PAAVAI ENGINEERING COLLEGE, NAMAKKAL – 637018
(AUTONOMOUS)
B.Tech. BIOTECHNOLOGY
REGULATIONS 2023
(CHOICE BASED CREDIT SYSTEM)
(Applicable to the students admitted during the academic year 2023 – 2024 onwards)
CURRICULUM

SEMESTER I

S.No	Category	Course Code	Course Title	L	T	P	C
1			Induction Programme				
Theory							
2	HS	GE23101	தமிழர்மரபு/Heritage of Tamils	1	0	0	1
3	BS	MA23101	Matrices and Calculus	3	1	0	4
4	BS	CH23103	Chemistry for Technologists	3	0	0	3
5	ES	ME23101	Engineering Graphics	2	0	2	3
6	ES	EE23101	Basic Electrical and Electronics Engineering	3	0	0	3
Theory with Laboratory							
7	HS	EN23101	Communication Skills for Engineers I.	2	0	2	3
Practical							
8	BS	CH23104	Chemistry Laboratory	0	0	2	1
9	ES	GE23103	Civil and Mechanical Engineering Practices Laboratory	0	0	2	1
			TOTAL	**14**	**1**	**8**	**19**

SEMESTER II

S.No	Category	Course Code	Course Title	L	T	P	C
Theory							
1	HS	GE23201	தமிழரும்தொழில்நுட்பமும்/ Tamils and Technology	1	0	0	1
2	BS	MA23201	Complex Variables and Differential Equations	3	1	0	4
3	BS	PH23202	Physics of Materials	3	0	0	3
4	ES	CS23201	Problem Solving and Python Programming	3	0	0	3
5	PC	BT23201	Bioorganic Chemistry	3	0	0	3
Theory with Laboratory							
6	HS	EN23201	Communication Skills for Engineers II	2	0	2	3
Practical							
7	BS	PH23205	Physics of Materials Laboratory	0	0	2	1
8	ES	CS23202	Problem Solving and Python Programming Laboratory	0	0	4	2
9	ES	GE23202	Electrical and Electronics Engineering Practices Laboratory	0	0	2	1
10	PC	BT23202	Bioorganic Chemistry Laboratory	0	0	2	1
			TOTAL	**15**	**1**	**12**	**22**

PAAVAI ENGINEERING COLLEGE, NAMAKKAL
Approved
BOARD OF STUDIES
BIOTECHNOLOGY
8/9/23
AUTONOMOUS

GE23101	தமிழர் மரபு	L P T C 1 0 0 1

அலகு I மொழி மற்றும் இலக்கியம் 3

இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி- தமிழ் செவ்விலக்கியங்கள் – சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ்க் காப்பியங்கள் தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு II மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை 3

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம், - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள் 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியன் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு IV தமிழர்களின் திணைக் கோட்பாடுகள் 3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அறம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறைமுகங்களும் – சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு 3

இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப்படிகள் – தமிழ்ப் புத்தகங்கள் அச்சு வரலாறு.

TOTAL PERIODS: 15

TEXT CUM REFERENCE BOOKS:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை. (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A Joint publication of TNTB & ESC and RMRL – (in print).
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by International institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subramanian, Dr.K.D.Thirunavukkarasu)
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by International institute of Tamil Studies)
9. Keeladi – 'Sangam City Civilzation on the vanks of river vaigai' (Jointly Published by Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by the author)
11. Porunai Civilization (Jointly Published by Department of Arcaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamilnadu).
12. Journey of Civilization Indus to vaigai (R.Balakrishnan) (Published by RMRL) – Reference Book

Head of the Department
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Paavai Engineering College (Autonomous)
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GE23101	HERITAGE OF TAMILS	L	P	T	C
		1	0	0	1

UNIT I LANGUAGE AND LITERATURE 3

Language Families in India - Dravidian Languages – Tamil as aClassical 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, Yazh 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.

TOTAL PERIODS: 15

TEXT CUM REFERENCE BOOKS:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை. (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A Joint publication of TNTB & ESC and RMRL – (in print).
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by International institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subramanian, Dr.K.D.Thirunavukkarasu)
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by International institute of Tamil Studies)
9. Keeladi – 'Sangam City Civilzation on the vanks of river vaigai' (Jointly Published by Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by the author)
11. Porunai Civilization (Jointly Published by Department of Arcaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamilnadu).
12. Journey of Civilization Indus to vaigai (R.Balakrishnan) (Published by RMRL) – Reference Book

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MA23101 **MATRICES AND CALCULUS** **3 1 0 4**

(COMMON TO ALL BRANCHES)

OBJECTIVES

To enable the students to

- understand the concepts of Eigen values and Eigen vectors of real matrices and its applications in the process of diagonalization of real symmetric matrices.
- study applications of Rolle's and Mean Value Theorems and also to understand the concept of maxima and minima using derivatives.
- learn the concept of partial differentiation and its applications to maxima and minima of functions of two or more variables.
- develop a thorough knowledge of definite and indefinite integrals
- learn the concepts of multiple integrals and their applications

UNIT I MATRICES **12**

Characteristic equation; Eigenvalues and Eigenvectors of a real matrix, Properties; Statement and applications of Cayley-Hamilton theorem; Diagonalisation of a real symmetric matrix by Similarity and Orthogonal transformation; Quadratic form - Reduction of quadratic form to canonical form by orthogonal transformation – Applications: Stretching of an elastic membrane.

UNIT II DIFFERENTIAL CALCULUS **12**

Limits and Continuity, properties of limit and classification of discontinuities; Tangent problems; Differentiation – Standard forms, Successive differentiation and Leibnitz theorem, Mean value theorem, Rolle's theorem – 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; Differentiation of implicit functions – Jacobians, Taylor's expansion – Applications: Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT IV INTEGRAL CALCULUS **12**

Definite and indefinite integrals; Properties of integrals; Methods of integration – Substitution method, Integration by parts, Bernoulli's formula – Reduction formulae involving exponential and trigonometric functions.

UNIT V MULTIPLE INTEGRALS **12**

Double integration – Cartesian and polar coordinates, Change of order of integration, Change of Variables; Triple integration in Cartesian co-ordinates – Area as double integral – Volume as triple integral.

TOTAL PERIODS: 60

OUTCOMES

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

- determine eigen values and eigen vectors and diagonalize real symmetric matrices.
- classify various types of functions involved in engineering fields, their differentiation techniques and applications
- find partial derivatives and apply the same to find maxima and minima of two or more variables
- implement different methods of integration used in engineering problems
- execute suitable integration techniques to calculate surface areas and volumes.

