		Total: 60 Periods

TEXT BOOKS	
1	Andrews, L.C and Shivamoggi, B, "Integral Transforms for Engineers" SPIE Press, 1999.

2	Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna Publishers, New Delhi, 2014.
3	Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
4	Glyn James., "Advanced Modern Engineering Mathematics", Pearson Education Limited, 2018.
5	Erwin Kreyszig, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, India, 2016.

BOOK REFERENCES

1	Narayanan S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998
2	Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 5 th Edition, Narosa Publishing House, New Delhi, Reprint 2019.
3	Dr.A.Singaravel – "Engineering Mathematics – II", Meenakchi Agency, Revised Edition -2019-20, Chennai.
4	Dr.G.Balaji – "Engineering Mathematics – II", G.Balaji Publishers, Revised Edition - 2019-20, Chennai.

E-RESOURCES

1	https://www.studocu.com/row/document/university-of-engineering-and-technology-lahore/principle-of-marketing/applications-of-complex-numbers-ppt/8436504
2	https://www.slideshare.net/sujathavvv/complex-analysis-208085345
3	https://slideplayer.com/slide/15496011/

COURSE OUTCOMES (CO)

After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Apply the concepts of Laplace transformation in core engineering applications.	K3	1
CO2	Solve linear differential equations using Laplace transform techniques.	K3	2
CO3	Apply the concepts of analytic functions and conformal mapping to transform the functions from z- plane into w- plane.	K3	3
CO4	Understand the concept of Z transforms to solve difference equations.	K2	4
CO5	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications.	K2	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 – Creating			

COURSE ARTICULATION MATRIX (CAM)													
COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	3	2	-	-	-
CO2	3	3	3	3	-	-	-	1	3	2	-	-	-
CO3	3	3	3	3	-	-	-	1	3	2	-	-	-
CO4	3	3	3	3	-	-	-	1	3	2	-	-	-
CO5	3	3	3	3	-	-	-	1	3	2	-	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

CO WISE DIRECT ASSESSMENT PATTERN										
Assessments			Maximum Marks					Total Marks	Marks Conversion	
			CO1	CO2	CO3	CO4	CO5			
CIA	CAT I	Part A	8	8	4	--	--	20	200 to 30	<u>CIA:</u> 40
		Part B	32	32	16	--	--	80		
		Total (a)	40	40	20	--	--	100		
	CAT II	Part A	--	--	4	8	8	20		
		Part B	--	--	16	32	32	80		
		Total (b)	--	--	20	40	40	100		
	Other Assessment	Total (c)	8	8	8	8	8	40	40 to 10	
ESE	End Semester Examinations – Theory	Part A	4	4	4	4	4	20	100 to 60	<u>ESE:</u> 60
		Part B	16	16	16	16	16	80		
		Total (d)	20	20	20	20	20	100		
Total Marks (a + b + c + d)			68	68	68	68	68	340	100	

INDIRECT ASSESSMENT	COURSE END SURVEY
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Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. ECE & MECH	23MA2T5	LAPLACE TRANSFORMS AND COMPLEX ANALYSIS	3	1	0	4

PRE-REQUISITES	CALCULUS AND DIFFERENTIAL EQUATIONS
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COURSE OBJECTIVES	
1	To apply the concepts of Laplace transformation in core engineering applications.
2	To solve linear differential equations using Laplace transform techniques.
3	To apply the concepts of analytic functions to transform the functions from z- plane into w- plane.
4	To apply the techniques of integration to evaluate real and complex integrals.
5	To evaluate contour integrals of a given function at given points using residue theorem.

COURSE CONTENT		
Unit – I	LAPLACE TRANSFORMS	9 + 3
Laplace transform–Condition for existence– Transform of elementary function– Standard properties (Statement only)–Transform of unit step function– Impulse function –periodic function– Initial and final value theorem.		
Unit – II	INVERSE LAPLACE TRANSFORMS	9 + 3
Inverse Laplace transform – Convolution theorem (without proof) – Standard properties (Statement only) – Second order linear differential equations with constant coefficients.		
Unit – III	ANALYTIC FUNCTIONS	9 + 3
Analytic functions : Cauchy –Riemann equations (Cartesian form) and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Construction of analytic functions – Bilinear transformations		
Unit – IV	COMPLEX INTEGRATION	9 + 3
Complex integration – Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula- Taylor’s and Laurent’s series expansions.		
Unit - V	SINGULARITIES AND RESIDUES	9 + 3
Singular points–Classification of singularities-Residues–Cauchy’s residue theorem–Application of residue theorem for evaluation of real integrals–Use of circular contour and semi circular contour.		
Lecture: 45 Periods		Tutorial: 15 Periods
		Total: 60 Periods

TEXT BOOKS	
1	Jain R.K and Iyengar S.R.K, “Advanced Engineering Mathematics”, 5 rd Edition, Narosa Publishing House, New Delhi, Reprint 2019.
2	Ramana B.V., “Higher Engineering Mathematics”, Tata Mcgraw Hill Publishing Company, New Delhi, 2017.
3	Kreyszig E., “Advanced Engineering Mathematics”, 10th Edition, John Wiley Sons, 2012.(E-

	BOOK)
4	Glyn James., “Advanced Modern Engineering Mathematics”, Pearson Education Limited, 2018.
5	N P Bali, Manish Goyal, “A Text Book of Engineering Mathematics”, 9rd Edition, Laxmi Publication Private Limited, 2010.

