SANKAR POLYTECHNIC COLLEGE [AUTONOMOUS], SANKAR NAGAR – 627357

REGULATION 2024

SEMESTER - II

S.no	Course Category	Course Type	Code	Course Title	L-T-P	Period	Credit	End Exam
1	Humanities & Social Science	Theory	P201	TamizharThozhilnutpam	2-0-0	30	2	Theory
2a	Program Core	Theory	P2102	Basics of Civil Engineering	3-0-0	45	3	Theory
b	Program Core	Theory	P2202	Basics of Computer Engineering	3-0-0	45	3	Theory
c	Program Core	Theory	P2302	Basics of Electrical & Electronics Engineering	3-0-0	45	3	Theory
d	Program Core	Theory	P2402	Basics of Electrical & Electronics Engineering	3-0-0	45	3	Theory
e	Program Core	Theory	P2502	Basics of Mechanical Engineering	3-0-0	45	3	Theory
3a	Basic Science	Practicum	P203A	AppliedMathematics-1 (Non Circuit Branches)	1-0-4	75	3	Practical
b	Basic Science	Practicum	P203B	AppliedMathematics-2 (Circuit Branches)	1-0-4	75	3	Practical
4a	Basic Science	Practicum	P204A	Applied Physics–1 (Non Circuit Branches)	1-0-2	45	2	Practical
b	Basic Science	Practicum	P204B	Applied Physics–2 (Circuit Branches)	1-0-2	45	2	Practical
5a	Basic Science	Practicum	P205A	Applied Chemistry –1 (Non Circuit Branches)	1-0-2	45	2	Practical
b	Basic Science	Practicum	P205B	Applied Chemistry –2 (Circuit Branches)	1-0-2	45	2	Practical
6	Basic Science	Practicum	P206	Basic Engineering Practices	1-0-2	45	2	Practical
7	Engineering Science	Lab	P207	DraftingPractices-1	0-0-4	60	2	Practical
8	Humanities &Social Science	Practicum	P208	Communicative English II	1-0-2	45	2	Practical
9	Open Elective	Advanced Skill Certification	P209	Advanced Skills Certification-2	1-0-2	45	2	NA
10	Humanities & Social Science	Integrated Learning Experience	-	Growth Lab	-	30	0	-
11	Audit Course	Integrated Learning Experience	-	I&E/ClubActivity/Community Initiatives	-	30	0	-
12	Audit Course	Integrated Learning Experience		Emerging Technology Seminars	-	8	0	-
13	Audit Course	Integrated Learning Experience	-	ShopFloorImmersion	-	8	0	-
14	Audit Course	Integrated Learning Experience	-	Health&Wellness	-	30	0	-
15	Audit Course	Integrated Learning Experience	-	StudentLedInitiative	-	24	0	-
TOTAL						**565**	**20**	

Note: Test & Revisions: 60 Periods | Library Hours: 15 Periods

P201	தமிழரும் தொழில்நுட்பமும் (Tamils and Technology)	L	T	P	C
Theory		2	0	0	2

Introduction

This course provides an opportunity for students who have Tamil as their mother tongue and for students from other states to have multifold outcomes. Learning in the mother tongue is a key factor for inclusion and quality learning, and it also improves learning outcomes and academic performance. This is crucial, for appreciation of Tamil as a language and as a culture. It fosters mutual understanding and respect for one another and helps preserve the wealth of cultural and traditional heritage that is embedded in Tamil language around the world.

Course Objectives

The objective of this course is to enable the student to

- Appreciate weaving and ceramic technology
- Learn the design and construction technology of ancient times
- understand the engineering principles of manufacturing technology
- introduce the methods of irrigation and agricultural technology
- learn the scientific tamil and tamil computing

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Explain the principles behind weaving and ceramic technology of ancient tamils
CO2: Correlate the present and ancient design and construction technology
CO3: Apply engineering principles to ancient manufacturing technology
CO4: Apply engineering principles to irrigation and agricultural technology
CO5: Develop scientific tamil and new techniques in tamil computing

P201	தமிழரும் தொழில்நுட்பமும் (Tamils and Technology)	L	T	P	C
Theory		2	0	0	2

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I & II)	Written Test (Unit III & IV)	Quiz / MCQ	Model Examination	Written Examination
Duration	2 hours	2 hours	1 hour	3 hours	3 hours
Exam Marks	60	60	40	100	100
Converted to	20	20	10	10	60
Marks	40				60

Note

- CA1 and CA2 Assessment test should be conducted. Best of one will be considered for the internal assessment of 20 Marks.
- CA3 Online quiz examination (MCQ) should be conducted covering the complete syllabus. The marks should be converted to 10 marks for the internal assessment
- CA4 Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10 marks for the internal assessment.

