

PAAVAI ENGINEERING COLLEGE, NAMAKKAL, – 637018
(AUTONOMOUS)

B.Tech. AGRICULTURAL ENGINEERING
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	CH23102	Chemistry for Engineers	3	0	0	3
5	ES	EE23101	Basic Electrical and Electronics Engineering	3	0	0	3
6	PC	AI23101	Principles and Practices of Crop Production	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	GE23102	Electrical and Electronics Engineering Practices Laboratory	0	0	2	1
10	PC	AI23102	Crop Production Practices Laboratory	0	0	2	1
Total				15	1	8	20

SEMESTER II

S. No	Category	Course Code	Course Title	L	T	P	C
Theory							
1	HS	GE23201	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	1	0	0	1
2	BS	MA23201	Complex Variables and Differential Equations	3	1	0	4
3	BS	PH23203	Physics for Agricultural Engineering	3	0	0	3
4	ES	ME23201	Engineering Graphics	2	0	2	3
5	ES	CS23201	Problem Solving and Python Programming	3	0	0	3
Theory with Laboratory							
6	HS	EN23201	Communication Skills for Engineers II	2	0	2	3
Practical							
7	BS	PH23206	Physics Laboratory for Agricultural Engineering	0	0	2	1
8	ES	GE23203	Civil and Mechanical Engineering Practices Laboratory	0	0	4	2
9	ES	CS23202	Problem Solving and Python Programming Laboratory	0	0	2	1
Total				14	1	12	21

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, ஓயிலாட்டம், 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. பொருறை - 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 Civilization on the banks 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 Archaeology & 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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GE23101	HERITAGE OF TAMILS	L P T C
		1 0 0 1
UNIT I	LANGUAGE AND LITERATURE	3
<p>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.</p>		
UNIT II	HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE	3
<p>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.</p>		
UNIT III	FOLK AND MARTIAL ARTS	3
<p>Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.</p>		
UNIT IV	THINAI CONCEPT OF TAMILS	3
<p>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.</p>		
UNIT V	CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE	3
<p>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.</p>		
TOTAL PERIODS:		15

TEXT CUM REFERENCE BOOKS:

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே.பிள்ளை. (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணிணித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு).
4. பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு).
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9. 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)
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 Archaeology & 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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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

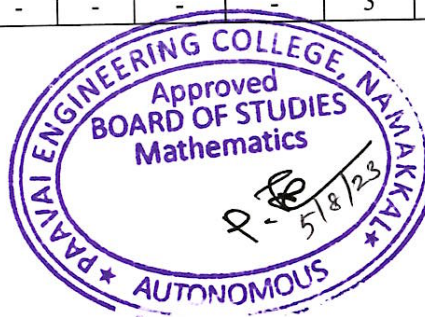
1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition, New Delhi, 2017.
2. T. Veerarajan., "Engineering Mathematics", 3rd Edition, Tata McGraw Hill, 2011.

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	-	-



COURSE OBJECTIVES

To enable the students to

- inculcate sound understanding of water quality parameters and water treatment techniques.
- facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics.
- introduce the basic concepts and applications of phase rule and alloys.
- establish basic knowledge of polymer composition from monomers.
- familiarize with the corrosion mechanism and organic coating

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 FUELS AND COMBUSTION

9

Fuels: Introduction -classification of fuels -coal -analysis of coal (proximate and ultimate) -carbonization - manufacture of metallurgical coke (Otto Hoffmann method) -octane number -cetane number -natural gas - compressed natural gas (CNG) -liquefied petroleum gases (LPG). Combustion : Introduction -calorific value - higher and lower calorific values-flue gas analysis (ORSAT Method)- Preparation of power alcohol, properties and uses.

UNIT III PHASE RULE AND ALLOYS

9

Phase rule: Introduction, and explanation of terms with examples, One Component System: Water System- Reduced phase rule- Two Component Systems- Lead- Silver system, Zn-Mg system. Alloys: Introduction – Definition – properties of Alloys- Functions - Ferrous alloys- Nichrome and Stainless Steel- Heat treatment of steel: Non Ferrous alloys; Brass and Bronze.