BOOK REFERENCES

1	Dr. P.Anuratha, V.Sudhakar “Engineering Mathematics – II”, SCITECH Publications Pvt Ltd,Chennai. New Edition R-2017.
2	Prof. A. Chandrasekar – “Engineering Mathematics – I”, Vishnu prints Media, New Edition -2017-18, Chennai.
3	Prof. A. Chandrasekar – “Engineering Mathematics – II”, Vishnu prints Media, Revised Edition -2019-20, Chennai.
4	Dr.A.Singaravel – “Engineering Mathematics – II”, Meenakchi Agency, Revised Edition -2019-20, Chennai.
5	Dr.G.Balaji – “Engineering Mathematics – II”, G.Balaji Publishers, Revised Edition - 2019-20, Chennai.

E-RESOURCES

1	https://www.youtube.com/watch?v=GSpbh94-Cjo
2	https://www.studocu.com/row/document/university-of-engineering-and-technology-lahore/principle-of-marketing/applications-of-complex-numbers-ppt/8436504
3	https://www.slideshare.net/sujathavvv/complex-analysis-208085345
4	https://slideplayer.com/slide/15496011/

COURSE OUTCOMES (CO)

After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Apply the concepts of Laplace transformation in core engineering applications.	K3	1
CO2	Solve linear differential equations using Laplace transform techniques.	K3	2
CO3	Apply the concepts of analytic functions to transform the functions from z- plane into w- plane.	K3	3
CO4	Apply the techniques of integration to evaluate real and complex integrals.	K3	4
CO5	Evaluate contour integrals of a given function at given points using residue theorem.	K2	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 - Creating			

COURSE ARTICULATION MATRIX (CAM)													
COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	3	-	2	-	-
CO2	3	3	3	3	-	-	-	1	3	-	2	-	-
CO3	3	3	3	3	-	-	-	1	3	-	2	-	-
CO4	3	3	3	3	-	-	-	1	3	-	2	-	-
CO5	3	3	3	3	-	-	-	1	3	-	2	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

CO WISE DIRECT ASSESSMENT PATTERN										
Assessments			Maximum Marks					Total Marks	Marks Conversion	
			CO1	CO2	CO3	CO4	CO5			
CIA	CAT I	Part A	8	8	4	--	--	20	200 to 30	<u>CIA:</u> 40
		Part B	32	32	16	--	--	80		
		Total (a)	40	40	20	--	--	100		
	CAT II	Part A	--	--	4	8	8	20		
		Part B	--	--	16	32	32	80		
		Total (b)	--	--	20	40	40	100		
	Other Assessment	Total (c)	8	8	8	8	8	40	40 to 10	
ESE	End Semester Examinations – Theory	Part A	4	4	4	4	4	20	100 to 60	<u>ESE:</u> 60
		Part B	16	16	16	16	16	80		
		Total (d)	20	20	20	20	20	100		
Total Marks (a + b + c + d)			68	68	68	68	68	340	100	

INDIRECT ASSESSMENT	COURSE END SURVEY
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Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E.MECH	23MA3T5	FOURIER ANALYSIS AND STATISTICS	3	1	0	4

PRE-REQUISITES	CALCULUS AND DIFFERENTIAL EQUATIONS & LAPLACE TRANSFORMS AND COMPLEX VARIABLES
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COURSE OBJECTIVES	
1	To use the appropriate methods related to Fourier series to solve the problems based on periodic and non-periodic functions.
2	To understand the situation and select appropriate techniques for solving problems based on Fourier transforms.
3	To apply probability axioms and the moments of discrete and continuous random variables to core engineering problems.
4	To analyse large and small sample tasks and interpret the results using Chi-square distribution and F distribution
5	To classify the experiment with proper observations and measurement to get a valid result using various design methods.

COURSE CONTENT		
Unit – I	FOURIER SERIES	9 + 3
Dirichlet's conditions- General Fourier series- Odd and even functions- Half range series- Parseval's identity- Harmonic analysis.		
Unit – II	FOURIER TRANSFORMS	9 + 3
Fourier transform pair - Fourier sine and cosine transforms - Properties (without proof) - Transforms of simple functions - Convolution theorem - Parseval's identity.		
Unit – III	PROBABILITY	9 + 3
Probability – Axioms of probability – Conditional probability – Total probability – Baye's Theorem – Discrete and continuous random variable.		
Unit – IV	TESTING OF HYPOTHESIS	9 + 3
Large sample tests for single mean and difference of means – Small sample test: t distribution - Chi-square distribution - F distribution.		
Unit - V	DESIGN OF EXPERIMENTS	9 + 3
One way and two way classifications – Completely randomized design – Randomized block design – Latin square design.		
Lecture: 45 Periods		Tutorial: 15 Periods
		Total: 60 Periods

