NPR
College of Engineering and Technology
(An Autonomous Institution)
NBA Accredited (B.E. - CSE, ECE, EEE & Mechanical Engg.) | Accredited by NAAC with 'A' Grade
Recognized by UGC under 2 (f) | Approved by All India Council for Technical Education, New Delhi | Affiliated to Anna University, Chennai
Natham, Dindigul (Dist.) - 624 401, Tamil Nadu. | Web: www.nprcet.edu.in

Department of Science and Humanities

REGULATIONS - 2026

CHOICE BASED CREDIT SYSTEM (CBCS)

CURRICULUM AND SYLLABUS

Chairperson-Board of Studies,
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SEMESTER I									
SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS	DEPARTMENTS
				L	T	P			
1	-	Induction Programme	-	-	-	-	-	0	Common to all
THEORY									
2	26MA101	Engineering Calculus	BSC	3	1	0	4	4	Common to all
3	26HS101	Professional English - I	HSMC	2	0	0	2	2	Common to all
4	26HS102	Heritage of Tamils	HSMC	1	0	0	1	1	Common to all
5	26PH101	Physics for Engineers	BSC	2	0	2	4	3	Common to all
6	26CH101	Engineering Chemistry	BSC	2	0	2	4	3	Common to all
TOTAL CREDITS							15	13	

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I SEMESTER

I - Course Name: 26MA101 Engineering Calculus

Prerequisite	Program Name	Sem	Category	L	T	P	C
NIL	B.E./B.TECH. COMMON TO ALL	I	BSC	3	1	0	4

II - Course Objectives

1	To provide technical competence of modelling engineering problems using calculus.
2	To apply the calculus concepts in solving engineering problems using analytical methods and computational tools.

III - Course Content

Preamble: This course is designed to provide students with a comprehensive understanding of the fundamental concepts and applications of differential and integral calculus. The syllabus progresses from single-variable calculus to functions of several variables and multiple integration, enabling students to develop a strong mathematical foundation for solving engineering and scientific problems.

Unit – I	**Differential Calculus**	**12 Periods**
Functions, graph of functions, Operations on functions, Limit of a function, Continuity, Limits at infinity, Derivative as a function, Maxima and Minima of functions of single variable, Mean value theorem, Effect of derivatives on the shape of a graph.		
Unit – II	**Functions of Several Variables**	**12 Periods**
Partial derivatives, Chain rule, Total derivative, Maxima and minima of functions of two variables, Method of Lagrange's Multipliers, Application problems in engineering.		
Unit – III	**Integral Calculus**	**12 Periods**
Fundamental theorem of Calculus, Indefinite integrals and the Net Change Theorem, Improper integrals, Arc Length, Area of Region, Area of surface of revolution.		
Unit – IV	**Double Integral**	**12 Periods**

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Iterated integrals and Fubini's theorem, Evaluation of double integrals, change of order of integration, change of variables between Cartesian and polar co-ordinates.		
Unit – V	**Triple Integral**	**12 Periods**
Evaluation of triple integrals, change of variables between Cartesian and Cylindrical Co-ordinates, change of variables between Cartesian and Spherical Co-ordinates.		
		Total: 60 Periods

Weightage	The course evaluation based on a total weightage of 100%. Continuous Internal Assessment (CIA) carries 40% of the total marks, while the End Semester Examinations (ESE) carries 60%.
Assessment Methodology	Assessment Methodology: The Continuous Internal Assessment is conducted through Quizzes (20 %), Assignments (20%) and Internal Examinations (60%)
Reference Books:	1. Anton, H., Bivens, I. C., & Davis, S. (2021). Calculus: Early transcendentals. John Wiley & Sons. 2. Ron Larson and David C. Falvo, (2013), Calculus: an Applied Approach. Cengage Learning. 3. Stewart, J., Clegg, D., & Watson, S. (2019). Calculus: Early transcendentals. 4. Thomas, G. B., Jr., Weir, M. D., Hass, J., & Heil, C. (2018). Thomas' calculus: Early transcendentals. Pearson. 5. Singh, K. (2019). Engineering mathematics through applications. Bloomsbury Publishing. 6. Grewal, B. S. (2012). Higher engineering mathematics. Khanna Publishers.
MOOC/ Web Platforms:	1. https://math.libretexts.org/Bookshelves/Calculus/Map%3A_Calculus_Early_Transcendentals_(Stewart)/ 2. https://openstax.org/books/calculus-volume-1/ 3. https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx 4. SCILAB, https://www.scilab.org/
Suggested Activities for Self-Learning	1. Visualization of the functions, Maxima and Minima of a function using open-source software, Solving Competitive Examination questions (Ex. GATE). 2. Partial Derivatives with two or three variables, Maxima and Minima of a function using open-source software, Solving Competitive Examination questions (Ex. GATE). 3. Definite and Indefinite Integrals, Determination of Area, Solving Competitive Examination questions (Ex. GATE).