P201	தமிழரும் தொழில்நுட்பமும் (Tamils and Technology)	L	T	P	C
Theory		2	0	0	2

அலகு 1	நெசவுமற்றும் பானைத்தொழில்நுட்பம்	
சங்ககாலத்தில் நெசவுத்தொழில் - பானைத்தொழில் நுட்பம் - கருப்புசிவப்புபாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்		5

அலகு 2	வடிவமைப்புமற்றும் கட்டிடத் தொழில்நுட்பம்	
சங்ககாலத்தில் வடிவமைப்புமற்றும் கட்டுமானங்கள் வடிவமைப்புமற்றும் கட்டிடத் தொழில்நுட்பம் சங்ககாலத்தில் வடிவமைப்புமற்றும் கட்டுமானங்கள்,சங்ககாலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு–சங்ககாலத்தில் கட்டுமானபொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடைஅமைப்புபற்றியவிவரங்கள் - மாமல்லபுரச் சிற்பங்களும்,கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிறவழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரிகட்டமைப்புகள் பற்றிஅறிதல்,மதுரைமீனாட்சிஅம்மன் ஆலயம் மற்றும் திருமலைநாயக்கர் மஹால் - செட்டிநாட்டுவீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை		7

அலகு 3	உற்பத்திதொழில்நுட்பம்	
கப்பம் கட்டும் கலை–உலோகவியல் - இரும்புதொழிற்சாலை - இரும்பைஉருக்குதல் எ.கு –வரலாற்றுச் சான்றுகளாகசெம்புமற்றும் தங்கநாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணிஉருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள்,கண்ணாடிமணிகள் - சுடுமண் மணிகள் - சங்குமணிகள் - எலும்புத் துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள		6

அலகு 4	வேளாண்மைமற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்	
அணை,ஏரி,குளங்கள்,மதகு–சோழர் காலக் குமுழித் தூம்பின் முக்கியத்துவம் - கால்நடைபராமரிப்பு–கால்நடைகளுக்காகவடிவமைக்கப்பட்டகிணறுகள் - வேளாண்மைமற்றும் வேளாண்மைச் சார்ந்தசெயல்பாடுகள் - கடல்சார் அறிவு– மீன்வளம் - முத்துமற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்தபண்டையஅறிவு– அறிவுசார் சமூகம்.		6

அலகு 5	அறிவியல் தமிழ் மற்றும் கணித்தமிழ்	
அறிவியல் தமிழின் வளர்ச்சி–கணித்தமிழ் வளர்ச்சி–தமிழ் நூல்கள் மின்பதிப்புசெய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத்திட்டம்		6
TOTAL		**30**

Reference

1. தமிழகவரலாறு–மக்களும் பண்பாடும் - கே.கே.பிள்ளை (வெளியீடு : தமிழ்நாடுபாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2. கணினித் தமிழ் - முனைவர் இல.சுந்தரம் (விகடன் பிரசுரம்)
3. கீழடி–வைகைநதிக்கரையில் சங்ககாலநகரநாகரிகம் (தொல்லியல் துறைவெளியீடு)
4. பொருநை–ஆற்றங்கரைநாகரிகம் (தொல்லியல் துறைவெளியீடு.

P201	தமிழரும் தொழில்நுட்பமும் (Tamils and Technology)	L	T	P	C
Theory		2	0	0	2

Unit I	**WEAVING AND CERAMIC TECHNOLOGY**	
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.		5
Unit II	**DESIGN AND CONSTRUCTION TECHNOLOGY**	
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.		7
Unit III	**MANUFACTURING TECHNOLOGY**	
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.		6
Unit IV	**AGRICULTURE AND IRRIGATION TECHNOLOGY**	
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.		6
Unit V	**SCIENTIFIC AND TAMIL COMPUTING**	
Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project		6
TOTAL HOURS		**30**

P2302	Basics of Electrical and Electronics Engineering	L	T	P	C
Theory		3	0	0	3

Introduction

Fundamental knowledge in the field of Electrical and Electronics are essential for all engineers. They must thoroughly study the characteristics of electrical & electronic components before delving into advanced applications. This foundational subject is crucial for a comprehensive grasp of the principles. To develop the necessary psychomotor skills in this area, students should not only understand the concepts butal so apply them effectively.