UNIT IV POLYMERS

9

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

UNIT V CORROSION AND ITS CONTROL

9

Corrosion-Causes-Types-Chemical corrosion and mechanism-Pilling- Bedworth rule-electrochemical corrosion –mechanism - galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – sacrificial anode and impressed cathodic current methods – corrosion inhibitors – protective coatings – Electroplating(Au) - Electroless plating (Ni) – organic coatings (paints). Paints: Constituents and functions.

TOTAL PERIODS: 45

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.
- compare and contrast the performance of different fuels by its calorific value.
- differentiate the various states in a equilibrium on a heterogeneous system.
- interpret the thermodynamic laws in energy calculations.
- elaborate the effects and control of corrosion.

TEXT BOOKS

1. Jain P.C. and Jain. M., Engineering Chemistry, 17/e, 2014 Dhanpat Rai Publishing Company, New Delhi, Reprint 2017.
2. B.K. Sharma – “Industrial Chemistry”, 11th ed., (2015), Goel Publication, Meerut.U.P.

REFERENCES

1. Puri B.R., Sharma L.R., Pathania, M.S. Principles of physical chemistry, 15/e 2015, Vishal Publishing Co., Meerut, Reprint 2017.
2. Stephen Zoepf., Electric Vehicle Engineering First Edition., McGraw – Hill Education(India) Private Limited 2021.
3. Dara S.S. and Umare S.S., A text book of Engineering Chemistry, 12/e, 2014 S.Chand and Company Limited, New Delhi Reprint 2016.
4. Engineering Chemistry, Wiley India Editorial Team, Wiley Eastern Pub, New Delhi 2018.

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	-	-	-	1	-	1	-	-
CO3	2	2	3	1	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	2	-	-
CO5	2	2	2	-	2	-	-	-	-	-	-	2	-	-



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

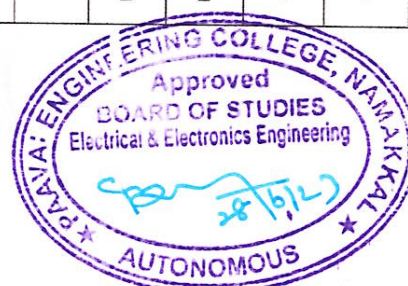
1. C.L.Wadhwa, "Basic Electrical Engineering", New age international Publishers, Fourth edition, Reprint 2021.
2. S.K.Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson Education India, Second edition, 2017.

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	-	-



AI23101 PRINCIPLES AND PRACTICES OF CROP PRODUCTION 3 0 0 3

COURSE OBJECTIVES

To enable students to,

- impart knowledge in the basics of Agriculture principles and practices.
- acquire knowledge in seasonal selection of crops and its establishments.
- introduce about the management of crops in all aspects.
- study the cultivation practices of major field crops.
- get an idea about weed management ,pest management and post harvesting

UNIT I INTRODUCTION TO AGRICULTURE 10

Introduction to agriculture - terms, definitions and branches; Scope and importance of agriculture; Field crops classification based on agronomic, special purpose, life span, root depth and CO₂ fixation; Factors affecting crop growth and production - internal (genetic) and external (Environmental, Edaphic and Biotic);Crop seasons in India .

UNIT II PRINCIPLES AND PRACTICES OF CROP PRODUCTION - I 10

Field preparation - land configuration; Tillage - objectives and types - On season tillage - Off season tillage - Special purpose tillage - modern concepts; Seeds and Sowing - Seed treatment- Sowing and planting ; Cropping system - Inter cropping - Cover cropping - Mixed cropping - Relay cropping - Multitier cropping - Crop rotation.

UNIT III PRINCIPLES AND PRACTICES OF CROP PRODUCTION - II 10

Intercultural operations - Gap filling - Thinning - Mulching - Earthing-up - Propping; Water Management - Methods of Irrigation ; Nutrient management - Essential nutrients - Nutrient requirement - Fertilizer application (Types and Methods);Weed management - Cultural - Chemical - Integrated; Pest and Diseases management - Cultural - Chemical - Integrated.

UNIT IV PRODUCTION PRACTICES OF AGRICULTURAL CROPS - I 9

Generalized management and cultivation practices for important groups of field crops in Tamil Nadu; cereal crops (Rice, Maize, Sorghum, Bajra and Ragi); Grain legumes (Red gram, Black gram, Green gram, Cowpea Horse gram and Soybean); Green manure crop (Daincha and Sunhemp); fodder crops (Bajra Napier Hybrid grass and Fodder Sorghum).

