

**PRATHYUSHA ENGINEERING COLLEGE**

**(An Autonomous Institution)**



**ESTD. 2001**

**DEPARTMENT OF SCIENCE AND HUMANITIES**

**REGULATIONS 2023**

**CHOICE BASED CREDIT SYSTEM**

**SEMESTER - I**

- 1. MA2301 MATRICES AND CALCULUS**
- 2. PH2301 ENGINEERING PHYSICS**
- 3. CH2301 ENGINEERING CHEMISTRY**
- 4. GE2301 ENGINEERING GRAPHICS**
- 5. HS2301 HERITAGE OF TAMILS**
- 6. LHS2301 COMMUNICATION SKILL LABORATORY**
- 7. LBS2301 PHYSICS AND CHEMISTRY LABORATORY**

## MATRICES AND CALCULUS

MA23101

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4 0 0 4

### COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that are needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications

### UNIT I MATRICES

(12)

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications: Stretching of an elastic membrane.

### UNIT II DIFFERENTIAL CALCULUS

(12)

Representation of functions - Limit of a function – Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications: Maxima and Minima of functions of one variable.

### UNIT III FUNCTIONS OF SEVERAL VARIABLES (12)

Partial derivatives – Euler's theorem for homogenous functions – Total derivatives – Change of variables – Jacobians – Partial differentiation of implicit functions — Taylor's expansion for functions of two variables – Applications: Maxima and minima functions of two variables and Lagrange's method of undetermined multipliers.

### UNIT IV INTEGRAL CALCULUS

(12)

Definite and Indefinite integrals – Substitution rule – Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions – Improper integrals – Applications : Hydrostatic force and pressure, moments and centre of mass.

### UNIT V MULTIPLE INTEGRALS

(12) Double integrals — Change of order of integration —

Double integrals in polar coordinates — Area enclosed by plane curves — Triple integrals — Volume of solids — Change of variables in double and triple integrals. Applications: Moments and centres of mass, moment of inertia.

**TOTAL: 60 PERIODS**

### COURSE OUTCOMES:

At the end of the course the students will be able to

1. Use the matrix algebra methods for solving practical problems.
2. Apply differential calculus tools in solving various application problems.
3. Able to use differential calculus ideas on several variable functions.
4. Apply different methods of integration in solving practical problems.
5. Apply multiple integral ideas in solving areas, volumes and other practical problems.

**TEXT BOOKS :**

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016
- 2.Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition 2018
- 3.James Stewart, " Calculus: Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

**REFERENCES:**

1. Anton. H, Bivens. I and Davis. S, "Calculus", Wiley, 10th Edition, 2016
- 2.Bali. N., Goyal.M. and Watkins.C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7th Edition, 2009.
- 3.Jain .R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
- 4.Narayanan. S. and Manicavachagom Pillai. T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
- 5.Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
- 6.Srimantha Pal and Bhunia. S.C, "Engineering Mathematics" Oxford University Press, 2015

## ENGINEERING PHYSICS

PH23101

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3 0 0 3

### COURSE OBJECTIVES

- .To make the students effectively to achieve an understanding of mechanics
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to be successfully the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

### UNIT I MECHANICS

9

Multi-particle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M. I –moment of inertia of continuous bodies – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum  
– rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – double pendulum –Introduction to nonlinear oscillations.

### UNIT II ELECTROMAGNETIC WAVES

9

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium vacuum interface for normal incidence.

### UNIT III OSCILLATIONS, OPTICS AND LASERS

9

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection - interference –Michelson interferometer –Theory of air wedge and experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion  
- Nd-YAG laser, CO<sub>2</sub> laser, semiconductor laser –Basic applications of lasers in industry.

### UNIT IV BASIC QUANTUM MECHANICS

9

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization – Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes- Normalization, probabilities and the correspondence principle.

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)- Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

**COURSE OUTCOMES**

After completion of this course, the students should be able to Understand the importance of mechanics.

- Express their knowledge in electromagnetic waves.
- Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
- Understand the importance of quantum physics.
- Comprehend and apply quantum mechanical principles towards the formation of energy bands.

**TOTAL PERIODS :45**

**TEXT BOOKS:**

1. D.Kleppner and R. Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M. Purcell and D.J. Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3. Arthur Beiser, Shashti Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw-Hill (Indian Edition), 2017.