TEXT BOOKS

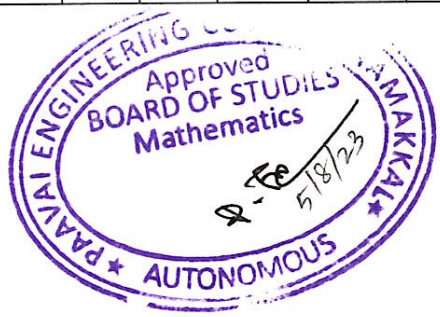
1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition, New Delhi, 2017.
2. T. Veerarajan., "Engineering Mathematics", 3rd Edition, Tata McGraw Hill, 2011.

REFERENCE BOOKS

1. Erwin Kreyszig., "Advanced Engineering Mathematics" 10th Edition, Wiley Publications, New Delhi, 2016.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
3. Dass, H.K., and Er. Rajnish Verma, "Higher Engineering Mathematics", S. Chand Private Ltd, 2011.
4. Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education, 2012.
5. James Stewart, "Calculus", 8th Edition, Cengage Learning, USA, 2015 reprint.

CO/PO Mapping:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3- Strong, 2-Medium, 1-Weak														
CO	Programmes Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	3	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	3	-	-



CH23103 **CHEMISTRY FOR TECHNOLOGISTS** **3 0 0 3**

(Common to BioTech., Chemical, Food Tech., & Pharma)

COURSE OBJECTIVES

To enable the students to

- inculcate sound understanding of water quality parameters and water treatment techniques.
- estabilish basic knowledge of polymer composition from monomers.
- notify the students with the basics of dyes and colour formation.
- understand the preparation and properties of oils, fats and lubricants.
- impart knowledge on the basic principles and preparatory methods of nanomaterials.

UNIT I WATER CHEMISTRY **9**

Water-sources and impurities – water quality parameter: colour, odour, pH, hardness, alkalinity, TDS, COD, BOD, and heavy metals. Hardness of water –types –expression of hardness –units –estimation of hardness of water by EDTA–boiler troubles (scale and sludge, priming and foaming, caustic embrittlement and boiler corrosion) –boiler feed water –Treatments-Internal treatment (phosphate and calgon conditioning) external treatment –Ion exchange process–desalination-Reverse Osmosis.

UNIT II POLYMERS **9**

Introduction: Functionality –degree of polymerization. Classification of polymers – Natural and Synthetic; Thermoplastic and Thermosetting plastics. Functionality –Addition (Free Radical, cationic and anionic mechanism); condensation and copolymerization. Preparation, properties and uses of Nylon 6, Teflon, Kevlar and polycarbonate (Lexan). Compounding and Fabrication Techniques: Injection, Extrusion, Blow and Calendaring.

UNIT III DYES **9**

Introduction, Definition-.Classification- acid, base, azo, vat and reactive dyes. -Theory of colour and constitution - Preparation and uses of 1) Azo dye-methyl orange 2) Triphenyl methane dye -Malachite green 3) Phthalein dye -phenolphthalein and fluorescein 4) Vat dye –Indigo 5) Anthraquinione dye –Alizarin.

UNIT IV OILS, FATS AND LUBRICANTS **9**

Definitions-oils-Chemical analysis of oils and fats – acid, saponification and iodine values- Lubricants-mechanism of lubrication, characteristics – viscosity, viscosity index, oiliness, flash and fire points, cloud and pour points, aniline point. Semi-solid lubricant – greases, preparation of lithium and calcium greases and uses, Solid lubricants – graphite and molybdenum disulphide structure, properties and uses.

UNIT V NANOMATERIALS **9**

Basics-distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Nanoscale materials properties and uses of nanocluster, rods, tubes (CNT) and wires. Preparation of nanoparticles-thermolysis, hydrothermal, solvothermal and sol-gel methods. Preparation of Carbon nanotube by chemical vapour deposition, laser ablation; applications of nanomaterials in medicine, batteries and Electronics agriculture, and biotechnology.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- analyze the water quality parameters and treatment methods.
- understand the quality and uses of polymer.
- identify the constituents, applied in the dyes field.
- exposure to the fatty acids and lubricants formation..
- elaborate the importance and advancements of nanomaterials.

TEXT BOOKS

1. Jain P.C. and Jain. M., Engineering Chemistry, 17/e, 2014 Dhanpat Rai Publishing Company,New Delhi, Reprint 2017.
2. Dara S.S. and Umare S.S., A text book of Engineering Chemistry,12/e S.Chand and Company Limited, New Delhi 2016.

REFERENCES

1. B.K.Sharma "Industrial Chemistry", 11th ed., (2015), Goel Publication, Meerut.
2. P.L.Soni "Text Book of Organic Chemistry", 26th Ed., (2017), S. Chand & Co, New Delhi.
3. ArunBahl and B.S. Bahl "Text Book of Organic Chemistry", 22nd Ed., (2016), S.Chand, New Delhi.
4. R.Chatwal., "Synthetic dyes" 6th edition,(2013) Himalaya publication House , New Delhi.

CO - PO Mapping:

Mapping of Course Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	1	-	2	-	-	3	2	-	-	-	-	2	-	-
CO2	3	2	2	1	1	1	2	-	1	1	1	1	-	-
CO3	2	2	3	2	-	1	1	-	-	-	-	-	-	-
CO4	3	3	2	2	-	1	1	-	-	-	-	2	-	-
CO5	1	1	2	-	2	1	-	-	-	-	-	2	-	-

ME23101 **ENGINEERING GRAPHICS** 2 0 2 3

(Common to All Branches)

COURSE OBJECTIVES

To enable the students to

- familiarize concepts like dimensioning, conventions and standards related to engineering drawing and imbibe knowledge on plane curves and projection of points.
- understand on projection of lines and plane surfaces
- develop the visualization skills for understanding the projection of solids
- illustrate on sectioning of solids and development of surfaces for simple solids
- comprehend the orthographic projection and isometric view

CONCEPTS AND CONVENTIONS (Not for Examination) 2

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 PLANE CURVES AND PROJECTION OF POINTS 8+3

Basic Geometrical constructions, Curves used in Engineering Practices: Conics – Construction of Ellipse, Parabola and Hyperbola by eccentricity method – Construction of cycloid – Construction of involutes of square and circle – Construction of spiral curve – Drawing of tangents and normal to the above curves - Projection of points in four quadrants.

UNIT II PROJECTION OF LINES AND PLANES 8+3

Projection of straight lines (only First angle projections) inclined to both the HP & VP -Determination of true lengths and true inclinations by Change of Position method. Projection of Planes (Square, Pentagon, Hexagon and Circle) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 9+3

Projection of simple solids like Square Prism, Pentagonal Prism, Hexagonal Prism, Square Pyramid, Pentagonal Pyramid, Hexagonal Pyramid, Cylinder and Cone when the axis is inclined to one of the principal planes (either horizontal or vertical plane).