Course Objectives

The objective of this course is to enable the student to

- Understand the fundamental knowledge and skills in basic electrical engineering relevant for diploma holders in their professional life.
- Comprehend the core concepts and an overview of Electrical Engineering for circuit branch specialization.
- Understand and outline the principles of resistors, capacitors, and inductors in electronic circuit design.
- Grasp the fundamentals of semiconductor physics and the behavior of PN junction and Zener diodes.
- Develop expertise in electrical safety, PCB preparation, and soldering techniques.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Analyze the foundational principles of electrical quantities and basic laws for precise calculations in DC circuits with resistors and capacitors.

CO2: Explore different power generation methods and the role of electricity in different job sector.

CO3: Design electronic circuits effectively using resistors, capacitors, and inductors

CO4: Analyze and interpret the characteristics of PN junction and Zener diodes in electronic circuits.

CO5: Evaluate and implement appropriate safety protocols, PCB design strategies, and soldering techniques for efficient and secure electronic work environments.

Pre-requisites

Knowledge of basic Mathematics and Science

P2302	Basics of Electrical and Electronics Engineering	L	T	P	C
Theory		3	0	0	3

CO/PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	-	-	-	-
CO2	1	3	2	-	-	-	-
CO3	3	1	-	-	-	-	-
CO4	3	2	2	-	-	-	-
CO5	3	2	2	-	-	-	-

Legend:3-HighCorrelation,2-MediumCorrelation,1-LowCorrelation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

P2302	Basics of Electrical and Electronics Engineering	L	T	P	C
Theory		3	0	0	3

Assessment Methodology

	Continuous Assessment(40marks)				End Semester Examination (60marks)
	CA1	CA2	CA3	CA4	
Mode	Written Test (Unit I&II)	Written Test (Unit III&IV)	Quiz/ MCQ	Model Examination	Written Examination
Duration	2hours	2hours	1hour	3hours	3hours
Exam Marks	60	60	40	100	100
Converted to	20	20	10	10	60
Marks	40				60

- CA1 and CA2 Assessment test should be conducted. Best of one will be considered for the internal assessment of 20 Marks.
- CA3 Online quiz examination (MCQ) should be conducted covering the complete syllabus. The marks should be converted to 10 marks for the internal assessment
- CA4 Model examination should be conducted as per the end semester question pattern. The marks should be converted to 10 marks for the internal assessment.

P2302	Basics of Electrical and Electronics Engineering	L	T	P	C
Theory		3	0	0	3

Unit I	FUNDAMENTALS OF ELECTRICAL ENGINEERING	
	Introduction to Electricity: Uses of Electricity in Engineering & Healthcare – Duties & responsibilities of Electrical Engineer. **Passive Components:** Resistor, Capacitor and inductor-Symbol, Working Principle, Properties, Types (Names Only) and Uses - Colour Coding of Resistor - Self and Mutual Inductance. **Electric Components & Circuits:** Definition and Units of Voltage, Current, Power & Energy – Ohm's Law - simple calculation using Series & Parallel connection of Resistors using Ohm's law only.	9

Unit II	ELECTRICAL SYSTEMS	
	Important Terms: Electrical materials – Electrical quantities - Charge, Current, Potential difference, Power & Energy - DC & AC supply– Types & Difference **Basic Laws:** Coulomb's law- Lenz Law -Fleming's rule. **Power Generation:** Energy sources–Power stations-Block Diagram of AC transmission – Functions of TANGEDCO.	9

Unit III	CONVERSION OF ENERGY	
	Conversion of Energy: Motor, Generator and Transformer– main parts and types (names only)- Working principle and uses Lamps (types only) – Simple lamp circuit. Applications of Solar PV panels - Domestic House wiring (Single Phase only)-Tools. Concept of Electric Vehicles –Types	9

Unit IV	FUNDAMENTALS OF SEMICONDUCTORS	
	Semiconductors: Energy Band, Fermi level, Intrinsic and Extrinsic Semiconductors, P-Type and N-Type Semi conductors, Drift Current, Diffusion Current. **PN Junction Diode and Zener Diode:** Symbol, construction and working- Forward Bias, Reverse Bias, VI Characteristics, Applications.	9