**REFERENCES:**

1. Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K. Thyagarajan and A. Ghatam. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. Halliday, R. Resnick and Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5. N. Garcia, A. Damask and Schwarz. Physics for Computer Science Students. SpringerVerlag, 2012.

**COURSE OBJECTIVES:**

- To inculcate sound understanding of water quality parameters and water treatment techniques.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To introduce the basic concepts and applications of phase rule and composites.
- To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- To familiarize the students with the operating principles, working processes and applications of energy conversion and storage devices.

**UNIT I WATER AND ITS TREATMENT****9**

Water: Sources and impurities, Water quality parameters: Definition and significance of-color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, fluoride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackish water: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming & foaming. Treatment of boiler feed water: Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) and External treatment – Ion exchange demineralization and zeolite process.

**UNIT II NANOCHEMISTRY****9**

Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

**UNIT III PHASE RULE AND COMPOSITES****9**

Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process. Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.

**UNIT IV FUELS AND COMBUSTION****9**

Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil - cetane number; Power alcohol and biodiesel.

Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. CO<sub>2</sub> emission and carbon footprint.

## UNIT V ENERGY SOURCES AND STORAGE DEVICES

9

Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion- battery; Electric vehicles - working principles; Fuel cells: H<sub>2</sub>-O<sub>2</sub> fuel cell, microbial fuel cell; Supercapacitors: Storage principle, types and examples.

TOTAL: 45 PERIODS

### COURSE OUTCOMES:

At the end of the course, the students will be able:

- To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.
- To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
- To apply the knowledge of phase rule and composites for material selection requirements.
- To recommend suitable fuels for engineering processes and applications.
- To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

### TEXT BOOKS:

1. Dr.A.Ravikrishnan, "Engineering Chemistry" 21<sup>st</sup> updated edition August 2002, Sri Krishna Hitech Publishing company Pvt Ltd.
2. P. C. Jain and Monica Jain, "Engineering Chemistry", 17<sup>th</sup> Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2018.
3. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
4. S.S. Dara, "A Text book of Engineering Chemistry", S. Chand Publishing, 12<sup>th</sup> Edition, 2018

### REFERENCES:

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2<sup>nd</sup> Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

## ENGINEERING GRAPHICS

GE23101

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### COURSE OBJECTIVES:

The main learning objective of this course is to prepare the students for:

1. Drawing engineering curves.
2. Drawing free hand Sketch of simple objects.
3. Drawing orthographic projection of solids and section of solids.
4. Drawing development of solids
5. Drawing isometric and perspective projections of simple solids.

### CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

### UNIT I PLANECURVES

9

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — Drawing of tangents and normals to the above curves.

### UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACE

9

Orthographic projection - principles - Principal planes - First angle projection - projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

### UNIT III PROJECTION OF SOLIDS AND FREE HAND SKETCHING

9

Projection of simple solids like prisms, pyramids, cylinder, cone when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Visualization concepts and Free Hand sketching: Visualization principles — Representation of Three Dimensional objects — Layout of views - Free hand sketching of multiple views from pictorial views of objects. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

### UNIT IV

#### PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 9

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids, cylinders and cones. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

### UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS

9

Principles of isometric projection — Isometric scale - Isometric projection of simple solids - Prisms, pyramids, cylinders, cones - combination of two solid objects in simple vertical positions - Perspective projection of simple solids - Prisms, pyramids and cylinders by visual ray method. Practicing three dimensional modeling of isometric projection of simple objects by CAD Software (Not for examination)

**TOTAL: 45 PERIODS**



### **COURSE OUTCOMES:**

On successful completion of this course, the student will be able to

- Use BIS conventions and specifications for engineering drawing.
- Construct the conic curves and cycloid.
- Solve practical problems involving projection of lines.
- Draw the orthographic, isometric and perspective projections of simple solids.
- Draw the development of simple solids.

### **TEXTBOOK:**

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53<sup>rd</sup> Edition, 2019.
2. Natrajan K. V., "A Text Book of Engineering Graphics", Dhana Lakshmi Publishers, Chennai, 2018.
3. Parthasarathy, N.S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015

### **REFERENCES:**

1. Basant Agarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2<sup>nd</sup> Edition, 2019.
2. Gopalakrishna K.R., "Engineering Drawing" (Vol. I & II combined), Subhas Publications, Bangalore, 27<sup>th</sup> Edition, 2017.
3. Luzzader, Warren J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4. Parthasarathy N.S. and Vela Murali, "Engineering Graphics", Oxford University Press, New Delhi, 2015.
5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2<sup>nd</sup> Edition, 2009.
6. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

### **Publication of Bureau of Indian Standards:**

1. IS 10711—2001: Technical products Documentation—Size and layout of drawings sheets.
2. IS 9609 (Parts 0 & 1)—2001: Technical products Documentation—Lettering.
3. IS 10714 (Part 20)—2001 & SP 46—2003: Lines for technical drawings.
4. IS 11669—1986 & SP 46—2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4)—2001: Technical drawings—Projection Methods.