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 9+3

Sectioning of Prisms (Square, Pentagon, Hexagon) and Pyramids (Square, Pentagon, Hexagon), cylinder and cone in simple vertical position when the cutting plane is inclined to one of the principal planes (HP & VP) and perpendicular to the other – obtaining true shape of section; Development of lateral surfaces of simple and sectioned solids mentioned above.

UNIT V ORTHOGRAPHIC AND ISOMETRIC PROJECTIONS 9+3

Representation of Three-dimensional objects –Need for importance of multiple views and their placement – First angle projection – layout views –developing visualization skills through multiple views from pictorial views of objects; Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids -Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Conversion of Isometric view to orthographic projection.

TOTAL PERIODS: 60

COURSE OUTCOMES

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

- draw the basic curves and projection of points in four quadrants
- delineate the projections of straight lines and plane surfaces in given quadrant
- comprehend the projection of solids in various positions in first quadrant
- generate the sectioning of solids and development of surfaces
- interpret orthographic and isometric projection of simple solids

TEXT BOOKS

1. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2016.
2. Prabhakaran.S, Makesh.M, Subburam.V, "Engineering Graphics", Maruthi Publishers, Chennai, 2018.

REFERENCES

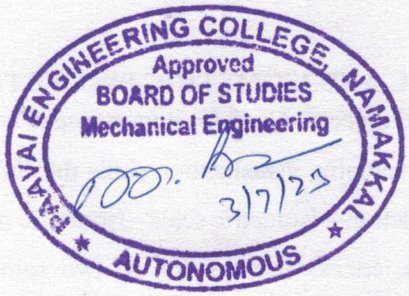
1. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
2. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
3. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009
4. N.D.Bhatt., "Engineering Drawing", Charotar Publishing House Pvt Ltd, Fifty third edition, 2014.

CO - PO Mapping

Mapping of Course Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	2	-	-	-	-	2	-	2	2	2
CO2	3	2	2	-	2	-	-	-	-	2	-	2	2	2
CO3	3	2	2	-	2	-	-	-	-	2	-	2	2	2
CO4	3	2	2	-	2	-	-	-	-	2	-	2	2	2
CO5	3	2	2	-	2	-	-	-	-	2	-	2	2	2



EE23101 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- know the electrical circuit concepts.
- familiarize the basics of electrical machines.
- provide the knowledge about the semiconductor device and basic switching circuits.
- impart the knowledge on instruments used for measurements.
- recognize the wiring system, earthing and protective devices for domestic purpose.

UNIT I ELECTRICAL CIRCUITS **9**

DC circuits - Ohm's law, resistance in series and parallel, Kirchhoff's laws, mesh current method, nodal voltage method; AC circuits - Phase, average value, RMS value, form factor, peak factor, instantaneous power, real power, reactive power and apparent power, power factor, RLC series circuits (Simple problems only).

UNIT II ELECTRICAL MACHINES (Quantitative only) **9**

DC machines - Construction and working principle, EMF equations, types and applications; Transformer- Construction, working principle and application; Single phase induction motor- Construction and principle of operation; Starting methods - Split phase motor, capacitor start motor, shaded pole motor.

UNIT III ANALOG AND DIGITAL ELECTRONICS **9**

Operation and characteristics of PN junction diodes, zener diode, bipolar junction transistor, JFET, MOSFET; Application - Rectifier and voltage regulators; Operational amplifier - Characteristics, basic applications; Basic switching circuits - JK and RS flip flop; 555 Timer - Functional block diagram; Astable and monostable multivibrator.

UNIT IV MEASUREMENTS AND INSTRUMENTATION **9**

Concept of measurements; Instruments and their classification; Moving iron instruments – Construction of attraction type and repulsion type instruments; Moving coil instruments - Principle, construction and working principle; Construction and working of dynamometer type wattmeter and induction type energy meter; Digital multimeter; Instrument transformer – Current transformer (CT), potential transformer (PT).

UNIT V DOMESTIC WIRING AND SAFETY **9**

Types of wiring; Earthing – Purpose of earthing, equipment earthing, system earthing; Methods of earthing - Pipe earthing, plate earthing; Protective devices - Fuse, miniature circuit breaker (MCB), earth leakage circuit breaker (ELCB), residual current circuit breaker (RCCB).

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- analyze the electrical circuit concepts in electrical parameter calculations.
- describe about different types of electrical machines.
- explain about the semiconductor device and basic switching circuits.
- identify the instruments used for measuring different electrical quantities.
- apply wiring system earthing and protective device concept for domestic purpose.

TEXTBOOK

1. C.L.Wadhwa, "Basic Electrical Engineering", New age international Publishers, Fourth edition, Reprint 2021.
2. S.K.Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson Education India, Second edition, 2017.

REFERENCES

1. D P Kothari, I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020.
2. S.K.Sahdev, " Basic Electrical Engineering ", Pearson India Education Services Pvt. Ltd, First Edition, 2015.
3. J.B. Gupta, "Basic Electrical Engineering", S.K. Kataria & Sons Publishers, Seventeenth Edition, 2023.
4. R.K.Rajput, "Basic Electrical and Electronics Engineering", University Science Press, Second Edition, Reprint 2017.

CO-PO MAPPING

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes PO's												PSO's	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	-	-	-	-	1	-	-	2	2	-	-
CO2	3	2	1	-	-	-	-	1	-	-	2	2	-	-
CO3	3	1	-	-	-	-	-	1	-	-	2	2	-	-
CO4	3	1	-	-	-	-	-	1	-	-	2	2	-	-
CO5	3	2	-	-	-	-	-	1	-	-	2	2	-	-

EN23101 **COMMUNICATION SKILLS FOR ENGINEERS I** **2 0 2 3**

(Common to All Branches)

COURSE OBJECTIVES

To enable the students to

- gain knowledge about the significance of vocabulary and syntax.
- develop a strong base in the use of English language.
- enhance the reading skills of the students to communicate confidently and effectively.
- draft effective essays and emails for effective communication.
- improve their basic speaking skills in delivering & confidently participating in impromptu talks.

UNIT I **6**

Language focus - Word Formation - Prefix and suffix, Synonyms, Antonyms; Reading - Sub-skills of Reading, Skimming, Scanning, inferring; Writing -Description of Gadgets and Process; Sounds in English.

UNIT II **6**

Language focus - Spelling - Homophones - Homonyms - Words used as Nouns and Verbs - Comparative Adjectives; Reading - Extensive reading; Letter writing - invitation; acceptance and declining letter - simple expressions.

UNIT III **6**

Language focus - Phrasal verbs - Acronyms - Abbreviations - Tenses; Use of Adjectives and Adverbs; Reading - Note Making; Writing - Paragraph Writing - compare and contrast, and Analytical, Discourse markers, travelogue.

UNIT IV **6**

Language focus - Cause and Effect Expressions - Subject Verb Agreement - Wh questions - Yes or No questions; Reading - Developing analytical skills, Deductive and inductive reasoning; Writing - Instructions, Minutes of meeting.