P2302	Basics of Electrical and Electronics Engineering	L	T	P	C
Theory		3	0	0	3

Unit V	ELECTRICAL SAFETY, PCB AND SOLDERING	
	Electrical Safety: Hazards of electricity [shock, burns, arc-blast, Thermal Radiation, explosions, fires, effects of electricity on the human body]–Safety precautions – First Aid for Electrical Accidents - Protective devices– Earthing – lightning arrester Introduction to PCB-Types, PCB Materials, Steps involved in preparation of a PCB. Introduction to Soldering-Types of Solder, Soldering Tools, Soldering Safety precautions.	9
	TOTAL HOURS	**45**

Suggested List of Students Activity

- Presentation/Seminars by students on any recent technological developments based on the course
- Periodic class quizzes conducted on a weekly/ fortnightly based on the course
- Micro project that shall been extension of any practical lab exercise to real- world application
- Electricity Billing for domestic and institutional purposes
- Demonstration of Electrical Components
- Calculating Resistance value by Colour Coding Techniques
- Fabricating PCB for a simple circuit- with2 or3elements

Text Books

- Engineering Circuit Analysis by W.H. Hayt & J.K. Kemmerly and Steven M. Durbin, Tata Mc Graw Hill, 7th edition, New Delhi, 2007
- Principles of Power Systems by V K. Metha & Rohit Metha, S.Chand Publishers, 3rd Edition,2005.
- Electric and Hybrid Vehicles by A K Babu, Second Edition, Khanna Publishers
- Electronic Devices and Circuit Theory by Robert L. Boyle stadand Louis Nashelsky
- Semi conductor Physics and Devices by Donald A. Neamen
- Electrical Safety Handbook, by John Cadick, Mary Capelli-Schellpfeffer, Dennis K. Neitzel, Al Winfield, Fourth Edition, The McGraw-Hill Companies, Inc. 2012.

P2302	Basics of Electrical and Electronics Engineering	L	T	P	C
Theory		3	0	0	3

Reference Books

- Electric Circuit Analysis by Sudhakar A and Shyam Mohan S P, Tata Mc Graw Hill, New Delhi,2008
- Electric Circuits by Mahmood Nahvi, Joseph A Edminister, Tata Mc Graw - Hill Education, 5thEdition, 2010
- Renewables and Efficient Electric Power Systems by Gilbert M . Master, John Wiley and Sons, 2004.
- Non- Conventional Sources Of Energy Sources, RAIGD, Khanna Publishers, 2012
- Printed Circuit Boards: Design, Fabrication and Assembly by Raghbir Khandpur,2005

Web-based/Online Resources

- NPTEL (Website):The National Programme on Technology Enhanced Learning (NPTEL) offers free online courses on semiconductor devices and other electrical engineering topics. NPTEL Electrical Engineering

- Electronics Hub (Website): Offers tutorials and articles on PCB design, soldering techniques, and electronics projects. Electronics Hub

P203 B	Applied Mathematics – II (Circuit Branches)	L	T	P	C
Practicum		1	0	4	3

Introduction

The knowledge of Mathematics is necessary for a better understanding of all engineering and science subjects. Computer based visual representations such as graphs, animations, and tables of Mathematical ideas will enhance the applicability of Mathematics in engineering domains. This course is designed to give a comprehensive coverage at an introductory level to the topics of Coordinate Geometry, Trigonometry, Complex Numbers, Differential Calculus and Integral Calculus and some of their applications to engineering domains.

Course Objectives

The objective of this course is to enable the students to

- Identify the type of conic represented by a general second-degree equation in two variables.
- Understand the properties of inverse trigonometric functions.
- Identify the applications of complex numbers in solving engineering problems.
- Acquire knowledge in the principles of differentiation.
- Summarize the methods of integration and their engineering applications.

Course Outcomes

After successful completion of this course, the students should be able to

CO1: Compute the vertex, focus, directrix and latus-rectum of parabola and ellipse.
CO2: Solve problems using the properties of inverse trigonometric functions.
CO3: Solve problems using arithmetic operations on complex numbers.
CO4: Calculate limits and derivatives of one variable functions.
CO5: Evaluate definite integrals and indefinite integrals.