TEXT BOOKS	
1	Jain.R.Kand Iyengar S.R.K,"Advanced Engineering Mathematics",5th Edition, Narosa Publishing House, New Delhi , Reprint 2019
2	Ramana B.V., "Higher Engineering Mathematics",TataMcgraw Hill Publishing Company, New

	Delhi, 2017
3	McGraw –Hill “Statistical Methods”, Combined Edition (Volumes I & II), N G DAS

BOOK REFERENCES

1	Introduction to “Probability and Statistics for Engineers and Scientists”, Third Edition SHELDON M. ROSS
2	Oliver . C. Lbe., “Fundamentals of applied probability and random processes” 2 nd Edition, 2014.
3	N P Bali, Manish Goyal, “A Text Book of Engineering Mathematics”, 9th Edition, Laxmi Publication Private Limited, 2010.

E-RESOURCES

1	https://slideplayer.com/slide/15496011/
2	https://youtu.be/tp_MdKz3fC8
3	https://youtu.be/lnVTILPF2e8

COURSE OUTCOMES (CO)

After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Use the appropriate methods related to Fourier series to solve the problems based on periodic and non-periodic functions.	K3	1
CO2	Understand the situation and select appropriate techniques for solving problems based on Fourier transforms.	K2	2
CO3	Apply probability axioms and the moments of discrete and continuous random variables to core engineering problems.	K3	3
CO4	Analyse large and small sample tasks and interpret the results using Chi-square distribution and F distribution	K4	4
CO5	Classify the experiment with proper observations and measurement to get a valid result using various design methods.	K2	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 – Creating			

COURSE ARTICULATION MATRIX (CAM)

COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	3	2	2	-	-
CO2	3	3	3	3	-	-	-	1	3	2	2	-	-
CO3	3	3	3	3	-	-	-	1	3	2	2	-	-
CO4	3	3	3	3	-	-	-	1	3	2	2	-	-

CO5	3	3	3	3	-	-		1	3	2	2	-	-
1 – Weak / Slight					2 – Medium / Moderate				3 – Strong / Substantial				

CO WISE DIRECT ASSESSMENT PATTERN										
Assessments			Maximum Marks					Total Marks	Marks Conversion	
			CO1	CO2	CO3	CO4	CO5			
CIA	CAT I	Part A	8	8	4	--	--	20	200 to 30	CIA: 40
		Part B	32	32	16	--	--	80		
		Total (a)	40	40	20	--	--	100		
	CAT II	Part A	--	--	4	8	8	20		
		Part B	--	--	16	32	32	80		
		Total (b)	--	--	20	40	40	100		
	Other Assessment	Total (c)	8	8	8	8	8	40	40 to 10	
ESE	End Semester Examinations – Theory	Part A	4	4	4	4	4	20	100 to 60	ESE: 60
		Part B	16	16	16	16	16	80		
		Total (d)	20	20	20	20	20	100		
Total Marks (a + b + c + d)			68	68	68	68	68	340	100	

INDIRECT ASSESSMENT	COURSE END SURVEY
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Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E.ECE	23MA3T6	Transforms and Random Processes	3	1	0	4

PRE-REQUISITES	CALCULUS AND DIFFERENTIAL EQUATIONS & LAPLACE TRANSFORMS AND COMPLEX VARIABLES
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COURSE OBJECTIVES	
1	To analyse the situation and select an appropriate techniques for solving problems based on Fourier transforms.
2	To understand Z-transform and estimate inverse Z-transform of certain functions and use it to solve difference equations.
3	To relate and apply the concept of probability and random variables and predict probabilities of events in models.
4	To interpret discrete and continuous probability distributions including requirements, mean and variance for making decisions.
5	To classify different types of random processes and use it to find whether it is SSS or WSS.

COURSE CONTENT		
Unit – I	FOURIER TRANSFORMS	9 + 3
Fourier transform pair - Fourier sine and cosine transforms - Properties (without proof) - Transforms of simple functions - Convolution theorem - Parseval's identity.		
Unit – II	Z TRANSFORM	9 + 3
Z-transforms- Elementary properties (statement only)- Inverse Z-transform (using partial fractions and residues)- Initial and final value theorems- Convolution theorem (without proof)- Formation of difference equations-Solution of difference equations using Z-transform.		
Unit – III	RANDOM VARIABLES	9 + 3
Random Variables - Discrete and Continuous random variables – Probability mass and density functions – Mean and Variance.		
Unit – IV	PROBABILITY DISTRIBUTIONS	9 + 3
Discrete Distributions: Binomial distribution – Poisson distribution – Continuous Distributions: Exponential distribution – Normal distribution – Two Dimensional Random Variables: Joint probability distributions – Marginal and conditional distributions		
Unit - V	RANDOM PROCESS	9 + 3
Introduction – Classification – Stationary process – Markov chains – Transition probabilities – Limiting distributions – Poisson process.		
Lecture: 45 Periods		Tutorial: 15 Periods
		Total: 60 Periods

TEXT BOOKS	
1	Grewal B.S., "Higher Engineering Mathematics", 43 rd Edition, Khanna Publications New Delhi, 2015
2	Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 5 th Edition, Narosa Publishing House, New Delhi, Reprint 2019.