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	4. Double integrals and triple integrals using open-source software, Solving Competitive Examination questions (Ex. GATE). 5.Triple integrals using open-source software, Solving Competitive Examination questions (Ex. GATE , JAM).

IV - Course Outcome

On completion of the course, the students will be able to		Bloom's Level Mapped
CO1	Explain the meaning of derivative, integral, and their geometric and physical interpretations.	Understand (K2)
CO2	Apply differentiation and integration techniques to compute maxima and minima of function, area of region.	Apply (K3)
CO3	Analyse the behavior of single and multivariable functions using derivatives and partial derivatives.	Analyse (K4)
CO4	Utilize modern computational software and online platforms to deepen understanding, perform complex calculations, and visualize mathematical concepts.	Apply (K3)
CO5	Utilize modern computational software and online platforms to evaluate and visualize triple integrals using Cartesian, cylindrical, and spherical coordinate systems.	Apply (K3)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ Pos	PO -1	PO -2	PO -3	PO -4	PO -5	PO -6	PO -7	PO -8	PO -9	PO -10	PO -11	PS O-1	PSO -2	PSO -3
CO-1	3	3	_	–	–	–	–	–	1	–	2	–	–	–
CO-2	3	3	1	–	2	–	–	–	1	–	2	–	–	–
CO-3	3	3	1	–	–	–	–	–	1	–	2	–	–	–
CO-4	3	3	_	–	3	–	–	–	2	–	2	–	–	–
CO-5	3	3	1	–	3	–	–	–	2	–	2	–	–	–

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

Course Designer	Mail id
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I - Course Name: 26HS101 Professional English - I

Prerequisite	Programme Name	Sem	Category	L	T	P	C
NIL	B.E./B.TECH. COMMON TO ALL	I	HSMC	2	0	0	2

II - Course Objectives

1	Enhance learners listening and speaking skills to understand and deliver speeches effectively.
2	Equip students with the skills to write clear, coherent, and grammatically correct texts for various purposes.
3	Strengthen the ability to comprehend, interpret, and analyse written English

III - Course Content

Preamble:

This course is designed to develop students' proficiency in English communication by strengthening the four essential language skills—Listening, Speaking, Reading, and Writing (LSRW). It provides learners with opportunities to communicate effectively in academic, professional, and social contexts.

Unit – I	SPEAKING FOR EFFECTIVE COMMUNICATION	8 Periods

Speaking Skills: Self-Introduction (Tenses, Adjectives) Expressing opinions (Subject-Verb Agreement), Participating in Conversations (Speech Acts-agreeing & disagreeing–synonyms and antonyms)

Unit – II	ACTIVE LISTENING SKILLS	6 Periods

Listening Skills: Listening to Simple Conversations (Understanding tone and intent), Short Speeches/Stories, Extracting information, Pronunciation, Listening to Various Accents.

Unit – III	READING STRATEGIES AND VOCABULARY DEVELOPMENT	8 Periods

Reading Skills: Reading Strategies – (Skimming, scanning, predicting); intensive reading - short passages and long passages on suggested themes (Sentence Patterns, Prefixes and suffixes, idioms and phrases.