UNIT V PRODUCTION PRACTICES OF AGRICULTURAL CROPS - II 6

Generalized management and cultivation practices of Oil seed crops (Groundnut, Sunflower, Gingelly and Castor), Sugar crop (Sugarcane) and Fibre crop (Cotton and Jute) .

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- apply the knowledge of cultivation of crops in different seasons.
- analyze the choice of crops to be selected for different regions and seasons.
- understand the crop management practices of agricultural field crops.
- identify the best cultivation practices to be followed for higher yield of field crops
- apply the modern technique in cultivation of cash crops.

TEXT BOOKS

1. Reddy T. Sankara G.H. YellamandaReddy, "Principles of Agronomy", Kalyani Publishers, NewDelhi,1995.
2. Rajendra Prasad, "Text Book of Field Crop Production", Directorate of Information and Publication,Krishi AnusandhanBhavan, Pusa, New Delhi, 2005.
3. Handbook of Agriculture. ICAR Publications, New Delhi.

REFERENCES

1. Balasubramanian, P and SP. Palaniappan, "Principles and practices of Agronomy", Agrobios (India),Jodhpur,2002.
2. Crop Production Guide, Tamil Nadu Agricultural University Publication, Coimbatore. 2005

CO/PO Mapping:

Mapping of course outcome with programme outcome (1/2/3 indicates strength of correlation) Strong :3, Moderate : 2, Weak : 1, Nil : -														
Cos	Programmes Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	2	3	-	-	-	-	-	-	-	-	-	-	3	2
CO2	-	3	2	-	-	-	-	-	-	-	-	3	3	2
CO3	2	3	-	-	-	2	-	-	-	-	-	-	3	2
CO4	-	3	2	-	-	2	-	-	-	-	-	3	3	2
CO5	2	-	-	-	-	-	-	-	-	-	-	-	3	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

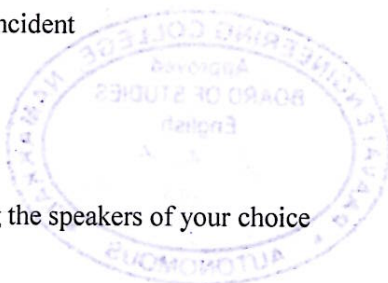
Language focus - Articles - Sentence Structures - Single line definition; Reading - Interpreting visual information, Writing - Flow Chart, Pie Chart, Bar Chart and Tabular column.

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 to Agri, 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

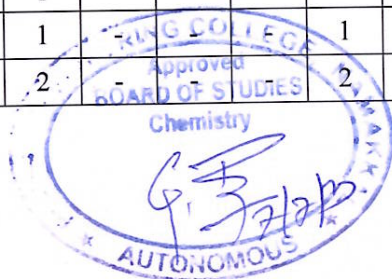
COURSE OUTCOMES

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	-	-



GE23102

**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

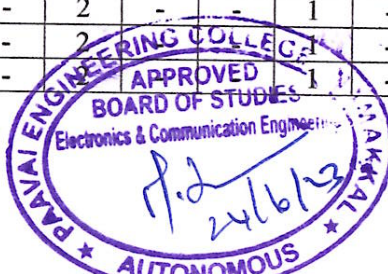
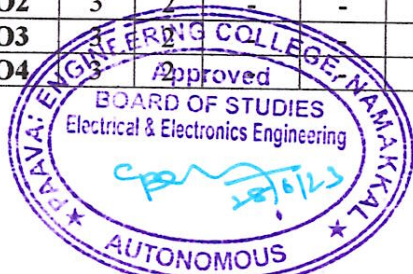
At the end of the course, the students will be able to

- 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	-	-	-	-	-	2	-	-	-	-	-	1	1	-
CO4	-	-	-	-	-	-	-	-	1	1	-	1	2	-



COURSE OBJECTIVES

To enable the students to

- gain sufficient knowledge in crop cultivation practices of important crops.
- know the basic principles in field preparation practices of crop cultivation.
- introduce the basic concept of seed selection and its treatment.
- introduce the different crop production practices in wet land, dry land and irrigated upland through hands on experience and demonstrations

LIST OF EXPERIMENTS

1. Field preparation studies
2. Identification of grains and crops
3. Seed selection and seed treatment procedures
4. Seed bed and nursery preparation
5. Sowing, transplanting and estimation of germination rate
6. Intercultural operation studies
7. Nutrient Management studies
8. Agro meteorological instruments
9. Integrated weed and Pest Management studies
10. Harvesting and yield estimation

TOTAL PERIODS: 30

COURSE OUTCOMES

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

- know the basic principles in field preparation practices of crop cultivation.
- identify various grains and crops to seeds.
- prepare seed bed for nursery preparation and sowing.
- calculate the germination percentage and nutrient requirement for field crops.