3	Ramana B.V., “Higher Engineering Mathematics”, Tata Mcgraw Hill Publishing Company, New Delhi, 2017.
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BOOK REFERENCES

1	Kreyszig E., “Advanced Engineering Mathematics”, 10 th Edition, John Wiley Sons, 2010.
2	Oliver . C. Lbe., “Fundamentals of applied probability and random processes” Academic Press, 2007.
3	Miller. S.L. and Childers. D.G., —“Probability and Random Processes with Applications to Signal Processing and Communications ”, Academic Press, 2013.

E-RESOURCES

1	https://youtu.be/tp_MdKz3fC8
2	https://youtu.be/5Z3KAKs-EZs
3	https://youtu.be/lnVTILPF2e8
4	https://youtu.be/8963i2DnFiQ
5	https://youtu.be/HfAXKnibhKw

COURSE OUTCOMES (CO)

After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Analyse the situation and select an appropriate techniques for solving problems based on Fourier transforms.	K3	1
CO2	Understand Z-transform and estimate inverse Z-transform of certain functions and use it to solve difference equations.	K2	2
CO3	Relate and apply the concept of probability and random variables and predict probabilities of events in models.	K3	3
CO4	Interpret discrete and continuous probability distributions including requirements, mean and variance for making decisions.	K2	4
CO5	Classify different types of random processes and use it to find whether it is SSS or WSS.	K2	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 – Creating			

COURSE ARTICULATION MATRIX (CAM)

COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	3	2	2	-	-

C02	3	3	3	3	-	-	-	1	3	2	2	-	-
C03	3	3	3	3	-	-	-	1	3	2	2	-	-
C04	3	3	3	3	-	-	-	1	3	2	2	-	-
C05	3	3	3	3	-	-		1	3	2	2	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

CO WISE DIRECT ASSESSMENT PATTERN										
Assessments			Maximum Marks					Total Marks	Marks Conversion	
			CO1	CO2	CO3	CO4	CO5			
CIA	CAT I	Part A	8	8	4	--	--	20	200 to 30	CIA: 40
		Part B	32	32	16	--	--	80		
		Total (a)	40	40	20	--	--	100		
	CAT II	Part A	--	--	4	8	8	20		
		Part B	--	--	16	32	32	80		
		Total (b)	--	--	20	40	40	100		
	Other Assessment	Total (c)	8	8	8	8	8	40	40 to 10	
ESE	End Semester Examinations – Theory	Part A	4	4	4	4	4	20	100 to 60	ESE: 60
		Part B	16	16	16	16	16	80		
		Total (d)	20	20	20	20	20	100		
Total Marks (a + b + c + d)			68	68	68	68	68	340	100	

INDIRECT ASSESSMENT	COURSE END SURVEY
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Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.Tech AIDS	23MA3T3	STATISTICAL ANALYSIS	3	1	0	4

PRE-REQUISITES	CALCULUS AND DIFFERENTIAL EQUATIONS, LAPLACE TRANSFORMS AND COMPLEX VARIABLES
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COURSE OBJECTIVES	
1	To apply various sampling methods to solve core engineering problems.
2	To justify the concept of testing of hypothesis for small and large samples and interpret the results.
3	To analyse the correlation and regression techniques and explore variable relationships
4	To classify the principles of design of experiments and perform analysis of variance.
5	To sketch control charts and criticize on the process control.

COURSE CONTENT			
Unit – I	SAMPLING	9 + 3	
Sampling distributions – Estimation of parameters – Statistical hypothesis – Large sample tests for single mean – small sample test –t, F distributions – Tests for goodness of fit			
Unit – II	TESTING OF HYPOTHESIS	9 + 3	
Large sample tests based on Normal distribution for difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion – Contingency table (test for independent) – Goodness of fit.			
Unit – III	CORRELATION AND REGRESSION	9 + 3	
Estimation using the regression line – Correlation analysis – Limitations, errors, and caveats of using regression and correlation analysis			
Unit – IV	DESIGN OF EXPERIMENTS	9 + 3	
One way and two way classifications – Completely randomized design – Randomized block design – Latin square design.			
Unit - V	STATISTICAL QUALITY CONTROL	9 + 3	
Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits – Acceptance sampling.			
Lecture: 45 Periods		Tutorial: 15 Periods	Total: 60 Periods

TEXT BOOKS	
1	Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2	Ramana B.V., "Higher Engineering Mathematics", TataMcgraw Hill Publishing Company, New Delhi, 2008
3	2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015

4	Jain .R.K and Iyengar S.R.K,”Advanced Engineering Mathematics”,3rd Edition, Narosa Publishing House, New Delhi , Reprint 2009
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BOOK REFERENCES

1	McGraw –Hill “Statistical Methods”, Combined Edition (Volumes I & II), N G DAS
2	Introduction to “Probability and Statistics for Engineers and Scientists”, Third Edition SHELDON M. ROSS
3	Taha, H.A., “Operations Research”, 8 th Edition, Pearson India Education Services, Delhi, 2009.