Unit – IV	WRITING FOR PROFESSIONAL COMMUNICATION	8 Periods

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Writing Skills: Word Substitution, Sentence Formation, Hints Development (Guided Writing), Writing Different Types of Paragraphs-(Sentence Structure)–Letter Writing/Emails (Informal)	
TOTAL: 30 Periods	
Weightage	The course evaluation is based on a total weightage of 100%. Continuous Internal Assessment (CIA) carries 40% of the total marks, while the End Semester Examination (ESE) carries 60%.
Assessment Methodology	Quiz (5%), Assignments (20%), Speaking Task (5%), Reading Task (5%), Writing Task (5%), Internal Examinations (60%).
Text Books	Miller, K. Q., & Wahl, S. T. (2023). Business and Professional Communication: KEYS for Workplace Excellence (5th ed.). SAGE Publications.
Reference Books	1.Kumar, Sanjay & Pushpalatha. (2018). English Language and Communication Skills for Engineers. India: Oxford University Press. 2. Sharma,S.,&Mishra,B.(2024). Communication Skills for Engineers and Scientists (2nd ed.). PHI Learning.
MOOC/Web Platforms	1. Cambridge English https://www.cambridgeenglish.org/learningenglish/grammar-and-vocabulary/ 2. Perfect English Grammar–https://www.perfect-english-grammar.com/ 3. BritishCouncil–LearnEnglish-https://learnenglish.britishcouncil.org/grammar
Suggested Activities for Self-Learning	1. Self-Introduction, just a Minute (JAM) Video recording, Situational role plays, Spell Bee, Word Substitution, Usage of Apps. 2. Listening and Repeating, Gap fill exercises, Note-taking 3. Reading - newspaper and digital articles, Cloze, Reading comprehension, note making and summarising 4. Error Detection, Picture and poster description, Descriptive, Narrative and Comparative paragraphs, Brainstorming and Mind Mapping - Informal letters/ Emails

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Listen and comprehend spoken English, take and draft notes.	Understand (K2)
CO2	Demonstrate effective listening skills to comprehend spoken English in different contexts and accents.	Apply (K3)

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CO3	Analyze texts in different contexts using appropriate reading strategies.	Analyse (K4)
CO4	Communicate thoughts and ideas in real life situations.	Apply (K3)
CO5	Develop communication skills relevant to engineering and technology.	Apply (K3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3
CO-1	-	-	-	-	-	-	-	-	2	3	2	-	-	-
CO-2	-	-	-	-	-	-	-	-	2	3	2	-	-	-
CO-3	-	-	-	-	-	-	-	-	2	3	2	-	-	-
CO-4	-	-	-	-	-	-	-	-	2	3	2	-	-	-
CO-5	-	-	-	-	-	-	-	-	2	3	2	-	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

Course Designer	Mail id
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I - Course Name: 26HS102 Heritage of Tamils

Prerequisite	Programme Name	Sem	Category	L	T	P	C
-	B.E/B.Tech.	I	HS	1	0	0	1

II - Course Objectives

1	Appreciate Tamil art, culture and literature Learn the history and culture of Tamil language
2	Relate to various art forms and their relevance to development
3	Acknowledge the rich heritage and significant achievements of the Tamils
4	Tamils Appreciate the contribution of Tamils to nation building
5	Summarize the contribution of Tamil in Indian culture.

III - Course Content

Preamble: This course introduces the rich literary, artistic, cultural, and historical heritage of the Tamils, highlighting their contributions to language, literature, fine arts, folk traditions, and social values. It also explores the role of Tamils in India's cultural development, freedom movement, education, trade, and preservation of knowledge through inscriptions and manuscripts.

Unit – I	மொழி மற்றும் இலக்கியம்:	3 Periods

இந்திய மொழிக்குடும்பம்- திராவிடமொழி -சங்க இலக்கியம் -அறம் -சமயச் சார்பற்ற தன்மை- திருக்குறளில் மேலாண்மைக் கருத்துக்கள்-தமிழ்காப்பியங்கள்- சமண பௌத்த சமயங்களின் தாக்கம்- பக்திஇலக்கியம்-ஆழ்வார்கள் நாயன்மார்கள்- சிற்றிலக்கியங்கள்- நவீன இலக்கியத்தின் வளர்ச்சி-தமிழ் இலகிய வளர்ச்சியில் பாரதியார் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

Unit – II	மரபு-பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை: சிற்பக்கலை	3 Periods

நடுகல் முதல் நவீன சிற்பங்கள் வரை- ஐம்பொன் சிலைகள்-பழங்குடியினர் தயாரிக்கும் கைவினைப் பொருட்கள்- பொம்மைகள்- தேர்செய்யும்கலை- சுடுமண் சிற்பங்கள்- நாட்டுப்புறத் தெய்வங்கள்- திருவள்ளுவர் சிலை- இசைக்கருவிகள்- தமிழர்களின் சமூக பொருளாதர வாழ்வில் கோயில்களின் பங்கு.