CO/PO Mapping :

Mapping of course outcome with programme outcome
(1/2/3 indicates strength of correlation) Strong :3, Moderate : 2, Weak : 1, Nil : -

COs	Programmes Outcomes(POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO2	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO3	3	-	-	-	2	-	-	-	-	-	-	3	3	-
CO4	3	-	-	-	2	-	-	-	-	-	-	3	3	3
CO5	3	-	-	-	-	-	2	-	-	-	-	3	3	-

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

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. பொருதை – 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 Civilization on the banks 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 Archaeology & 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)
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GE23201

TAMILS AND TECHNOLOGY

L T P C
1 0 0 1

UNIT I WEAVING AND CERAMIC TECHNOLOGY

3

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

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY

3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY

3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel - Copper and gold Coins 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

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. பொருறை – 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 Civilization on the banks 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 Archaeology & 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, Mamakkal-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

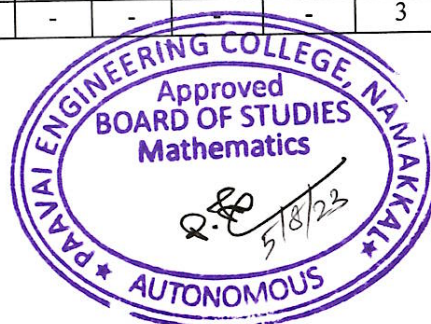
1. Grewal. B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publications, Delhi, 2011.
2. Erwin Kreyszig., "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons, New Delhi, 2016.

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)												PSO1	PSO2
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		
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	-	-



COURSE OBJECTIVES

To enable the students to

- gain knowledge about the conduction properties of metals.
- correlate the different types of semiconducting materials.
- analyze the various types of magnetic materials and its applications.
- familiarize the properties of sensors and transducers.
- impart knowledge about the behaviour and types of soil.

UNIT I CONDUCTING MATERIALS 9

Introduction to 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 MATERIALS 9

Introduction to magnetic materials - Origin of magnetic moments - Classification of magnetic materials: Dia-magnetic materials, Para-magnetic materials, Ferro-magnetic materials; Domain theory of ferromagnetism; Hysteresis; Soft and hard magnetic materials; Ferrites and its structures - Applications.

UNIT IV REMOTE SENSING 9

Principles of operation field-based instruments: Leaf area meter, canopy analyzer - Spectro radiometer, Laser land leveler - Sensors: Electrochemical Sensors, Humidity sensor - Urea quality sensor - Biosensor - Infrared thermometry - Near Infrared spectroscopy.

UNIT V SOIL PHYSICS 9

Basic principles of physics applied to soils - viscosity, surface tension, capillarity, stress-strain relations, gaseous diffusion, heat transport, thermodynamic principles; Properties of water in relation to porous media - Types of soil water - Permeability of soils: flow of water through soil, factors affecting permeability of soil - Darcy's law, hydraulic conductivity and water diffusivity.

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.
- discuss the basic idea of semiconducting materials and Hall coefficient determinations.
- apply the knowledge of magnetic materials in real time applications.
- realize the function of sensor and transducers and their applications.
- known the knowledge of basic properties of soil, bearing capacity and the properties of soils.

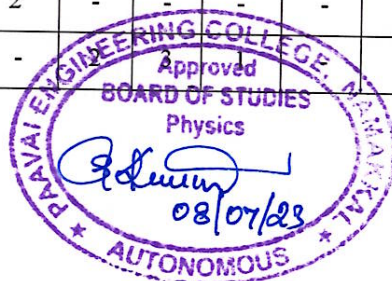
TEXT BOOKS

1. A.Marikani, Material Science, PHI, New Delhi, 2017.
2. R.K. Gaur and Gupta. S.L, Engineering Physics, Dhanpat Rai Publishers, 2017.
3. “Principles of Soil Physics”, Rattan Lal Manoj K .Shukla, New York: Marcel Dekker; London: Taylor & Francis, 2004.