E-RESOURCES

1	https://youtu.be/tp_MdKz3fC8
2	https://youtu.be/lnVTILPF2e8

COURSE OUTCOMES (CO)

After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Apply various sampling methods to solve core engineering problems.	K3	1
CO2	Justify the concept of testing of hypothesis for small and large samples and interpret the results.	K5	2
CO3	Analyse the correlation and regression techniques and explore variable relationships	K4	3
CO4	Classify the principles of design of experiments and perform analysis of variance.	K2	4
CO5	Sketch control charts and criticize on the process control.	K5	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 – Creating			

COURSE ARTICULATION MATRIX (CAM)

COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	3	2	2	-	-
CO2	3	3	3	3	-	-	-	1	3	2	2	-	-
CO3	3	3	3	3	-	-	-	1	3	2	2	-	-
CO4	3	3	3	3	-	-	-	1	3	2	2	-	-
CO5	3	3	3	3	-	-		1	3	2	2	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

CO WISE DIRECT ASSESSMENT PATTERN										
Assessments			Maximum Marks					Total Marks	Marks Conversion	
			CO1	CO2	CO3	CO4	CO5			
CIA	CAT I	Part A	8	8	4	--	--	20	200 to 30	<u>CIA:</u> 40
		Part B	32	32	16	--	--	80		
		Total (a)	40	40	20	--	--	100		
	CAT II	Part A	--	--	4	8	8	20		
		Part B	--	--	16	32	32	80		
		Total (b)	--	--	20	40	40	100		
	Other Assessment	Total (c)	8	8	8	8	8	40	40 to 10	
ESE	End Semester Examinations – Theory	Part A	4	4	4	4	4	20	100 to 60	<u>ESE:</u> 60
		Part B	16	16	16	16	16	80		
		Total (d)	20	20	20	20	20	100		
Total Marks (a + b + c + d)			68	68	68	68	68	340	100	

INDIRECT ASSESSMENT	COURSE END SURVEY
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III	B.E. EEE	23MA3T4	Boundary Value Problems And Numerical Methods	3	1	0	4
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PRE-REQUISITES	Calculus And Differential Equations & Transforms, Complex Variables And Fourier Analysis
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COURSE OBJECTIVES	
1	To apply Fourier series to solve an initial-boundary value problem for one dimensional wave and heat equations.
2	To solve an initial-boundary value for two dimensional heat equations using Fourier Series.
3	To identify and apply various numerical techniques for solving non-linear equations and systems of linear equations.
4	To choose appropriate method to determine the integration and differentiation of the functions by using the numerical data.
5	To solve ordinary differential equations by using numerical methods.

COURSE CONTENT		
Unit – I	ONE DIMENSIONAL BOUNDARY VALUE PROBLEMS	9 + 3
Fourier series solution – Vibration of strings – One dimensional wave equation – One dimensional heat flow equation (unsteady state).		
Unit – II	TWO DIMENSIONAL BOUNDARY VALUE PROBLEMS	9 + 3
Fourier series solution – Two dimensional (steady state) heat flow equations (Cartesian form only) -- Separation of variables..		
Unit – III	SYSTEM OF EQUATIONS	9 + 3
Newton- Raphson method - Solution of linear system of equations - Gauss elimination method – Gauss Jordan method – Gauss Seidel method.		
Unit – IV	INTERPOLATION	9 + 3
Interpolation with equal intervals - Newton's forward and backward difference formulae - Interpolation with Unequal intervals- Lagrange's interpolation.		
Unit - V	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	9 + 3
Taylor's series method-Euler method-Modified Euler method-Fourth order Runge kutta method for solving first order differential equations.		
Lecture: 45 Periods		Tutorial: 15 Periods
		Total: 60 Periods

TEXT BOOKS	
1	Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2	Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
3	Brian Bradie, "A Friendly Introduction to Numerical Analysis", Pearson Education, Asia, New Delhi, 2007.
4	Gerald. C. F. and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 6th Edition, New Delhi, 2006.
5	Mathews, J.H. "Numerical Methods for Mathematics, Science and Engineering", 2nd Edition,

	Prentice Hall, 1992.
--	----------------------

BOOK REFERENCES	
1	Dr.G.Balaji " Numerical Methods" Eighteenth Edition,G.BalajiPublishers,Chennai-33.
2	Dr. K. Singaravelu "Transforms and Partial differential Equations" Revised edition, Meenakshi Agency Chennai.
3	Dr.G.Balaji "Transforms and Partial differential Equations", G.Balaji Publishers, Chennai-33.
4	"Numerical Methods for Engineers", With Software and Programming Applications, Fourth Edition. Steven C. Chapra Raymond P. Canale
5	Dr. M. Chandasekar "Transforms and Partial differential Equations", New Edition 2018-2019 vishnu Prints Media Chennai.