Pre-requisites

High School Mathematics

P203 B	**Applied Mathematics – II** **(Circuit Branches)**	L	T	P	C
Practicum		1	0	4	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	1	1	1	3
CO2	3	3	2	1	1	1	3
CO3	3	3	2	1	1	1	3
CO4	3	3	2	1	1	1	3
CO5	3	3	2	1	1	1	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Use explicit instruction for developing Math vocabulary and conceptual understanding.
- Use inducto-deductive approach to achieve the desired learning objectives.
- Use open-ended questions to nurture the problem-solving and reasoning skills among students.
- A theory-demonstrate-practice-activity strategy may be used throughout the course to ensure that learning is outcome-based and employability-based.
- Encourage students through illustrated problems and hand-on activities to use visual methods and simulations to solve real problems.

P203 B	**Applied Mathematics – II** **(Circuit Branches)**	L	T	P	C
Practicum		1	0	4	3

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Lab Test (Ex. 1 to 4)	Written Test Units I to III	Lab Test (Ex. 5 to 10)	Practical observation note book (Ex. 1 to 10)	Practical Exam
Duration	2 hours	2 hours	2 hours	***	3 hours
Exam Marks	70	30	70	100	100 (Theory: 30 + Practical: 70)
Converted to	10	10	10	10	60
Final Marks	40				60

Note:

- One practical exercise question shall be given for each CA1 and CA3. The mark allocation is Aim: 10 marks, Procedure: 20 marks, Output: 30 marks, Viva-voce: 10 marks.
- 20 questions shall be given from the theory portion for CA2, out of which 15 have to be answered. Each question carries 2 marks.
- Each experiment should be evaluated for 10 marks in CA4.
- Practical observation note book is sufficient and no need of separate practical record note book. Submission of Practical observation note book to end semester practical exam is mandatory.

P203 B	**Applied Mathematics – II** (Circuit Branches)	L	T	P	C
Practicum		1	0	4	3

Unit I	**COORDINATE GEOMETRY**	
THEORY General equation of conics – Classification of conics – Standard equations of parabola – Vertex, focus, axis, directrix, focal distance, focal chord, latus-rectum of parabola – Standard equations of ellipse – Vertices, foci, major axis, minor axis, directrices, eccentricity, centre and latus-rectums of ellipse – Simple problems.		3
PRACTICAL Basics of GeoGebra (Not for examinations) • Familiarize the interfaces of GeoGebra such as Graphics View, Algebra View, Graphics2, Spreadsheet, Computer Algebra System (CAS), Probability Calculator and 3D Graphics. • Familiarize the Tool Bar and important tools of GeoGebra.		5
Exercise No: 1 Do the following activities. i. Draw the graph of the parabolas $(y-k)^2 = 4a(x-h)$ and $(x-h)^2 = 4a(y-k)$ for the given values of a, b, h and k. Determine the vertex, focus, axis, directrix, latus-rectum of each parabola and mark them on the graphs. ii. Draw the graph of the ellipse $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$ for the given values of a, b, h and k. Determine the eccentricity, centre, foci, vertices, major axis, minor axis, directrices, and latus-rectums and mark them on the graph.		5
Exercise No: 2 Do the following activities for the given image of a parabolic shaped satellite dish antenna. i. Draw a parabola which fits the given image of the dish antenna. ii. Write the equation of the parabola. iii. Find the vertex, focus, directrix and latus-rectum and mark them on the graph. iv. How far from the vertex should the receiver of the antenna be placed? Note: The dish antenna given in the image will be exactly open right-side, left-side or upside.		6

P203 B	**Applied Mathematics – II** (Circuit Branches)	L	T	P	C
Practicum		1	0	4	3