REFERENCE BOOKS

1. Umesh K Mishra & Jasprit Singh, Semiconductor Device Physics and Design, Springer,2008.
2. Wahab, M.A.-Solid State Physics: Structure and Properties of Materials. Narosa Publishing House, 2009.
3. S.O. Pillai, Solid State Physics. New Academic Science, Publishers,2018.
4. P K Palanisamy, Material Science, SciTech Publications,2015.
5. Kasap, S.O.—Principles of Electronic Materials and Devices, McGraw - Hill Education,2017.
6. “Soil Physics”, Jury, W.A., Gardner, W. and Horton, R., John Wiley and Sons, New York, 2004

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



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

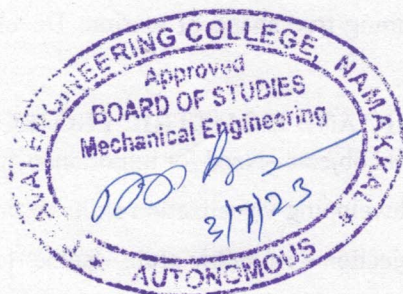
1. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2016.
2. Prabhakaran.S, Makesh.M, Subburam.V, "Engineering Graphics", Maruthi Publishers, Chennai, 2018.

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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



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 I, 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	-



EN23201

COMMUNICATION SKILLS FOR ENGINEERS II
(Common to All Branches)

2 0 2 3

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 texts.
- equip the learners to make effective presentations on topics in engineering and technology.
- participate successfully in Group Discussions.

UNIT I

Language focus - One word substitutions, Active Voice and Passive Voice, Spotting the Errors; Reading - critical reading; Writing - Checklist, Recommendation. 6

UNIT II

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. 6

UNIT III

Language focus - Compound Nouns - Numerical Expression - Preposition; Reading - Reading articles in newspapers; Writing - Technical Reports - Industrial Visit report, Accident report, Feasibility report, Survey report. 6

UNIT IV

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. 6

UNIT V

Language focus - Editing - Extended Definitions - Silent Letters; Reading - English Corner; Writing - Essay writing, instructional manual, memos, agenda, circular, notices. 6

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.

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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	-	-



PH23206 PHYSICS LABORATORY FOR AGRICULTURAL ENGINEERING 0 0 2 1
(AGRI)

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 sun light and semiconductor.
- analyze the hysteresis losses of magnetic materials.
- learn the viscosity, velocity and compressibility of the various liquids

LIST OF EXPERIMENTS

1. Determine specific resistance of the material of given wires using 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 coefficient of viscosity of a liquid -Poiseuille's method.
7. Determination of velocity of sound and compressibility of liquid - Ultrasonic interferometer.

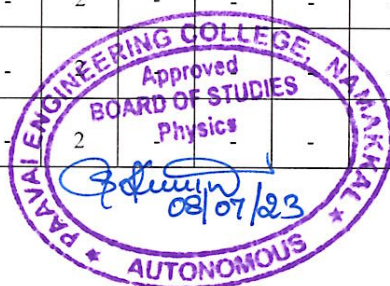
TOTAL PERIODS: 30

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.
- calculate the coefficient of viscosity, velocity of ultrasonic waves and compressibility of the given liquid.

Mapping of Course Outcomes with Programme Outcomes (1/2/3 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	3	2	2	-	2	-	-	-	-	2	2	-	-
CO2	3	3	2	2	-	2	-	-	-	-	2	2	-	-
CO3	3	3	2	2	-	-	-	-	-	-	2	2	-	-
CO4	3	2	2	2	-	2	-	-	-	-	2	2	-	-



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:**

7. Preparation of Arc Welding of Butt Joints, Lap Joints and Tee-Joints
8. Square Tray, Rectangular Tray and Funnel
9. Vee Fitting, Square Fitting
10. Simple Turning
11. Facing
12. Drilling Practice

TOTAL PERIODS: 30

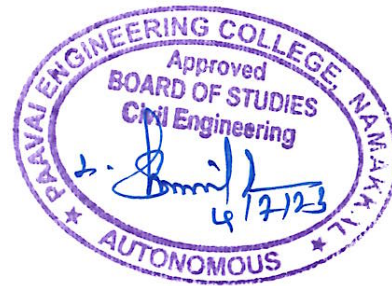
COURSE OUTCOMES

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



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