E-RESOURCES	
1	https://www.youtube.com/watch?v=0B8tKcqXoRE
2	https://www.scienceabc.com/eyeopeners/why-do-we-need-numerical-analysis-in-everyday-life.html
3	https://testbook.com/maths/applications-of-differential-equations
4	https://www.youtube.com/watch?v=Cb3HpOf2V1g&list=PL1B727B06A221E026

COURSE OUTCOMES (CO)			
After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Apply Fourier series to solve an initial-boundary value problem for one dimensional wave and heat equations.	K3	1
CO2	Solve an initial-boundary value for two dimensional heat equations using Fourier Series.	K3	2
CO3	Identify and apply various numerical techniques for solving non-linear equations and systems of linear equations.	K3	3
CO4	Choose appropriate method to determine the integration and differentiation of the functions by using the numerical data.	K4	4
CO5	Solve ordinary differential equations by using numerical methods.	K3	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 – Creating			

COURSE ARTICULATION MATRIX (CAM)													
COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	-	-	-	1	3	2	2	-	-
CO2	3	3	3	3	-	-	-	1	3	2	2	-	-
CO3	3	3	3	3	-	-	-	1	3	2	2	-	-
CO4	3	3	3	3	-	-	-	1	3	2	2	-	-
CO5	3	3	3	3	-	-	-	1	3	2	2	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

CO WISE DIRECT ASSESSMENT PATTERN										
Assessments			Maximum Marks					Total Marks	Marks Conversion	
			CO1	CO2	CO3	CO4	CO5			
CIA	CAT I	Part A	8	8	4	--	--	20	200 to 30	<u>CIA:</u> 40
		Part B	32	32	16	--	--	80		
		Total (a)	40	40	20	--	--	100		
	CAT II	Part A	--	--	4	8	8	20		
		Part B	--	--	16	32	32	80		
		Total (b)	--	--	20	40	40	100		
	Other Assessment	Total (c)	8	8	8	8	8	40	40 to 10	
	ESE	End Semester Examinations – Theory	Part A	4	4	4	4	4	20	100 to 60
Part B			16	16	16	16	16	80		
Total (d)			20	20	20	20	20	100		
Total Marks (a + b + c + d)			68	68	68	68	68	340	100	

INDIRECT ASSESSMENT	COURSE END SURVEY
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Sem	Programme	Course Code	Course Name	L	T	P	C
III	B.E.CSE / B.Tech. IT	23MA3T2	PROBABILITY AND QUEUING THEORY	3	1	0	4

PRE-REQUISITES	CALCULUS AND DIFFERENTIAL EQUATIONS, ALGEBRA AND NUMBER THEORY
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COURSE OBJECTIVES	
1	To relate and apply the concept of probability and random variables to predict probabilities of events
2	To interpret discrete and continuous probability distributions including requirements, mean and variance for making decisions.
3	To compute correlation between variables, and predict unknown values using regression.
4	To classify different types of random processes and use it to find whether it is SSS or WSS.
5	To analyse the situation and select an appropriate queuing model techniques for solving problems based on Little's formula.

COURSE CONTENT		
Unit – I	PROBABILITY	9 + 3
Probability-Axioms of probability –Conditional probability-Total probability-Baye's theorem- Discrete and continuous random variables – Moments – Moment generating functions		
Unit – II	DISTRIBUTION FUNCTIONS	9 + 3
Binomial distribution-Poisson distribution-Exponential distribution-Uniform distribution-Normal distribution-Applications.		
Unit – III	TWO-DIMENSIONAL RANDOM VARIABLES	9 + 3
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression.		
Unit – IV	RANDOM PROCESSES	9 + 3
Classification – Stationary process – Markov chain – Bernoulli and Poisson process.		
Unit - V	QUEUEING MODELS	9 + 3
Markovian queues – Birth and death processes – Single and multiple server queueing models – Little's formula with finite waiting rooms.		
Lecture: 45 Periods		Tutorial: 15 Periods
		Total: 60 Periods

TEXT BOOKS

1	Jain R.K and Iyengar S.R.K, “Advanced Engineering Mathematics”, 5 rd Edition, Narosa Publishing House, New Delhi, Reprint 2019.
2	Ramana B.V., “Higher Engineering Mathematics”, Tata Mcgraw Hill Publishing Company, New Delhi, 2017.
3	Kreyszig E., “Advanced Engineering Mathematics”, 10th Edition, John Wiley Sons, 2012.(E-BOOK)
4	Glyn James., “Advanced Modern Engineering Mathematics”, Pearson Education Limited, 2018.
5	N P Bali, Manish Goyal, “A Text Book of Engineering Mathematics”, 9rd Edition, Laxmi Publication Private Limited, 2010.