### **Special points applicable to University Examinations on Engineering Graphics:**

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate session on the same day

## HERITAGE OF TAMILS

### தமிழர்மரபு

HS23101

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#### UNIT-1மொழி மற்றும் இலக்கியம்

3

தமிழர்களின் பாரம்பரியம் / தமிழர்மரபு மொழி குடும்பங்கள்  
இந்தியாவில் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி தமிழ்  
செம்மொழி – செம்மொழி இலக்கியம் – செம்மொழி இலக்கியம் –  
தமிழ் – சங்க இலக்கியத்தின் மதச்சார்பற்ற தன்மை – சங்க  
இலக்கியங்களில் விநியோக நீதி- திருக்குறளியல் தமிழ்  
மேலாண்மை – E. தமிழ் நிலத்தில் பௌத்தம் மற்றும் சமணத்தின்  
தாக்கம் - பக்தி இலக்கியம் ஆழ்வார்கள் மற்றும் நாயன்மார்கள் -  
சிறு கவிதை வடிவங்கள் - தமிழில்நவீன இலக்கியத்தின் வளர்ச்சி -  
பாரதியார் மற்றும் பாரதிதாசன் பங்களிப்பு.

#### UNIT II பாரம்பரியம் – நவீன கலைக்கு பாறை ஓவியங்கள் –

3

சிற்பம் தமிழர்களின் பாரம்பரியம் / தமிழர்மரபு நாயகக் கல்  
முதல் நவீன சிற்பம் வரை – வெண்கல சின்னங்கள் பழங்குடியினர்  
மற்றும் அவர்களின் கைவினைப்பொருட்கள் – கோவில் கார்  
தயாரிக்கும் கலை பாரிய டெரகோட்டா, வில்வக் கட்டிடங்கள்  
கன்னியாகுமரி, இசைக்கருவிகள் தயாரித்தல் - மிருதங்கம், பாறை,  
வீணை, யாழ் மற்றும் நாதஸ்வரம் தமிழர்களின் சமூக மற்றும்  
பொருளாதார வாழ்வில் கோயில்களின் பங்கு.

#### UNIT III தமிழர்களின் பாரம்பரியம் / தமிழர்மரபு

3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியன் கூத்து,  
ஒயிலாட்டம், தோல்பப்பெட்ரி, சிலம்பாட்டம், வளரி, புலி நடனம் –  
தமிழர்களின் விளையாட்டு மற்றும் விளையாட்டுகள்.

#### UNIT-IVதமிழர்களின் திணை கருத்து

3

தமிழர்களின் தாவரங்கள் மற்றும் விலங்கினங்கள் மற்றும்  
தொல்காப்பியம் மற்றும் சங்க இலக்கியங்களிலிருந்து அகம்  
மற்றும் புரம் கருத்து-தமிழர்களின் அறம் கருத்து – சங்க  
காலத்தில் கல்வி மற்றும் எழுத்தறிவு – பண்டைய நகரங்கள்  
மற்றும் ஏற்றுமதி

#### UNIT V இந்திய தேசிய இயக்கத்திற்கும் இந்திய கலாச்சாரத்திற்கும்

3

#### தமிழர்களின் பங்களிப்பு

தமிழர்களின் பாரம்பரியம் / தமிழர்மரபு இந்திய சுதந்திரப் போராட்டத்திற்கு

தமிழர்களின் பங்களிப்பு - இந்தியாவின் பிறபகுதிகளில் தமிழர்களின் கலாச்சார செல்வாக்கு சித்தாஜெனின் சுயநலம். மருத்துவ முறைகள் - கல்வெட்டுகள் & கையெழுத்துப் பிரதிகள் - தமிழ் புத்தகங்களின் அச்ச வரலாறு.

#### TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண் போடும் - மக.மக. பிள்மள (தவளியீடு):

தமிழ்நாடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).