UNIT V **6**

Language focus - Articles - Sentence Structures - Single line definition; Reading - Interpreting visual information, Writing - Flow Chart, Pie Chart, Bar Chart and Tabular column.

TOTAL PERIODS: 30

LIST OF EXERCISES

1. Self-Introduction and SWOT Analysis
2. JAM
3. Narration of a story or an incident
4. Tongue twisters
5. My day
6. Shadowing
7. Short speeches by adopting the speakers of your choice
8. Presentation Skills

TOTAL PERIODS: 30

COURSE OUTCOMES

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

- develop their vocabulary and grammar to express their ideas both in speaking and writing.
- develop their writing skills with the sufficient vocabulary.
- effectively Interpret and analyze the given text with the proper grammatical patterns, besides, use cohesive devices in professional communication either written or spoken.
- write the creative topics, minutes, essays and letters with the flair of language skills without errors.
- make effective presentations.

TEXT BOOKS

1. N P Sudharshana, C.Savitha. English Technical Communication. Cambridge University Press India Pvt.Ltd, New Delhi.2016.
2. Mahalakshmi.S.N.English and Workbook for Engineers. V.K.Publications, Sivakasi.2017.

REFERENCES

1. Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and practice. Oxford University Press, NewDelhi.2011.
2. Rizvi,Ashraf.M. Effective Technical Communication. Tata McGraw-Hill, NewDelhi.2005.
3. Rutherford, Andrea.J Basic Communication Skills for Technology. Pearson,NewDelhi,2001.

CO - PO Mapping

Mapping of Course Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	-	2	-	3	2	3	2	3	-	-
CO2	-	1	2	-	-	1	1	2	2	3	-	-	-	-
CO3	-	-	1	-	-	1	1	2	2	3	1	1	-	-
CO4	-	2	1.	-	-	2	2	1	2	3	1	1	-	-
CO5	-	3	2	-	-	2	1	2	1	3	1	3	-	-

CHEMISTRY LABORATORY 0 0 2 1

CH23104 (Common toAgri,AI&ML,AI&DS,BioTech,BME,Chemical,FT,CSE(IOT),IT&PT)

COURSE OBJECTIVES

To enable the students to

- acquire practical skills in the determination of water parameter through volumetric and instrumental analysis.
- acquaint with the determination of molecular weight of a polymer.
- explain the amount of corrosion in steel by instrumentation.
- elucidate the presence of metals in aqueous media by volumetric analysis.

LIST OF EXPERIMENTS (Any Eight Experiments)

1. Estimation of Chloride content in water sample by Argentometric method.
2. Determination of Calcium and Magnesium in water sample by complexometric method.
3. Determination of strength of acid by using pH meter.
4. Determination of strength of acids in a mixture using conductivity meter.
5. Conductometric titration of strong acid Vs Strong base.
6. Determination of alkalinity in water sample.
7. Estimation of copper in the water sample using Iodometric titration.
8. Estimation of iron content in the water sample using potentiometric titration.
9. Determination of molecular weight of polymer using Oswald viscometer.
10. Corrosion studies by weight loss method.

TOTAL PERIODS: 30

COURSE OUTCOMES

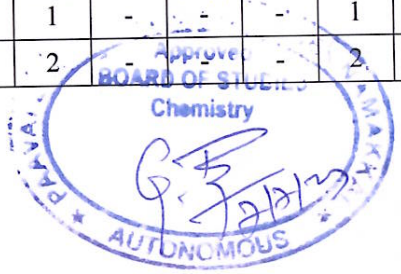
At the end of the course, the students will be able to

- Outfitted with hands-on experience in the quantitative analysis of water quality parameters.
- Evaluate the weight loss in steel.
- Calculate the molecular weight of a given polymer.
- Interpret the presence of metals in aqueous media.

CO - PO Mapping:

Mapping of Course Outcomes with Programme Outcomes:
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	2	1	-	-	-	2	-	-	2	-	-
CO2	2	3	2	2	1	-	-	-	2	-	-	-	-	-
CO3	1	2	1	2	1	-	-	-	1	-	-	-	-	-
CO4	2	1	1	1	2	-	-	-	2	-	-	2	-	-



GE23103 **CIVIL AND MECHANICAL ENGINEERING PRACTICES LABORATORY** **0 0 2 1**

COURSE OBJECTIVES

To enable the students to

- develop their knowledge in basic civil engineering practices such as plumbing, carpentry and its tool usages.
- practice joints by sawing, planning and cutting.
- develop their knowledge in basic mechanical engineering practices such as welding, sheet metal work and its tool usages.
- practice some of mechanical basics such as, fitting, drilling and basic machining.

I. CIVIL ENGINEERING PRACTICE

PLUMBING WORKS

Hands-on-training: Exercise for plumbing works.

1. Single Tap Connection with Shower.
2. Multi Tap Connection for a house plumbing.
3. Connection of two Galvanized Iron pipes.

CARPENTRY WORKS

Hands-on-training: Exercise for carpentry works.

1. Making of T- Joint for the given dimensions.
2. Making of Mortise and Tenon Joint for the given dimensions.
3. Making of Dovetail Joint for the given dimensions.

II. MECHANICAL ENGINEERING PRACTICE

LIST OF EXPERIMENTS:

1. Preparation of Arc Welding of Butt Joints, Lap Joints and Tee-Joints
2. Square Tray, Rectangular Tray and Funnel
3. Vee Fitting, Square Fitting
4. Simple Turning
5. Facing
6. Drilling Practice

TOTAL PERIODS: 30

COURSE OUTCOMES

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

- understand carpentry work in the building, installation of doors and windows.
- install plumbing systems in the building.
- prepare models by welding, machining and sheet metal.
- make the practice for drilling and fittings.

CO - PO Mapping

Mapping of Course Outcomes with Programme Outcomes: **(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak**														
COs	**Programme Outcomes(POs)**													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	1	-	-	-	-	-	-	2	1	2	2	3	2
CO2	3	1	-	-	-	-	-	-	2	1	2	2	3	2
CO3	3	1	-	-	-	-	-	-	2	1	2	2	3	2
CO4	3	1	-	-	-	-	-	-	2	1	2	2	3	2

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GE23201 **தமிழரும் தொழில்நுட்பமும்** L T P C 1 0 0 1

அலகு I நெசவு மற்றும் பானைத் தொழில்நுட்பம் 3

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு II வடுவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் 3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் &சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை வடிவமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும் கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டி நாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக்கலை

அலகு III உற்பத்தி தொழில் நுட்பம் 3

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பு உருக்குதல், எஃகு - வரலாற்றுச் சின்னங்களாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் -எலும்புத் துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு IV வேளாண்மை மற்றும் நீர்பாசனத் தொழில்நுட்பம் 3