Unit – III	நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்	3 Periods

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தெருக்கூத்து- கரகாட்டம்- வில்லுப்பாட்டு- கணியன்கூத்து- ஒயிலாட்டம்- தோல்பாவைக் கூத்து- சிலம்பாட்டம்- வளரி- புலியாட்டம்- தமிழர்களின் விளையாட்டு.		
Unit – IV	**தமிழர்களின் திணைக் கோட்பாடுகள்:**	**3 Periods**
தமிழகத்தின் தாவரங்களும் விளங்குகளும் தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக்கோட்பாடுகள் தமிழர்கள் போற்றிய அறக்கோட்பாடுகள் சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் சங்ககால நகரங்களும் துறைமுகங்களும் சங்க இலக்கியத்தில் ஏற்றுமதி மற்றும் இறக்குமதி- கடல் கடந்த நாடுகளின் சோழர்களின் வெற்றி.		
Unit – V	**இந்திய தேசிய இயக்கம் மற்றும் இந்தியப் பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு**	**3 Periods**
இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு-இந்தியாவின் பிற்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம்-சுயமரியாதை இயக்கம். இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு-கல்வெட்டுகள்-கையெழுத்துப்படிகள்-தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.		
		TOTAL: 15 Periods

Weightage	Internal Assessment: **40%** End Semester Examination: **60%**
Assessment Methodology	The Continuous Internal Assessment is conducted through Quizzes (20%), Assignments (20%) and Internal Examinations (60%).
Text Books	தமிழர்மரபு/Heritage of Tamils- POOBALAN-VRB ***பப்ளிஷர்ஸ்*** (VRB Publishers)
Reference Books	1.தமிழகவரலாறு-மக்களும்பண்பாடும்-கே.கே.பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்) 2.கீழடி வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல்துறைவெளியீடு 3. பொருநை- ஆற்றங்கரைநாகரிகம். (தொல்லியல்துறைவெளியீடு.) 4, Social Life of Tamils (Dr.K.K.Pillay) Ajoint publication of TNTB&ESC and RMRL–(in print)
MOOC/Web Platforms	1. https://www.tamilmurasu.com.sg/tamilnadu/story20200112-38854.html 2. https://www.tamildigitallibrary.in/admin/assets/book 3. https://www.tamilhistory.co.in/2020/05/heroic-games-ancient-tamils-jallikattu-silambam.html 4. https://www.tamilvu.org/ta/courses-degree-a061-a0611-html-a0611313-10334

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	5. https://tamil.samayam.com/others-news/independence-day-2016/news/freedom-fighters-of-india/articleshow/53666058.cms
Suggested Activities for Self-Learning	1.Read selected works from Sangam literature, *Thirukkural*, epics, and modern Tamil literary texts. 2.Visit museums, heritage sites, temples, and art galleries to understand Tamil culture and architecture. 3.Participate in folk art programs, cultural festivals, and traditional games to experience Tamil traditions. 4.Prepare reports or presentations on Tamil literary figures, freedom fighters, and cultural contributions. 5. Explore inscriptions, manuscripts, digital archives, and online resources related to Tamil history and heritage.

IV - Course Outcomes

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Understand the significance of Tamil as a classical language	Understand (K2)
CO2	Relate the art and culture in Tamil language	Understand (K2)
CO3	Explain the importance of music, dance and martial arts that were derived from Tamil Culture	Understand (K2)
CO4	Understand the poetic mode or theme of classical language	Understand (K2)
CO5	Relate the contribution of Tamils to Nation building	Understand (K2)

V - Mapping Table - Mapping of COs with POs and PSOs

COs Vs POs/PSOs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	-	-	-	-	-	1	1	-	-	-	1	-	-	-
CO2	-	-	-	-	-	1	1	-	-	-	1	-	-	-
CO3	-	-	-	-	-	1	1	-	-	-	1	-	-	-
CO4	-	-	-	-	-	1	1	-	-	-	1	-	-	-
CO5	-	-	-	-	-	1	1	-	-	-	1	-	-	-