2. கணினித்தமிழ் - முனவர்இல. சுந்தரம். (விகடன் பிரசுரம்).

3. கீழடி - மவமக நதிக்கமரயில் ஂங்ககொல நகர நொகரிகம் (ததொல்லியல் துமறதவளியீடு)

4. தபொருமந - ஆற்றங்கமர நொகரிகம். (ததொல்லியல் துமற தவளியீடு)

5. Social Life of Tamils (Dr.KKPillay) TNTB & ESC மற்றும் RMRL ஆகியவற்றின் கூட்டு வெளியீடு - (அச்ச வடிவில்)

6. தமிழர்களின் சமூக வாழ்க்கை - செம்மொழி காலம் (Dr.S.Singaravelu)

#### UNIT I LANGUAGE AND LITERATURE

3

Language Families in India - Dravidian 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 & 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, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, 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 & Manuscripts – Print History of Tamil Books.

#### **TEXT-CUM-REFERENCE BOOKS**

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & 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. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.hirunavukkarasu) (Published by: International Institute of Tamil Studies).
4. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by:International Institute of Tamil Studies)
5. Keeladi – ‘Sangam City Civilization on the banks of river Vaigai’ (Jointly Published by:Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation,Tamil Nadu)

## COMMUNICATION SKILL LABORATORY

LHS23101

**L T P C**  
**0 0 3 1.5**

### Course Objectives:

- To improve the communicative competence of learners
- To help learners use language effectively in academic /work contexts
- To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- To build on students English language skills by engaging them in listening, speaking and grammar learning activities relevant to authentic contexts.
- To use language efficiently in expressing their opinions via various media.

### Unit I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION

Listening to voicemail & messages; Listening and filling a form. Speaking – making telephone calls-Self Introduction; Introducing a friend; -politeness strategies- making polite requests, making polite offers, replying to polite requests and offers- understanding basic instructions ( filling out a bank application for example), Role Play

### Unit II NARRATION AND SUMMATION

Listening – Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities. Speaking – Narrating personal experiences / events-Talking about current and temporary situations & permanent and regular situations

### Unit III VERBAL ABILITY

Vocabulary, Grammar, Reading Comprehension, Critical Reasoning, Analogies, Sentence Correction, Idioms and Phrases, Para-jumbles, Synonyms and Antonyms, Reading Speed and Comprehension.

### Unit IV CLASSIFICATION AND RECOMMENDATIONS

Listening – Listening to TED Talks; Listening to lectures – and educational videos. Speaking -Small Talk; General presentation, technical Presentation

### Unit V EXPRESSION

Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. Speaking -making predictions- talking about a given topic-giving opinions-understanding a website-describing processes, Group discussion, Debates

**TOTAL: 30 PERIODS**

### Learning Outcomes:

At the end of the course, learners will be able

- To listen and comprehend complex academic texts
- To speak fluently and accurately in formal and informal communicative contexts
- To express their opinions effectively in both oral and written medium of communication

### Assessment Pattern

- End Semester ONLY listening and Reading will be conducted online, and Speaking and Writing offline

**COURSE OBJECTIVES:**

The student should be able to:

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student as an active participant in each part of all lab exercises.

**PHYSICS LABORATORY: (Any seven experiments to be conducted)**

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus
4. Uniform bending – Determination of Young's modulus
5. Laser- Determination of the wave length of the laser using grating
6. Air wedge - Determination of thickness of a thin sheet/wire
7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle.  
b) Compact disc-Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect
12. Michelson Interferometer.
13. Melde's string experiment
14. Experiment with lattice dynamics kit.

**TOTAL: 30 PERIODS****COURSE OUTCOMES:**

At the end of the course, the students will be able to:

- Apply the principle of elasticity vs Young 's modulus & rigidity modulus of Engineering materials.
- Apply the principle elasticity in determining compressibility of liquids using ultrasonic waves.
- Apply the principle of optics in fiber optical communication.
- Apply thermal properties of various insulating materials in engineering applications.
- Use the basic instruments like vernier caliper, micrometer and microscope for various basic measurements.