அணை - ஏரிகுளங்கள், மதகு - சோழர்காலக் குமிழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு -அறிவுசார் சமூகம்

அலகு V *அறிவியல் தமிழ் மற்றும் கணித்தமிழ்* 3

அறிவியல் தமிழின் வளர்ச்சி -கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் சொற்குவைத் திட்டம்

TOTAL PERIODS: 15

TEXT CUM REFERENCE BOOKS:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை. (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
5. Social Life of Tamils (Dr.K.K.Pillay) A Joint publication of TNTB & ESC and RMRL – (in print).
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by International institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subramanian, Dr.K.D.Thirunavukkarasu)
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by International institute of Tamil Studies)
9. Keeladi – 'Sangam City Civilzation on the vanks of river vaigai' (Jointly Published by Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by the author)
11. Porunai Civilization (Jointly Published by Department of Arcaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamilnadu).
12. Journey of Civilization Indus to vaigai (R.Balakrishnan) (Published by RMRL) – Reference Book

Head of the Department
Department of Science & Humanities
Paavai Engineering College (Autonomous)
NH-44, Pachal, Namakkal-637 018

GE23201	TAMILS AND TECHNOLOGY	L	T	P	C
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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 goldCoins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

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 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

TOTAL PERIODS: 15

TEXT CUM REFERENCE BOOKS:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை. (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).

5. Social Life of Tamils (Dr.K.K.Pillay) A Joint publication of TNTB & ESC and RMRL – (in print).
6. Social Life of the Tamils – The Classical Period (Dr.S.Singaravelu) (Published by International institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subramanian, Dr.K.D.Thirunavukkarasu)
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by International institute of Tamil Studies)
9. Keeladi – 'Sangam City Civilzation on the vanks of river vaigai' (Jointly Published by Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by the author)
11. Porunai Civilization (Jointly Published by Department of Arcaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamilnadu).
12. Journey of Civilization Indus to vaigai (R.Balakrishnan) (Published by RMRL) – Reference Book

Head of the Department
Department of Science & Humanities
Paavai Engineering College (Autonomous)
NH-44, Pachal, Namakkal-637 018

MA23201 COMPLEX VARIABLES AND DIFFERENTIAL EQUATIONS 3 1 0 4

(Common to AGRI, AERO, BME, BIOTECH, CIVIL, CHEMICAL, ECE, EEE, FOOD, MECH, MCT, ROBOTICS, PHARMA)

OBJECTIVES

To enable the students to

- develop analytical techniques to solve various higher order differential equations with constant and variable coefficients
- study Laplace Transforms of various standard functions, periodic functions and understand the techniques of solving ordinary differential equations using Laplace Transform methods.
- gain knowledge on differentiation and integration of vector-valued functions
- understand the differential calculus of complex variables and analytic functions
- recognize the concept of complex integration applied in engineering disciplines

UNIT I ORDINARY DIFFERENTIAL EQUATIONS **12**

Higher order linear differential equations with constant coefficients; Method of variation of parameters; Method of undetermined coefficients; Cauchy's and Legendre's linear equations.

UNIT II LAPLACE TRANSFORM **12**

Laplace transform - Transform of elementary functions, Properties; Transform of periodic functions; Definition of Inverse Laplace transforms - Statement and applications of Convolution theorem; Initial and Final value theorems; Solution of linear ODE of second order with constant coefficients by Laplace transforms.

UNIT III VECTOR CALCULUS **12**

Gradient, Divergence and Curl, Directional derivative; Irrotational and solenoidal vector fields; Vector integration – Statement of Green's, Gauss divergence and Stokes' theorem, Verification and Simple applications.

UNIT IV ANALYTIC FUNCTIONS **12**

Functions of a complex variable; Analytic functions - Statement of Cauchy-Riemann equations; Harmonic functions and orthogonal properties, Harmonic conjugate, Construction of analytic functions; Conformal mapping - w= z+c, cz, 1/z and Bilinear transformation.

UNIT V COMPLEX INTEGRATION **12**

Complex integration - Statement and applications of Cauchy's integral theorem and Cauchy's integral formula; Taylor and Laurent expansions; Singular points - Residues, Residue theorem; Contour integration - evaluation of circular and semicircular Contour.

TOTAL PERIODS: 60

COURSE OUTCOMES

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

- solve higher order differential equations with constant and variable coefficients.
- determine Laplace transforms of various functions and solve initial value problems using Laplace transforms.
- familiarize with vector calculus concepts.
- gain knowledge on the analytic functions and related concepts.
- solve real definite integrals with the help of complex integration techniques.

TEXT BOOKS

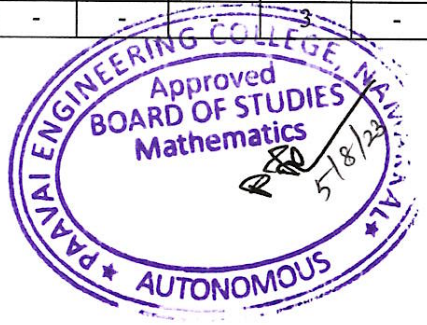
1. Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publications, Delhi, 2011.
2. Erwin Kreyszig., "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons, New Delhi, 2016.

REFERENCE BOOKS

1. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2008.
2. T. Veerarajan., "Engineering Mathematics", 3rd Edition, Tata McGraw Hill, 2011.
3. Peter V. O'Neil, "Advanced Engineering Mathematics", 7th Edition, Cengage learning, 2012.
4. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
5. Dass. H.K., and Er. Rajnish Verma, "Higher Engineering Mathematics", S. Chand Private Ltd., (2014).

CO/PO Mapping:

Mapping of Course Outcomes with Programme Outcomes (3/2/1 indicates strength of correlation) 3- Strong, 2-Medium, 1-Weak														
CO	Programmes Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	-	-	-	-	-	-	-	2	-	-
CO2	3	2	3	2	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	2	-	-	-	-	-	-	-	2	-	-
CO4	3	2	3	3	-	-	-	-	-	-	-	3	-	-
CO5	3	3	2	3	-	-	-	-	-	-	-	3	-	-



PH23202 **PHYSICS OF MATERIALS** 3 0 0 3

(COMMON TO CHEMICAL, FOOD, PHARMA, BME, BIOTECH)

COURSE OBJECTIVES

To enable the students to

- gain knowledge about the conduction properties of metals.
- correlate the different types of semiconducting materials.
- introduce the different types of magnetic materials, dielectric materials and its applications.
- study the various advanced materials and its applications.
- recognize properties of nanoparticles and its uses.