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Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

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I - Course Name: 26PH101 Physics for Engineers

Prerequisite	Program Name	Sem	Category	L	T	P	C
NIL	B.E./B.TECH. COMMON TO ALL	I	BSC	2	0	2	3

II - Course Objectives

1.	To impart knowledge on the elastic, viscous, and thermal properties of matter.
2.	To explain the core behaviours of mechanical oscillations, acoustics, and electromagnetic waves.
3.	To introduce the fundamental principles of quantum mechanics and particle behaviours.
4.	To facilitate understanding of optics and its applications, different types of Lasers and fibre optics.
5.	To develop hands-on laboratory experience through physical experimentation and data measurement.

III - Course Content

Preamble:

This Applied Physics course provides students with a strong foundation in physics and teaches them how to apply these concepts to engineering. It is designed to develop scientific thinking and help students connect physics principles directly with their core engineering fields.

Unit – I	PROPERTIES OF MATTER	6+6 Periods

Properties of Matter: Elasticity – Cantilever – Young's modulus (non-uniform bending) – Girders: Bridges and buildings – Viscosity: Stokes method – Surface tension: drop weight method – Thermal expansion – Thermal stress– Bimetallic strips– Expansion joints

Practical: 1. Non-Uniform bending – Young's modulus of the material
2. Cantilever Experiment – Young's modulus of the material.

Unit – II	OSCILLATIONS & WAVES	6+6 Periods

Oscillations: Simple Harmonic motion – Torsional pendulum – Couple per unit twist – Damped and Forced Oscillation

Waves: Waves on a stretched string – Energy and Power – standing waves – Ultrasonics – piezo – electric method – Acoustic grating – Electromagnetic waves: Maxwell equation – Production of EM waves by dipole antenna – Propagation of EM waves in free space – Cell phone reception.

Practical: 1. Torsional pendulum

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2. Rigidity Modulus of the material of the wire.		
Unit – III	**QUANTUM MECHANICS**	**6+6 Periods**
Quantum Mechanics: Limitations in Classical Mechanics – Black body radiation – Photoelectric effect – de Broglie hypothesis – Schrodinger Wave equation – Particle in a box (infinite potential well - three-dimensional box) – Barrier penetration and quantum tunnelling. **Practical**: 1. Photo-electric effect 2. Determination of Planck's constant.		
Unit – IV	**OPTICS**	**6+6 Periods**
Optics: Interference: Air wedge – Michelson's Interferometer – Fiber optics: Structure of a fiber – Fiber Optic Communication System – Fiber Sensors (Virtual demo) – Displacement – pressure sensor and Temperature sensor **Practical**: 1. Thickness of a thin sheet/wire using Air wedge Method.		
Unit – V	**LASER**	**6+6 Periods**
LASER: Introduction to lasers – Einstein Co-efficient – Nd:YAG laser – CO_2 laser (construction – functioning and applications) – dye laser – applications of LASER **Practical**: 1. Ruling width of Compact disc using Laser.		
		Total: 30 + 30 = 60 Periods

Weightage	Continuous Internal Assessment: 50 %, End Semester Examinations: 50 %
Assessment Methodology:	Assessment Methodology: Quiz (5 %), Assignments (20 %), Flipped Class (5 %), Practical (30 %), Internal Examinations (60 %)
Text Books:	1. Young, H. D., & Freedman, R. A. (2020). *University physics with modern physics*. Pearson. 2. Gaur, R. K., & Gupta, S. L. (2022). *Engineering physics*. Dhanpat Rai Publications. 3. Mathur, D. S. (2010). *Elements of properties of matter*. S. Chand Publishing. 4. Griffiths, D. J. (2018). *Introduction to quantum mechanics*. Cambridge University Press. 5. Silfvast, W. T. (2008). *Laser fundamentals*. Cambridge University Press.
Reference Books:	1. R. Wolfson, Essential University Physics. Volume 1 & 2. Pearson, 2016. 2. D. Kleppner and R. Kolenkow. An Introduction to Mechanics, Mc Graw Hill Education, 2017. 3. Arthur Beiser, Concepts of Modern Physics, McGraw-Hill, 2021.