REFERENCE BOOKS

1	Miller. S.L. and Childers. D.G., —“Probability and Random Processes with Applications to Signal Processing and Communications ”, Academic Press, 2013.
2	Peebles, P.Z., "Probability, Random Variables and Random Signal Principles ", Tata McGraw Hill, 6 th Edition, New Delhi, 2018.
3	Oliver . C. Lbe., “Fundamentals of applied probability and random processes” Academic Press, 2018.
4	Taha, H.A., “Operations Research”, 8 th Edition, Pearson India Education Services, Delhi, 2015.
5	Donald Gross, John F. Shortle, James M .Thomson, Carl M. Haris.,”Fundamentals of Queueing theory”,4 th Edition, Wiley India Pvt Ltd,2017.

E-RESOURCES

1	https://youtu.be/lnVTILPF2e8
2	https://youtu.be/8963i2DnFiQ
3	https://youtu.be/HfAXKnibhKw

COURSE OUTCOMES (CO)

After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Relate and apply the concept of probability and random variables to predict probabilities of events	K2	1
CO2	Interpret discrete and continuous probability distributions including requirements, mean and variance for making decisions.	K2	2
CO3	Compute correlation between variables, and predict unknown values using regression.	K3	3
CO4	Classify different types of random processes and use it to find whether it is SSS or WSS.	K2	4
CO5	Analyse the situation and select an appropriate queuing model techniques for solving problems based on Little’s formula.	K4	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 - Creating			

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E. / B.Tech., Common to all	23EN3L1	INTERPERSONAL COMMUNICATION SKILLS LABORATORY - I	0	0	3	1.5

PRE-REQUISITES	COMMUNICATIVE ENGLISH & TECHNICAL ENGLISH
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COURSE OBJECTIVES	
1	To choose clear and friendly language for all kinds of transactions.
2	To engage and communicate effectively.
3	To reveal their personality clearly.
4	To develop essential communication skills.
5	To understand work ethics and culture.

LIST OF EXPERIMENTS		
I	Conversation Practice Sessions (To be done as real-life interactions)	CO1
II	Talking to friends	CO2
III	Listening skills	CO2
IV	Email Etiquette	CO3
V	Business English	CO3
VI	Discussion on the clips	CO4
VII	Decision Making	CO4
VIII	Developing Conversation	CO5
PRACTICAL: 45 Periods		Tutorial: 0 Periods
		Total: 45Periods

BOOK REFERENCES	
1	Communication Skills in English by Anjana Tiwari, 2021
2	How to improve your communication skills by Dawood Khan, 2021.
3	Communication to connect, 2020.

E-RESOURCES	
1	https://youtu.be/cC2vxmBDAG8
2	https://youtu.be/l3RSiSUwIT0
3	https://youtu.be/cyXADWE7KPo

COURSE OUTCOMES (CO)			
After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Produce appropriate and accurate language for transactions of various kinds.	K3	1
CO2	Understand and converse with their higher authorities/ subordinates/ other persons concerned.	K3	2
CO3	Expose their personality effectively.	K4	3
CO4	Acquire skills in the critical areas of communication, viz., socializing, telephoning, and negotiations.	K4	4
CO5	Perceive work ethics and work culture.	K2	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 – Creating			

COURSE ARTICULATION MATRIX (CAM)													
COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

CO WISE DIRECT ASSESSMENT PATTERN										
Assessments			Maximum Marks					Total Marks	Marks Conversion	
			CO1	CO2	CO3	CO4	CO5			
CIA	Lab Record	All Ex.	Rubrics - 10 marks for each Ex.					75	100 to 60	<u>CIA:</u> 60
	Model Examination	Any One Ex.	Rubrics - 25 marks for the Ex.					25		
ESE	End Semester Examinations – Practical	Any One Ex.	Rubrics - 25 marks for the Ex.					100	100 to 40	<u>ESE:</u> 40
Total Marks									100	

INDIRECT ASSESSMENT	COURSE END SURVEY
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Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E.MECH & CSE / B.Tech., IT & AIDS	23EN4L1	INTERPERSONAL COMMUNICATION SKILLS LAB - II	0	0	3	1.5

PRE-REQUISITES	COMMUNICATIVE ENGLISH & TECHNICAL ENGLISH INTERPERSONAL COMMUNICATION SKILLS LAB - I
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COURSE OBJECTIVES	
1	To achieve academic success.
2	To embrace the opportunity.
3	To use proper English in every situation.
4	To engage in specific academic speaking activities.
5	To make effective presentations.