Unit II	INVERSE TRIGONOMETRIC FUNCTIONS	
THEORY Recapitulation of domain and range of $\sin x, \cos x, \tan x, \operatorname{cosec} x, \sec x$ and $\cot x$ and their graphs – Definition of inverse trigonometric functions – Domain and range of $\sin^{-1} x, \cos^{-1} x, \tan^{-1} x, \operatorname{cosec}^{-1} x, \sec^{-1} x, \cot^{-1} x$ and their graphs – Principal values of inverse trigonometric functions – Simple problems.		3
PRACTICAL **Exercise No: 3** Do the following activities. i. Draw the graphs of $A\sin(Bx + C)$ and $A\cos(Bx + C)$ for some fixed finite real values of A, B and C. Find their domain, range, maximum value, minimum value, amplitude, period and phase shift. ii. Draw the graphs of $\sin^{-1} x$ and $\cos^{-1} x$. Find their domain, range, maximum value and minimum value.		5
Exercise No: 4 The alternating current passing through a circuit is $i(t) = I_m \sin \omega t$, where I_m is the maximum value of current and ω is the angular velocity. Let R be the resistance and V_m be the maximum voltage. i. Graph the sinusoidal waveform of $i(t)$ for the given values of I_m and ω. ii. Calculate the maximum voltage V_m using the formula $V_m = I_m R$ for the given value of R. iii. Graph the sinusoidal waveform of voltage using the formula $v(t) = V_m \sin\left(\omega t + \frac{\pi}{2}\right)$. iv. Determine the value of root mean square (r.m.s) current using the formula $I_{rms} = \frac{I_m}{\sqrt{2}}$. v. Determine the frequency using the formula $F = \frac{\omega}{2\pi}$. vi. Calculate the instantaneous value of the current at t sec.		6

P203 B	**Applied Mathematics – II** (Circuit Branches)	L	T	P	C
Practicum		1	0	4	3

Unit III	COMPLEX NUMBERS	
THEORY Definition of a complex number – Real and imaginary parts – Modulus and argument – Polar form of a complex number – Conjugate of a complex number – Representation of complex numbers on Argand plane – Addition, subtraction, multiplication and division of complex numbers – De-Moivre's theorem (without proof) - Simple problems.		3
PRACTICAL **Exercise No: 5** Do the following activities: i. Mark the given complex number z on the Argand plane. Find the real and imaginary parts of z. Find the distance of z from x-axis and relate it to the real part of z. Find the distance of z from y-axis and relate it to the imaginary part of z. ii. Find the conjugate of z. Mark $\bar{z}$ on the Argand plane. Find the reflection of z on x-axis and relate it to $\bar{z}$. iii. Find the modulus of z. Find the distance between z and origin of the Argand plane and relate it to the modulus of z. Find the modulus of $\bar{z}$ and relate it to the modulus of z. iv. Find the argument of z. Find the angle between the line segment Oz and x axis and relate it to the argument of z. Find the argument of $\bar{z}$ and relate it to the argument of z.		5
Exercise No: 6 Do the following activities. i. The representation of apparent power as phasor sum of active power and reactive power is given by $S = 550 + 952.63j$. Draw the phasor diagram of the system. Find the numerical value of the apparent power. Also calculate the phase angle and power factor of the system. ii. A machine takes 10KW (real power, P) at a power factor of 0.6 from 400V supply. Calculate the total load in KVA (apparent power, S) and KVAR (reactive power, R). Represent the apparent power as a phasor sum of active power and reactive power. Note: The course teacher/examiner can assign appropriate values for S, P, power factor and supply in Ex-6.		6

P203 B	**Applied Mathematics – II** (Circuit Branches)	L	T	P	C
Practicum		1	0	4	3

Unit IV	**DIFFERENTIAL CALCULUS**	
THEORY Limits of polynomials and rational functions – Limits of the form $\lim_{x\to 0}\frac{\sin ax}{bx}$ and $\lim_{x\to 0}\frac{\tan ax}{bx}$ (x in radians) (results only) – Definition of differentiability – Differentiation formulae for standard functions – Differentiation of sum, difference, product and quotient of functions – Chain rule – Second order derivatives – Maxima and minima – Simple problems.		3
PRACTICAL **Exercise No: 7** Do the following activities. i. Graph the polynomial function $f(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_1 x + a_0$, where $a_n, a_{n-1}, \ldots, a_0$ are real numbers and $a_n \neq 0$. Find the value of $f(x)$ at $x = a$ and the limit of $f(x)$ at $x = a$. ii. Graph the rational function $R(x) = \frac{a_n x^n + a_{n-1}x^{n-1} + \cdots + a_1 x + a_0}{b_m x^m + b_{m-1}x^{m-1} + \cdots + b_1 x + b_0}$, where $a_n,\ a_{n-1}, \ldots, a_0, b_m, b_{m-1}, \ldots, b_0$ are real numbers and $a_n, b_m \neq 0$. Find the value of $f(x)$ and the limit of $f(x)$ at $x = a$. iii. Graph the functions $\frac{\sin ax}{bx}$ and $\frac{\tan ax}{bx}$ where a and b are real numbers and $a, b \neq 0$. Evaluate $\lim_{x\to 0}\frac{\sin ax}{bx}$ and $\lim_{x\to 0}\frac{\tan ax}{bx}$. iv. Graph the functions $c\ (constant)$, x^n, $\sin x$, $\cos x$, $\tan x$, $\operatorname{cosec} x$, $\sec x$, $\cot x$, e^x and $\log x$. Find their first derivative and second derivative. Note: Only two functions will be given in Board Practical Examination in subdivision-(iv) of Ex-7.		5
Exercise No: 8 The alternating current passing through a circuit is $i(t) = I_m \sin \omega t$ where, I_m is the maximum value of current and ω is the angular velocity. Let L be the inductance. i. Graph the sinusoidal wave form of $i(t)$ for the given values of I_m and ω. ii. Graph the voltage using the formula $v(t) = L\frac{di(t)}{dt}$ for the given value of L. iii. Determine the values of $i(t)$ and $v(t)$ for a fixed t and different values of ω. iv. Determine the values of $i(t)$ and $v(t)$ for fixed value of ω and different values of t. **v.** Determine the values of t for which $i(t)$ and $v(t)$ are equal.		6