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MOOC/ Web & E-Resources Platforms:	1. Barrier penetration problem and Quantum tunnelling: https://archive.nptel.ac.in/courses/115/104/115104096/ 2. EM waves and wireless channelling: https://onlinecourses.nptel.ac.in/noc24_ee31/preview 3. CO2 Laser: https://onlinecourses.nptel.ac.in/noc25_ph03/preview 4. Bimetallic Strips _ https://www.youtube.com/watch?v=WZQ8lvxdzDk 5. Cell phone Reception_ https://www.youtube.com/watch?v=1JZG9x_VOwA 6. Dipole Antenna_ https://www.youtube.com/watch?v=4xF1Fq2wB1I 7. Optical Sensors_ https://auece.digimat.in/nptel/courses/video/108106173/L02.html 8. Scanning Tunnelling Electron Microscope_ https://www.youtube.com/watch?v=XNYZYbXNWQA
Suggested Activities:	1. Virtual demonstration of thermal stress 2. Virtual demonstration of propagation of EM waves 3. Virtual demonstration of Scanning Transmission Electron Microscope Demonstration of sensors applications 4. Demonstration of Laser working and applications

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Apply the principles of elasticity, viscosity, surface tension, and thermal expansion to analyse the mechanical and thermal behaviour of materials.	Apply (K3)
CO2	Explain the core mechanics of simple harmonic motion, acoustic wave generation, and electromagnetic wave propagation in engineering applications.	Understand (K2)
CO3	Describe the fundamental concepts of quantum mechanics, wave-particle duality, quantum tunnelling, and their applications in modern technologies.	Understand (K2)
CO4	Utilize the principles of Interference and Total Internal Reflection to analyze optical communication and fiber-optic sensing systems.	Apply (K3)
CO5	Comprehend the operating principles of lasers and apply laser concepts to engineering and technological applications.	Apply (K3)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

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V - Mapping Table Mapping of COs with POs and PSOs

COs/ Pos	PO -1	PO -2	PO -3	PO -4	PO -5	PO -6	PO -7	PO -8	PO -9	PO -10	PO -11	PS O-1	PSO -2	PSO -3
CO-1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO-2	3	2	1	-	-	-	-	-	-	-	-	2	2	-
CO-3	3	2	1	-	-	-	-	-	-	-	-	2	-	1
CO-4	3	2	1	3	-	-	-	1	-	-	-	2	2	-
CO-5	3	2	1	-	-	-	-	-	-	-	-	1	-	-

Mapping: 1-Low, 2-Medium, 3-High (Mapping value based on usage of Action verbs in each CO)

Course Designer	Mail id
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Recognized by UGC under 2 (f) | Approved by All India Council for Technical Education, New Delhi | Affiliated to Anna University, Chennai
Natham, Dindigul (Dist.) - 624 401, Tamil Nadu. | Web: www.nprcet.edu.in

I - Course Name: 26CH101 Engineering Chemistry

Prerequisite	Program Name	Sem	Category	L	T	P	C
NIL	B.E./B.TECH. COMMON TO ALL	I	BSC	2	0	2	3

II - Course Objectives

1	To provide students with a solid understanding of the chemical principles for engineering applications.
2	To introduce the chemical properties of materials and how these properties influence the selection and use of materials in engineering systems.
3	To impart practical applications of chemistry in commonly used engineering devices

III - Course Content

Preamble: It emphasizes the significance of water quality assessment, treatment, and desalination techniques for sustainable water management. The course introduces the synthesis, properties, and engineering applications of nanomaterials, highlighting recent advances in nanotechnology. It also develops knowledge of electrochemical principles, conductivity, and electrochemical cells, which form the basis of energy storage technologies. Students gain insight into corrosion mechanisms, preventive methods, and protective coatings to enhance the durability of engineering materials. Furthermore, the course explores conventional, contemporary, and emerging battery technologies, their materials, performance, safety aspects, and applications in electric mobility. laboratory competence, and problem-solving abilities, enabling students to apply chemical concepts effectively to real-world engineering challenges and sustainable technological development.

Unit I	**Water Technology**	**6+6 Periods**

Water quality parameters and standards. Industrial feed water, Remediation. Municipal water treatment. Desalination.

Practical: 1. Analysis of alkalinity of water sample.