LIST OF EXPERIMENTS		
I	Role Play	CO1
II	Empathy	CO2
III	Time Management	CO2
IV	Body Language	CO2
V	Mock Interview	CO3
VI	Group Discussion	CO4
VII	Presentation	CO4
VIII	Team Building Skills	CO5
PRACTICAL: 45 Periods		Tutorial: 0 Periods
		Total: 45 Periods

BOOK REFERENCES

1	Communication Skill by Dale Carnegie, 2022.
2	Communication: Core Interpersonal Skills by Gjyn O'Toolee, 2020.
3	Effective Communication in the workplace by David L. Lewis, 2019.
4	Communication skills/ BBA- 1 YEAR (NEP2020 (NEP2020 Department Of Higher Education) Madhya Pradesh (Paperback, Dr. Sumit Kishore Mathur, Dr. Awanti Dixit)

OTHER REFERENCES

1	https://youtu.be/cC2vxmBDAG8
2	https://youtu.be/l3RSiSUwIT0

COURSE OUTCOMES (CO)

After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Equip them with the English language skills required for the successful Undertaking of academic studies.	K3	1
CO2	Read and understand any text in English according to the inputs given by the teacher in the classroom.	K3	2
CO3	Write and speak good English in all situations.	K4	3
CO4	Acquire guidance and practice in general and classroom conversation and to Engage in specific academic speaking activities.	K4	4
CO5	Make effective presentations.	K2	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 – Creating			

COURSE ARTICULATION MATRIX (CAM)

COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

CO WISE DIRECT ASSESSMENT PATTERN

Assessments			Maximum Marks					Total Marks	Marks Conversion	
			CO1	CO2	CO3	CO4	CO5			
CIA	Lab Record	All Ex.	Rubrics - 10 marks for each Ex.					75	100 to 60	CIA: 60
	Model Examination	Any One Ex.	Rubrics - 25 marks for the Ex.					25		
ESE	End Semester Examinations – Practical	Any One Ex.	Rubrics - 25 marks for the Ex.					100	100 to 40	ESE: 40
Total Marks									100	

INDIRECT ASSESSMENT**COURSE END SURVEY**

Semester	Programme	Course Code	Course Name	L	T	P	C
VI	B.E. ECE & EEE		INTERPERSONAL COMMUNICATION SKILLS LAB - II	0	0	3	1.5

PRE-REQUISITES	COMMUNICATIVE ENGLISH & TECHNICAL ENGLISH INTERPERSONAL COMMUNICATION SKILLS LAB - I
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COURSE OBJECTIVES	
1	To achieve academic success.
2	To embrace the opportunity.
3	To use proper English in every situation.
4	To engage in specific academic speaking activities.
5	To make effective presentations.

LIST OF EXPERIMENTS

I	Role Play	C01
II	Empathy	C02
III	Time Management	C02
IV	Body Language	C02
V	Mock Interview	C03
VI	Group Discussion	C04
VII	Presentation	C04
VIII	Team Building Skills	C05
PRACTICAL: 45 Periods		
Tutorial: 0 Periods		
		Total: 45 Periods

BOOK REFERENCES

1	Communication Skill by Dale Carnegie, 2022.
2	Communication: Core Interpersonal Skills by Gjyn O'Toolee, 2020.
3	Effective Communication in the workplace by David L. Lewis, 2019.
4	Communication skills/ BBA- 1 YEAR (NEP2020 (NEP2020 Department Of Higher Education) Madhya Pradesh (Paperback, Dr. Sumit Kishore Mathur, Dr. Awanti Dixit)

OTHER REFERENCES

1	https://youtu.be/cC2vxmBDAG8
2	https://youtu.be/l3RSiSUwIT0
3	https://youtu.be/cyXADWE7KPo

COURSE OUTCOMES (CO)

After Successful completion of the course, the students should be able to		RBT Level	Unit
CO1	Equip them with the English language skills required for the successful Undertaking of academic studies.	K3	1
CO2	Read and understand any text in English according to the inputs given by the teacher in the classroom.	K3	2
CO3	Write and speak good English in all situations.	K4	3
CO4	Acquire guidance and practice in general and classroom conversation and to Engage in specific academic speaking activities.	K4	4
CO5	Make effective presentations.	K2	5
RBT Levels: K1 – Remembering; K2 – Understanding; K3 – Applying; K4 – Analyzing; K5 – Evaluating; K6 – Creating			

COURSE ARTICULATION MATRIX (CAM)

COs	Programme Outcomes (POs)											PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	-	-	-	-	-	-	-	-	2	3	-	-	-
CO3	-	-	-	-	-	-	-	-	2	3	-	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	-	-
1 – Weak / Slight					2 – Medium / Moderate					3 – Strong / Substantial			

CO WISE DIRECT ASSESSMENT PATTERN										
Assessments			Maximum Marks					Total Marks	Marks Conversion	
			CO1	CO2	CO3	CO4	CO5			
CIA	Lab Record	All Ex.	Rubrics - 10 marks for each Ex.					75	100 to 60	<u>CIA:</u> 60
	Model Examination	Any One Ex.	Rubrics - 25 marks for the Ex.					25		
ESE	End Semester Examinations – Practical	Any One Ex.	Rubrics - 25 marks for the Ex.					100	100 to 40	<u>ESE:</u> 40
Total Marks								100		

INDIRECT ASSESSMENT	COURSE END SURVEY
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Board Chairman