P203 B	**Applied Mathematics – II** (Circuit Branches)	L	T	P	C
Practicum		1	0	4	3

Unit V	INTEGRAL CALCULUS	
THEORY Integration formulae of standard functions as inverse operation of differentiation – Bernoulli's formula – Definite integrals (Properties are excluded) – Area and volume using integration – Simple problems.		3
PRACTICAL **Exercise No: 9** Do the following activities. i. Graph the functions $c\,(constant)$, $x^n, n \in \mathbb{R}$, e^x, $\sin x$, $\cos x$, $\sec^2 x$, $\mathrm{cosec}^2 x$, $\sec x \tan x$ and $\mathrm{cosec} x \cot x$. Find their indefinite integrals. ii. Evaluate the definite integral $\int_a^b f(x)\,dx$ and relate it to the area under the curve $y = f(x)$ between x-axis, $x = a$ and $x = b$. iii. Find the volume of the solid generated by the revolution of the area bounded by $y = f(x)$, x-axis, $x = a$ and $x = b$ about x-axis. Note: Only two functions will be given in Board Practical Examination in subdivision-(i) of Ex-9		5
Exercise No: 10 Let V be the voltage, L be the inductance and R be the resistance of a circuit. i. Graph the function of current at time t using the formula $I(t) = \frac{V}{R}\left(1 - e^{-\frac{Rt}{L}}\right)$. ii. Graph the function of charge passing through the coil at time t using the formula $Q(t) = \int I(t)dt$. iii. Find the values of $I(t)$ and $Q(t)$ for given values of V, L and R at different t values. iv. Find the values of $I(t)$ and $Q(t)$ at a fixed time for different values of V, L and R.		6
TOTAL HOURS		**75**

Note: While setting up the practical exercise questions, the course teacher/examiner shall assign appropriate functions/constants wherever they are not mentioned explicitly.

P203 B	Applied Mathematics – II (Circuit Branches)	L	T	P	C
Practicum		1	0	4	3

Suggested List of Students Activities

- Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.
- Operate a cathode-ray oscilloscope (CRO) and visualize the formation of ellipse on the screen.
- Examine a satellite dish antenna and verify that the receiver is fixed at its focus.
- Draw the phasor diagram and visualize the triangular relationship between apparent power, active power and reactive power.
- Find the height of a mountain using GeoGebra simulation of the image of the mountain.
- Find the volume of a water bottle using GeoGebra simulation of the image of the bottle.

References

- Higher Secondary First Year Mathematics Volume-I & Volume-II, Tamil Nadu Textbook and Educational Services Corporation, Government of Tamil Nadu, 2022.
- Higher Secondary Second Year Mathematics Volume-I & Volume-II, Tamil Nadu Textbook and Educational Services Corporation, Government of Tamil Nadu, 2022.
- John Bird, Higher Engineering Mathematics, Newnes (Elsevier), 6th Edition, 2010.
- Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2012.
- Deepak Singh, Mathematics-I, Khanna Book Publishing Co. (P) Ltd., 2021.
- Garima Singh, Mathematics-II, Khanna Book Publishing Co. (P) Ltd., 2021.
- John Vince, Calculus for Computer Graphics, Second Edition, Springer, 2019.
- GeoGebra Manual, The Official Manual of GeoGebra (PDF Version), 2016.
- GeoGebra Handbook for Senior Secondary Mathematics Teachers, Regional Institute of Education, Mysuru, 2016.
- Steve Phelps, An Introduction to GeoGebra, GeoGebra Institute of Ohio, University of Cincinnati.