UNIT I CONDUCTING MATERIALS 9

Conductors - Types of conducting materials; Classical free electron theory of metals - Postulates; Derivation of electrical conductivity and thermal conductivity - Wiedemann-Franz law and its verifications - Lorentz number - Merits and demerits of classical free electron theory; Quantum free electron theory - Fermi-Dirac distribution function - Effect of temperature on Fermi function; Density of energy states - Carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS 9

Types of Semiconductors - Elemental and Compound Semiconductor; Intrinsic semiconductor: Expressions for density of electrons, holes and carrier concentration - Fermi level - Variation of Fermi level with temperature; Electrical conductivity - Band gap determination; Extrinsic semiconductors: n-type and p-type semiconductors (Qualitative); Hall effect - Determination of Hall coefficient - Applications: LED - solar cell.

UNIT III MAGNETIC AND DIELECTRIC MATERIALS 9

Magnetic Materials: Domain theory of ferromagnetism - Hysteresis - Soft and hard magnetic materials - Ferrites - Applications.

Dielectric Materials: Types of polarization - Expression for electronic and ionic polarization - orientation and space charge polarization - Langevin Debye equation - different types of dielectric breakdown - Applications (Capacitor and transformer).

UNIT IV MODERN ENGINEERING MATERIALS 9

Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): phases, shape memory effect, pseudo elastic effect, Ni-Ti alloy, applications - Bio materials - Classification of Biomaterials - Ceramics - types and applications – polymers and its applications.

UNIT V PREPARATION OF MATERIALS 9

Nanomaterials: Classification of nanomaterials - properties of nanoparticles - Top - down and bottom-up process - synthesis - Ball Milling - Co-precipitation and Electrodeposition methods - Applications.

Carbon nanotubes: Fabrication - Plasma Arcing - Pulsed Laser Deposition (PLD) - Structure - properties and Applications.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- select the metals required for specific applications in the field of engineering and technology .
- apply the knowledge of an intrinsic semiconductors and determinations of hall co - efficient.
- illustrate various magnetic, dielectric materials and its storage applications.
- predict the various types of new engineering materials and its real time applications.
- characterize the properties, preparation of nanomaterials for various optoelectronic devices.

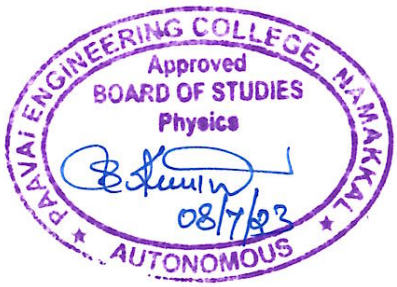
TEXT BOOKS

1. A.Marikani, Material Science, PHI, New Delhi, 2017.
2. Rajagopal, K, Engineering Physics, PHI learning Private Limited, 2015.

REFERENCE BOOKS

1. P K Palanisamy, Solid State Physics, Scitech Publication (India) Pvt. Ltd., Chennai, 2004.
2. Wahab, M.A. -Solid State Physics: Structure and Properties of Materials. Narosa Publishing House, 2009.
3. M. Arumugam, Material Science, Anuradha Publications, 2014.
4. G. Vijayakumari, Engineering Physics, 8th edition, Vikas Publishing House Pvt. Ltd., 2015.
5. S.O.Pillai, Solid State Physics. New Academic Science, Publishers, 2018.

CO/PO Mapping (3/2/1 indicates strength of correlation) 3 - Strong, 2 - Medium, 1 - Weak													
COs		Programmes Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	-	-	2	3	-	-	-	2	3	-	-
CO2	3	3	3	2	-	2	3	-	-	-	3	2	-	-
CO3	3	2	3	3	2	-	-	-	-	-	3	2	-	-
CO4	3	3	3	2	2	-	-	-	-	-	3	2	-	-
CO5	3	3	2	-	2	-	-	-	-	-	3	3	-	-



CS23201 PROBLEM SOLVING AND PYTHON PROGRAMMING 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- know the basics of problem solving and number systems
- know about the expressions and control statements in python programs.
- develop programs with strings and functions
- understand the concepts class, objects and lists.
- acquire knowledge data structures and modules.

UNIT I PROBLEM SOLVING AND NUMBER SYSTEMS 9

Need for computer languages. Algorithms - Building blocks of algorithms (statements, state, control flow, functions); notation (pseudo code, flow chart, and programming language); algorithmic problem solving - simple strategies for developing algorithms (iteration, recursion). Number Systems - Binary, Octal, Decimal, Hexadecimal numbers. Introduction to Python - Python interpreter, Modes: Interactive mode and Script mode

UNIT II EXPRESSION AND CONTROL STATEMENTS 9

Tokens in python – Variables, Data Types, Operators, Constants, Special Symbols: Input / Output statements - I/O using built-in functions, Type Conversion (implicit and explicit conversions). Control Statements - Conditional (if) - alternative (if - else), chained conditional (if- elif - else), Iteration (while, for), break, continue.

UNIT III FUNCTIONS AND STRINGS 9

Functions - Types of functions -in built functions, user defined functions, positional arguments, default arguments, keyword arguments, return values, recursion functions; Strings handling mechanism in python – string assignments - string slices - string functions.

UNIT IV CLASS, OBJECTS AND LISTS 9

Classes - Defining Class, The Self Parameter and Adding Methods to a class: The init Method; Introduction to data structures – Lists, Introduction Creating List, Accessing the Elements of a list, Negative Indices , List slicing, Python In build Functions for Lists, The List operator, List Methods.

UNIT V TUPLES, SETS, DICTIONARIES AND MODULES 9

Tuples - tuple assignment, tuple as return value; Set – set operations, set methods; Dictionaries - operations and methods; modules - Introduction to modules – creating own modules- importing modules; Working with File- Error handling in python.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- develop algorithmic solutions to simple computational problems.
- develop python programs with expressions and also read, write, execute simple Python programs.
- write python programs blocks of code that would be executed by using conditions.
- use class object concept for reuse program elements and write functions.
- Signifies compound data using Python lists, tuple, set, dictionaries and packages.

TEXT BOOKS

1. Ashok Namdev kamthane, Amit Ashok kamthane, —Programming and Problem Solving with Python, Second Edition McGraw-Hill, 2022.
2. Martin C. Brown, ``The Complete Reference -Python'', McGraw-Hill 2018.

REFERENCES

1. R.Shankar, M.Senthil, K.Palani, " Fundamentals of computing and Programming", Sri Krishna Publications,2008
2. Robert Sedge wick, Kevin Wayne, Robert Dondero,Introduction to Programming in Python: An Inter- disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python3.2, Network Theory Ltd., 2011.
4. Timothy A.Budd,—Exploring Python ‖, Mc-Graw Hill Education (India) Private Ltd.,2015.