2. Analysis of total hardness of water sample.

Unit II	**Nano Chemistry**	**6+6 Periods**

Classification, Size, dependent properties. Preparation of nanomaterials, Top-down and Bottom-Up approaches, Applications (Flipped classroom).

Practical: 1. Determination of molecular weight of a polymer using Ostwald viscometer.

2. Analysis of dissolved oxygen in water sample.

Unit III	**Electrochemistry**	**6+6 Periods**

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Electrochemical cell, Electrode potential, Redox reaction. Conductivity of electrolytes, Factors. **Practical:** 1. Determination of strength of strong acids with strong base using conductivity meter Determination of strength of acids in a mixture of acids using conductivity meter		
Unit IV	**Corrosion & Control**	**6+6 Periods**
Chemical and electrochemical corrosions, galvanic series, factors influencing corrosion, Electrochemical protection. Organic and Inorganic coating. **Practical:** 1. Determination of strength of given hydrochloric acid using pH meter 2. Estimation of copper content of the given solution by EDTA method		
Unit V	**Batteries**	**6+6 Periods**
Conventional, Contemporary and Emerging battery storage technologies, Primary & Secondary Batteries Battery Pack, Battery Materials, Performance Parameters, Testing, Safety aspects. **Practical:** 1. Estimation of iron content of the given solution using potentiometer. 2. Determination of chloride content of water sample by argentometric method.		
		Total: 30+ 30 = 60 Periods

Weightage	Continuous Assessment: 50%, End Semester Examinations: 50%
Assessment Methodology	Quiz (5%), Assignments (20%), Flipped Class (5%), Practical (30%), Internal Examinations (60%)
References	1. Jain, P. C., & Jain, M. (2015). Engineering Chemistry (17th ed.). Dhanpat Rai Publishing Company (P) Ltd. 2. Dara, S. S. (2004). A Textbook of Engineering Chemistry. Chand Publications. 3. Sachdeva, M. V. (2011). Basics of Nano Chemistry. Anmol Publications Pvt Ltd. 4. Friedrich, E. (2014). Engineering Chemistry. Medtech.
E-Resources:	1. Water and Wastewater Engineering (Prof. Ligy Philip, IIT Madras) https://nptel.ac.in/courses/105106202. 2. Electrochemical Energy Systems (Prof. S. Mitra, IIT Madras) – https://nptel.ac.in/courses/113106028. 3. Corrosion (Prof. Kallol Mondal, IIT Kanpur) – https://nptel.ac.in/courses/112104088 4. Chemistry of Battery Systems (Prof. V. R. Marathe, IIT Madras) – https://nptel.ac.in/courses/115106130 5. Resource on all battery types, testing, and safety – https://batteryuniversity.com/articles
Suggested activities for	1. Coagulation of water sample using Alum. 2. Electrochemical cell demonstration

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self-Learning	3. Case Study on Corrosion in Pipelines and Electronics, Control measures for a corroded metal 4. Demonstration of battery pack in e-vehicles.

IV - Course Outcome

On completion of the course, the students will be able to		**Bloom's Level Mapped**
CO1	Understand the importance of chemistry applications with underlying mechanisms.	Understand (K2)
CO2	Apply the chemistry concepts in widely used devices.	Apply (K3)
CO3	Analyse the effect of various chemical parameters on the performance of engineering systems.	Analyse (K4)
CO4	Perform experimentations as a group and interpret the results.	Analyse (K4)
CO5	Communicate findings through case studies and reports	Analyse (K4)

(Action verb of each CO to be matched with the next mapping table) (For example: if CO-1 uses the High Order Thinking Skills based action verb, then the corresponding PO must be mapped with High Correlation)

V - Mapping Table Mapping of COs with POs and PSOs

COs/ POs/ PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	1	-	-	-	-	-	-	-	-	2	2	-
CO3	2	2	1	-	-	-	-	-	-	-	-	2	1	-
CO4	2	1	1	3	-	-	-	1	-	-	-	-	2	2
CO5	2	2	2	-	-	-	-	-	1	-	-	-	2	3

V - Mapping Table Mapping of COs with POs and PSOs

1' = Low; '2' = Medium; '3' = High (Mapping value based on usage of Action verbs in each CO)

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