## CHEMISTRY LABORATORY

LBS23101

L T P C  
0 0 3 1.5

### CHEMISTRY LABORATORY:

#### COURSE OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
  - To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
  - To demonstrate the analysis of metals and alloys.
  - To demonstrate the synthesis of nanoparticles
1. Preparation of  $\text{Na}_2\text{CO}_3$  as a primary standard and estimation of acidity of a water sample using the primary standard
  2. Determination of types and amount of alkalinity in a water sample.
    - Split the first experiment into two
  3. Determination of total, temporary & permanent hardness of water by EDTA method.
  4. Determination of DO content of water sample by Winkler's method.
  5. Determination of chloride content of water sample by Argentometric method.
  6. Estimation of copper content of the given solution by Iodometry.
  7. Estimation of TDS of a water sample by gravimetry.
  8. Determination of strength of given hydrochloric acid using pH meter.
  9. Determination of strength of acids in a mixture of acids using conductivity meter.
  10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
  11. Estimation of iron content of the given solution using potentiometer.
  12. Estimation of sodium /potassium present in water using a flame photometer.
  13. Preparation of nanoparticles ( $\text{TiO}_2/\text{ZnO}/\text{CuO}$ ) by Sol-Gel method.
  14. Estimation of Nickel in steel
  15. Proximate analysis of Coal

**TOTAL : 30 PERIODS**

#### COURSE OUTCOMES :

- To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
- To determine the amount of metal ions through volumetric and spectroscopic techniques
- To analyse and determine the composition of alloys.
- To learn simple method of synthesis of nanoparticles
- To quantitatively analyse the impurities in solution by electroanalytical techniques

#### TEXT BOOKS :

1. J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis (2009).

**PRATHYUSHA ENGINEERING COLLEGE**

**(An Autonomous Institution)**



**ESTD. 2001**

**DEPARTMENT OF SCIENCE AND HUMANITIES**

**REGULATIONS 2023**

**CHOICE BASED CREDIT SYSTEM**

**SEMESTER - II**

- 1. MA2302 DIFFERENTIAL EQUATIONS AND TRANSFORM TECHNIQUES**
- 2. HS23202 PROFESSIONAL ENGLISH**
- 3. HS20203 TAMIL AND TECHNOLOGY**



**UNIT I ORDINARY DIFFERENTIAL EQUATIONS (12)**

Homogeneous linear ordinary differential equations of second order, linearity principle, general solution-Particular integral- Operator method – Solution by variation of parameters – Method of undetermined coefficients– Homogeneous equations of Euler-Cauchy and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

**UNIT II PARTIAL DIFFERENTIAL EQUATIONS (12)**

Formation of partial differential equations - Singular integrals - Solutions of standard types of first order partial differential equations - Lagrange's linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

**UNIT III FOURIER SERIES (12)**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series – Complex form of Fourier series – Parseval's Identity – Harmonic Analysis.

**UNIT IV FOURIER TRANSFORMS (12)**

Fourier integral theorem – Fourier transform pair– Fourier Sine and Cosine transforms – Properties – Transform of elementary functions – Convolution theorem(without proof) – Parseval's Identity.

**UNIT V Z-TRANSFORMS (12)**

Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and Final value theorems – Formation of difference equation – Solution of difference equation using Z-transform.

**TOTAL: 60 PERIODS****COURSE OUTCOMES:**

**At the end of the course, the students will be able to:**

- CO1:** Solve higher order ordinary differential equations which arise in engineering applications.
- CO2:** Solve the partial differential equations in solving engineering problems.
- CO3:** Apply Fourier series techniques in engineering applications.
- CO4:** Understand the Fourier transform techniques in solving engineering problems.
- CO5:** Understand the Z-transforms techniques in solving difference equations.

**TEXT BOOKS:**

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 44<sup>th</sup> Edition, New Delhi, 2017.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India Pvt Ltd., New Delhi, 2015.

**REFERENCES:**

- 1.N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- 2.Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education 2<sup>nd</sup> Edition, 5<sup>th</sup> Reprint, Delhi.
- 3.Jain R. K. and Iyengar S.R.K., "Advance Engineering Mathematics", Narosa Publications, 5<sup>th</sup> Edition, New Delhi, 2017.
- 4.Peter V.O'Neil, "Advance Engineering Mathematics", Cengage Learning India Pvt Ltd, 7<sup>th</sup> Edition, New Delhi, 2012.
- 5.Ramana B. V., "Higher Engineering Mathematics", Tata Mcgraw Hill Co. Ltd., 11<sup>th</sup> Reprint, New Delhi, 2010.

**COURSE OBJECTIVES:**

- To improve the communicative competence of learners
- To learn to use basic grammatic structures in suitable contexts
- To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text
- To help learners use language effectively in professional contexts
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.