CO/PO Mapping

Mapping of Course Out comes with Programme Out come (1,2,3 indicates the strength of correlation) (1-LOW;2-MEDIUM;3-HIGH)														
CO	Programme Outcome(POs)												Programme Specific Outcome(PSO)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	1	-	-	-	-	-	1	2	-
CO2	3	2	1	-	2	1	-	-	-	-	-	1	2	-
CO3	3	2	1	-	2	1	-	-	-	-	-	1	2	-
CO4	3	2	1	-	2	1	-	-	-	-	-	1	2	-
CO5	3	2	1	1	2	1	-	-	-	-	-	1	2	-

BT23201 **BIOORGANIC CHEMISTRY** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- recall the introduction of elements of atom, charges and their bonding rule.
- understand the substitution and addition reactions in the mechanisms.
- realize the key role of various kinetic mechanisms in biotechnology
- know the role of catalysis in enzymatic reactions
- apply the application of bioorganic reactions in transfer reactions and biosynthesis

UNIT I BONDING AND STEREOCHEMISTRY **9**

Atoms Electrons and orbitals - Covalent Bonds - Octet rule - Polar covalent Bonds - Electronegativity-formal charge - Resonance Acids and Bases - Arrhenius and Bronsted Lowry Theories - Acid Base equilibria - SP3 hybridization - Conformations analysis ethane, butane and cyclohexane - Cis- trans isomerism. Stereochemical activity around the tetrahedral carbon – optical activity - Conformation of the peptide bond.

UNIT II MECHANISMS OF SUBSTITUTION AND ADDITION REACTIONS **9**

SN1 and SN2 reactions on tetrahedral carbon- nucleophiles- mechanism steric effects – nucleophilic addition on Acetals and ketals -Aldehyde and ketone groups – reactions of carbonyl group with amines-acid catalyzed ester hydrolysis – Saponification of an ester- hydrolysis of amides. Ester enolates - claisen .condensation – Michael condensation.

UNIT III KINETICS AND MECHANISM **9**

Kinetic method – Rate law and mechanism – Transition states- Intermediates – Trapping of intermediates -- Microscopic reversibility – Kinetic and thermodynamic reversibility – Isotopes for detecting intermediates. Primary and secondary isotopes – the Arrhenius equation Eyring equation - ΔG, ΔS, ΔH, Thermodynamics of coupled reactions.

UNIT IV CATALYSIS **9**

Reactivity – Coenzymes – Proton transfer – metal ions – Intra molecular reactions – Covalent catalysis – Catalysis by organized aggregates and phases. Inclusion complexation.

UNIT V BIOORGANIC REACTIONS **9**

Timing of Bond formation and fission – Acyl group transfer – C-C bond formation and fission – Catalysis of proton transfer reactions – Transfer of hydride ion – Alkyl group. Transfer – Terpene biosynthesis – Merrifield state peptide synthesis – Sanger method for peptide and DNA sequencing

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- know in detail about the elements of atom, charges and their bonding rule
- understand the various kinetic properties and types of reaction mechanisms
- understand the possible bio-organic reactions involved in biosynthesis
- analyze various bioorganic based productions
- apply the concepts of bioorganic reactions

TEXT BOOKS

1. Francis A. Carey, Robert M. Giuliano, Neil T. Allison and Susan L. Bane "Organic Chemistry". 11th Edition, McGraw-Hill Education, 2020
2. Page, M.I. and Andrew Williams "Organic and Bio-organic Mechanisms". Pearson, 2010.

REFERENCES

1. Dugas, Hermann "Bioorganic Chemistry: A Chemical Approach to Enzyme Action" 3rd Edition, Springer, 2012.
2. Mary K. Campbell, Dr. Owen M. Mcdougal, Shawn O. Farrell, Biochemistry, Brooks/Cole; 9th edition, 2017
3. Nelson DL, Cox MM. Lehninger Principles of Biochemistry. W H Freeman & Co; 8th edition, 2021
4. Christopher K. Mathews, Dean R. Appling, Biochemistry, 4th Edition, Pearson Education, 2012

CO/PO MAPPING :

CO/PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs		Programmes Outcomes (POs)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	1	1
CO2	1	-	-	-	2	-	-	-	-	-	-	3	3	2
CO3	2	-	3	-	3	-	-	-	2	-	-	3	1	2
CO4	2	-	3	-	3	-	-	-	2	-	-	3	1	2
CO5	2	-	-	-	3	-	-	-	2	-	-	3	1	2

EN23201 **COMMUNICATION SKILLS FOR ENGINEERS II** **2 0 2 3**

(Common to All Branches)

COURSE OBJECTIVES

To enable the students to

- enhance the ability to listen, read, write and speak English.
- comprehend and draft reports related to their branches of specialization.
- augment their ability to read and comprehend technical exits.
- equip the learners to make effective presentations on topics in engineering and technology.
- participate successfully in Group Discussions.

UNIT I **6**

Language focus - One word substitutions, Active Voice and Passive Voice, Spotting the Errors; Reading - critical reading; Writing - Checklist, Recommendation.

UNIT II **6**

Language focus - Collocations - Fixed expressions (adhere to, on the part of etc.) - Idioms and Phrases; Reading - Extensive reading, Summarizing; Writing - Writing a job application - Resume, E-mail format; Blog writing on social media.

UNIT III **6**

Language focus - Compound Nouns - Numerical Expression - Preposition; Reading - Reading articles in newspapers; Writing - Technical Reports - Industrial Visit report, Accident report, Feasibility report, Survey report.

UNIT IV **6**

Language focus -Direct and Indirect Speech - If Conditionals - Purpose expression; Reading - journals articles; Writing - writing a review of a Book, film - Drafting project proposal, Letter writing - Business Correspondence - Calling for quotation, Placing orders, complaint.

UNIT V **6**

Language focus - Editing - Extended Definitions - Silent Letters; Reading - English Corner; Writing - Essay writing, instructional manual, memos, agenda, circular, notices.

TOTAL PERIODS: 30

List of Exercises

1. Advertising Your Product
2. Description of an Event / Competition
3. SOP (Statement of Purpose)
4. TED Talks
5. Video Profile Making
6. Resume Writing Format
7. GD
8. Mock Interview

TOTAL PERIODS: 30

COURSE OUTCOMES

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

- converse with clarity and confidence.
- interpret and analyze a given text.
- draft comprehensive reports, job applications and e-mails.
- make effective presentations using power point.
- participate successfully in Group Discussions and interviews.

TEXT BOOKS

1. N P Sudharshana, C.Savitha. English Technical Communication. Cambridge University Press India Pvt. Ltd, New Delhi.2016.
2. Mahalakshmi.S.N.English and Workbook for Engineers.V.K.Publications,Sivakasi.2017.

REFERENCES

1. Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and practice. Oxford University Press, NewDelhi.2011.
2. Rizvi,Ashraf.M.Effective Technical Communication.Tata McGraw-Hill, NewDelhi.2005.
3. Rutherford, Andrea.JBasic Communication Skills for Technology. Pearson,NewDelhi,2001.

CO - PO Mapping

Mapping of Course Outcomes with Programme Outcomes:

(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium , 1-Weak

COs	Programme Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	-	1	1	1	1	3	2	2	-	-
CO2	-	-	-	-	1	1	1	2	2	3	1	1	-	-
CO3	-	2	-	-	-	1	1	1	2	3	1	1	-	-
CO4	-	-	3	1	-	-	-	-	2	3	1	1	-	-
CO5	-	-	3	1	-	-	-	-	2	3	1	1	-	-

PH23205 **PHYSICS OF MATERIALS LABORATORY** **0 0 2 1**

(COMMON TO CHEMICAL, FOOD, PHARMA, BME, BIOTECH)

COURSE OBJECTIVES

To enable the students to

- study and verify the resistance of metals by various methods
- demonstrate various experiments and physics concepts applied in sunlight and semiconductor.
- analyze the hysteresis losses of magnetic materials.
- learn the thermal conductivity property of poor conductors and the viscosity of the liquid.

LIST OF EXPERIMENTS

1. Determine specific resistance of the material of given wires using a meter bridge.
2. Verify Ohm's law - series and parallel.
3. Determination of Solar Cell parameters.
4. Determination of band gap of a semiconductor.
5. Experiments on electromagnetic induction B-H Curve experiment to determine magnetic parameter.
6. Determination of thermal conductivity of a bad conductor-Lee's disc method.
7. Determination of coefficient of viscosity of a liquid -Poiseuille's method.

TOTAL PERIODS: 30

COURSE OUTCOMES

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

- calculate the specific resistance and verify the resistivity of the materials.
- determine characteristic of solar cell between voltage and current and also gap between bands in semiconductor.
- find the hysteresis losses of energy in given material.
- evaluate the viscosity of the liquid and thermal conducting property of bad conductors.

Mapping of Course Outcomes with Programme Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

		Programmes Outcomes (POs)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	2	-	2	-	-	-	-	2	2	-	-
CO2	3	3	2	2	-	2	-	-	-	-	2	2	-	-
CO3	3	3	2	2	-	2	-	-	-	-	2	2	-	-
CO4	3	2	2	2	-	2	-	-	-	-	2	2	-	-

CS23202 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- acquire programming skills in core python concepts
- study about object oriented skills in python.
- study about list, tuples, set, dictionaries.
- study file handling mechanisms, exception handling techniques in python

LIST OF EXPERIMENTS

1. Programs that take command line arguments (word count)
2. Compute the GCD of two numbers
3. Find the square root of a number (Newton's method)
4. First n prime numbers
5. Exponentiation (power of a number)
6. Find the maximum of a list of numbers
7. Find the factorial of the number using recursive function
8. Working with nested for loop.
9. Class and Objects.
10. File creation and access file content in python.
11. Find the most frequent words in a text read from a file
12. Working with Modules
13. Python Exception handling

TOTAL PERIODS: 60

COURSE OUTCOMES

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

- create python program using various looping and control statements.
- work with object, class, functions, strings and lists in python.
- implement tuples and dictionaries in python programming.
- develop python program to perform file operations, Modules and handle the exceptions.

CO-PO MAPPING:

Mapping of Course Outcomes with Programme Outcome (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	**Programme Outcomes (POs)**												**Programme Specific Outcomes (PSOs)**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	3	2	1	1	1	-	-	1	-	1	1	1	-
CO2	2	2	2	1	1	1	-	-	1	-	-	1	2	-
CO3	3	2	2	3	1	1	-	-	2	-	-	2	2	2
CO4	3	2	2	3	1	1	-	-	2	-	-	2	2	1

GE23202 **ELECTRICAL AND ELECTRONICS ENGINEERING PRACTICES LABORATORY** **0 0 2 1**

COURSE OBJECTIVES

To enable the students to

- understand the various wiring concepts.
- know about the energy measuring apparatus.

ELECTRICAL ENGINEERING PRACTICES

LIST OF EXPERIMENTS

1. Stair-case wiring.
2. Fluorescent lamp wiring.
3. Residential house wiring.
4. Wiring of ceiling fan with capacitor.
5. Measurement of energy using single phase energy meter.

TOTAL PERIODS: 15

COURSE OUTCOMES

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

- implement wiring practice in real time.
- measure the energy consumed in real time.

ELECTRONICS ENGINEERING PRACTICES

COURSE OBJECTIVES

To enable the students to

- know about basic logic gates, soldering and assembling of electronic components.
- gain hands-on experience in simple electronic circuits.

LIST OF EXPERIMENTS

1. Soldering simple electronic circuits and checking continuity.
2. Implementation of half wave Rectifier using diodes
3. Generation of clock signal
4. Verification of basic logic gates

COURSE OUTCOMES

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

- solder and test simple electronic circuits and verify basic logic gates.
- verify rectifier and clock generator circuits.

TOTAL PERIODS: 15

CO-PO MAPPING

Mapping of Course Outcome (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes PSO's
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes PO's												PSO's	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	-	-	-	2	-	-	1	-	-	1	1	-
CO2	3	2	-	-	-	2	-	-	1	-	-	1	2	-
CO3	3	2	-	-	-	2	-	-	1	-	-	1	1	-
CO4	3	2	-	-	-	2	-	-	1	-	-	1	2	-

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BT23202 **BIOORGANIC CHEMISTRY LABORATORY** **0 0 2 1**

COURSE OBJECTIVES

To enable students to

- train the students on synthesis of bioorganic molecules
- educate the bioorganic process of production
- create awareness on the isolation of pigments and metabolites
- familiarize with various bioorganic molecule production from key element

LIST OF EXPERIMENTS

1. Synthesis of aspirin
2. Hydrolysis of sucrose
3. Preparation of pyruvic acid from tartaric acid
4. Preparation of oleic acid from tartaric acid
5. Preparation of alpha D- glucopyranose pentaacetate
6. Preparation of 1,2,5,6 dicyclohexylnoine alpha d glucofuranose
7. Isolation of lycopene from tomato paste
8. Preparation of L-proline
9. Preparation of L-cysteine from hair
10. Preparation of S-ethylhydroxyl butonate from methylacetoacetate using yeast

TOTAL PERIODS: 30

COURSE OUTCOMES

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

- understand the methodology of synthesis of materials and be able to analyze their physical and chemical properties
- understand technique for isolation of phytochemicals from the natural sources
- apply the mechanism of biochemical reaction by in vitro studies and to analyze the biological molecules and its importance in research and industry.
- evaluate steps of upstream and downstream processing involved in the production of medicinally important compounds

CO/PO MAPPING :

CO/PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs		**Programmes Outcomes (POs)**												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	-	-	2	2	-	-	-	1	-	1	1	3	2
CO2	1	1	1	2	3	-	-	-	1	-	1	-	3	3
CO3	1	2	1	1	2	-	-	-	1	-	1	1	3	3
CO4	1	1	1	1	2	-	-	-	1	-	1	2	2	2