**UNIT I INTRODUCTION TO EFFECTIVE COMMUNICATION 1**

What is effective communication? (Explain using activities) Why is communication critical for excellence during study, research and work? What are the seven C's of effective communication? What are key language skills? What is effective listening? What does it involve? What is effective speaking? What does it mean to be an excellent reader? What should you be able to do? What is effective writing? How does one develop language and communication skills? What does the course focus on? How are communication and language skills going to be enhanced during this course? What do you as a learner need to do to enhance your English language and communication skills to get the best out of this course?

**INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION 8**

Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. Writing - Writing emails / letters introducing oneself. Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags. Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

**UNIT II NARRATION AND SUMMATION 9**

Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) Grammar - forms of Verbs -Subject-Verb Agreement; and Prepositions. Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.

**UNIT III DESCRIPTION OF A PROCESS / PRODUCT 9**

Reading – Reading advertisements, gadget reviews; user manuals. Writing - Writing definitions; instructions; and Product /Process description. Grammar – Tenses (past, present future) Imperatives; Adjectives; Degrees of comparison; . Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).

**UNIT IV CLASSIFICATION AND RECOMMENDATIONS 9**

Reading – Newspaper articles; Journal reports –and Non Verbal Communication ( tables, pie charts etc., ). Writing – Note-making / Note-taking (\*Study skills to be taught, not tested); Writing recommendations; Transferring information from non verbal ( chart , graph etc, to verbal mode) Grammar – Articles; Pronouns - Possessive & Relative pronouns. Vocabulary - Collocations; Fixed / Semi fixed expressions.

**UNIT V EXPRESSION 9**

Reading – Reading editorials; and Opinion Blogs; Writing – Essay Writing (Descriptive or narrative). Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, Compound & Complex Sentences. Vocabulary - Cause & Effect Expressions – Content vs Function words.

**COURSE OUTCOMES :**

At the end of the course, learners will be able

CO1:To use appropriate words in a professional context

CO2:To gain understanding of basic grammatic structures and use them in right context.

CO3:To read and infer the denotative and connotative meanings of technical texts

CO4:To write definitions, descriptions, narrations and essays on various topics

**TEXT BOOKS :**

1.English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)

2.English for Science & Technology Cambridge University Press, 2021.

Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

**REFERENCES:**

1.Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.

2.A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.

3.English For Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill Education, ISBN : 0070264244.

4.Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.

5.Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.

**ASSESSMENT PATTERN**

**Two internal assessments and an end semester examination to test students' reading and writing skills along with their grammatical and lexical competence.**

## தமிழரும் தொழில்நுட்பமும்

HS23203

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### UNIT I நெசவு மற்றும் செராமிக் தொழில்நுட்பம்

3

சங்க காலத்தில் நெசவுத் தொழில் - பீங்கான் தொழில்நுட்பம் - கருப்பு மற்றும் சிவப்பு பாத்திரங்கள் (BRW) - மட்பாண்டங்கள் மீது கிராஃபிட்டி.

### UNIT II வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பம்

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சங்க காலத்தில் வீட்டு உபயோகப் பொருட்களில் வடிவமைத்தல் மற்றும் கட்டமைப்பு கட்டுமானங்கள் - கட்டிட பொருட்கள் மற்றும் சங்க காலத்து மாவீரர் கற்கள் - சிலப்பதிகாரத்தில் கட்டப்பட்ட கட்டடங்களின் விவரங்கள் - மாமல்லபுரத்தில் உள்ள சிற்பங்கள் மற்றும் கோவில்கள் - சோழர்களின் பெரிய கோவில்கள் மற்றும் பிற வழிபாட்டு தலங்கள் - நாயக்கர் கால கோவில்கள் - வகை ஆய்வு (மதுரை மீனாட்சி கோயில்)- திருமலை நாயக்கர் மஹால் - செட்டி நாடு வீடுகள், ஆங்கிலேயர் காலத்தில் மதராஸில் உள்ள இந்தோ - சரசெனிக் கட்டிடக்கலை .

### UNIT III உற்பத்தி தொழில்நுட்பம்

3

கப்பல் கட்டும் கலை - உலோகவியல் ஆய்வுகள் - இரும்புத் தொழில் - இரும்பு உருகுதல், எஃகு - தாமிரம் மற்றும் தங்க நாணயங்கள் வரலாற்றின் ஆதாரமாக - நாணயங்கள் அச்சிடுதல் - மணிகள் செய்யும் தொழில்கள் கல் மணிகள் - கண்ணாடி மணிகள் - டெரகோட்டா மணிகள் - ஷெல் மணிகள் / எலும்பு துடிப்புகள் - தொல்பொருள் சான்றுகள் சிலப்பதிகாரத்தில் விவரிக்கப்பட்டுள்ள ரத்தினக் கற்கள் .

### UNIT IV விவசாயம் மற்றும் நீர்ப்பாசன தொழில்நுட்பம்

3

அணை, தொட்டி, குளங்கள், மதகு, சோழர் கால குமிழி தூம்பு முக்கியத்துவம், கால்நடை பராமரிப்பு- கால்நடைகள் பயன்படுத்த வடிவமைக்கப்பட்ட கிணறுகள் - விவசாயம் மற்றும் வேளாண் செயலாக்கம் - கடல் அறிவு - மீன்வளம் - முத்து - சங்கு டைவிங் - கடல் பற்றிய பண்டைய அறிவு - கடல் குறிப்பிட்ட அறிவு - அறிவு.

### UNIT V அறிவியல் தமிழ் & தமிழ் கம்ப்யூட்டிங்

3

அறிவியல் தமிழ் வளர்ச்சி - தமிழ் கணினி - தமிழ் நூல்களின் டிஜிட்டல் மயமாக்கல் - தமிழ் மென்பொருள் உருவாக்கம் - தமிழ் மெய்நிகர் அகாடமி - தமிழ் டிஜிட்டல் நூலகம் - இணைய தமிழ் அகராதிகள் - சொற்குவை திட்டம்.

## டெக்ஸ்ட்-கம்-குறிப்பு

1. தமிழக வரலாறு – மக்களும் பண் போடும் – கக.கக. பிள்ளை (தவளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித்தமிழ் – மூலவர்இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வளக நதிக்களரயில் சங்ககொல நகர
4. தபொருளந – ஆற்றங்களர நொகரிகம். (ததொல்லியல் துளற தவளியீடு)
5. தமிழர்களின் சமூக வாழ்க்கை (Dr.KKPillay) TNTB & ESC மற்றும் RMRL ஆகியவற்றின் கூட்டு வெளியீடு – (அச்சில்)
6. தமிழர்களின் சமூக வாழ்க்கை – செம்மொழி காலம் (டாக்டர்.எஸ்.சிங்காரவேலு) (வெளியீடு:சர்வதேச தமிழாய்வு நிறுவனம்.
7. தமிழர்களின் வரலாற்றுப் பாரம்பரியம் (டாக்டர்.எஸ்.வி.சுபதமணியன், டாக்டர்.கே.டி. திருநாவுக்கரசு) (வெளியீடு: சர்வதேசம் தமிழாய்வு நிறுவனம் ).(கூட்டு வெளியீடு:தொல்லியல் துறை & தமிழ்நாடு பாடநூல் மற்றும் கல்வி சேவைகள் கழகம், தமிழ்நாடு)
10. இந்திய வரலாற்றில் சிறப்புக் குறிப்புடன் தமிழ்நாட்டின் ஆய்வுகள் (டாக்டர். கே.கே.பிள்ளை)(வெளியீடு: ஆசிரியர்)
11. பொருளை நாகரிகம் ( கூட்டாக வெளியீடு: தொல்லியல் துறை & தமிழ்நாடு பாடபுத்தகம் மற்றும் கல்வி சேவைகள் கழகம், தமிழ்நாடு)
12. வைகைக்கு சிந்து நாகரீக பயணம் (ஆர்.பாலகிருஷ்ணன்) (வெளியீடு: ஆர்.எம்.ஆர்.எல்) - குறிப்பு புத்தகம்.

**UNIT I WEAVING AND CERAMIC TECHNOLOGY**

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

**UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY**

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**

Art of Ship Building – Metallurgical studies – Iron industry – Iron smelting, steel -Copper and gold Coins as source of history – Minting of Coins – Beads making-industries Stone beads -Glass beads – Terracotta beads -Shell beads/ bone beads – Archeological evidences – Gem stone types described in Silappathikaram.

**UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu 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**

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.

**TEXT-CUM-REFERENCE BOOKS**

1. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & 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. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
4. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
5. Keeladi – ‘Sangam City Civilization on the banks of river Vaigai’ (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
6. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
7. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
8. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.