P203 B	Applied Mathematics – II (Circuit Branches)	L	T	P	C
Practicum		1	0	4	3

Web-based/Online Resources

https://www.khanacademy.org/math/
https://www.mathportal.org/
https://openstax.org/subjects/math
https://www.mathhelp.com/
https://www.geogebra.org/
https://www.desmos.com/
https://phet.colorado.edu/

Hardware Requirement

- Desktop Computers: 30 + 2 Nos.
- Projector and Screen
- Printer

Software Requirement

- Operating System: Windows 7 or later
- GeoGebra Classic 5 (Free version)

Allocation of Marks for End Semester Examination

Part	Description	Marks
A	Written Test (Theory Portion)	30
B	Aim	10
C	Procedure	20
D	Output	30
E	Viva Voce	10
TOTAL MARKS		**100**

Note:

- 20 questions shall be given from the theory portion, out of which 15 have to be answered. Each question carries 2 marks.
- One practical exercise question along with respective unfilled output table(s) shall be given for practical exam.

P204 B	Applied Physics – II (Circuit Branches)	L	T	P	C
Practicum		1	0	2	2

Introduction

This course will give the outline and applications of some important physics principles which are relevant for circuit polytechnic branches

Course Objectives

The objective of this course is to

- Outline the relevance of acoustic principles and doppler effect
- Discuss the properties of light, refractive index, optoelectronic devices
- Define Current, voltage, ohm's law and simple DC circuit
- Introduces the basics of magnetism and Faraday law of Electromagnetic induction and its applications in engineering field

Course Outcomes

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

CO1: Design building structures with safe acoustic guidelines
CO2: Apply optics principles properly to understand the working of technological gadgets and computer and device interfacing
CO3: Construct simple DC circuit and troubleshoot problems in the circuits
CO4: Calculate the effective resistance in series and parallel circuits, classify the materials based on magnetic properties

Pre-requisites

10^{th} Standard physics

P204 B	Applied Physics – II (Circuit Branches)	L	T	P	C
Practicum		1	0	2	2

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	1	1	1	3
CO2	3	3	2	1	1	1	3
CO3	3	3	2	1	1	1	3
CO4	3	3	2	1	1	1	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome- and employability-based.
- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source of error, if any.

P204 B	Applied Physics – II (Circuit Branches)	L	T	P	C
Practicum		1	0	2	2

Assessment Methodology

	Continuous Assessment (40 marks)			End Semester Examination (60 marks)
	CA1	CA2	CA3	
Mode	Assignment / MCQ test (Unit – I & II)	Practical Test (8 expts)	Record Work	Practical Exam
Duration	…	2 hour	…	3 hours
Exam Marks	20	40	…	100
Converted to	10	10	…	60
Final Marks	20		20	60

Note:

- Addition of CA 1 and CA 2 should be considered for the internal assessment of total 20 marks
- CA3, 20 marks should be given for Record work and considered for the internal assessment marks

P204 B	Applied Physics – II (Circuit Branches)	L	T	P	C
Practicum		1	0	2	2

Unit I	SOUND & OPTICS	
Wave motion – audible range – infrasonic and ultrasonic – longitudinal, transverse and progressive waves – standing waves – free and forced vibration – Sonometer – acoustics of buildings – echo – reverberation – reverberation time – Sabine formula (no derivation) – Noise pollution – Doppler effect – applications. Reflection - Refraction – laws of reflection and refraction – refractive index of a medium – Total internal reflection – fiber optics – applications – Laser – Principle – applications – point lasers – remote sensing – RADAR – principle and applications – Sensors – Basics – various types – applications – Optoelectronic devices		6
Ex.No	Name of the Experiment	
1	Determination of Refractive index of the glass plate using pin and paper	9
2	Determination of Refractive index of water using travelling microscope	
3	Determination of frequency of tuning fork using Sonometer.	
Unit II	**BASICS OF ELECTRICITY AND MAGNETISM**	
Current- Voltage - Ohm's law – resistance – effective resistance - Kirchhoff current and voltage law - Internal resistance of the cell - Joule's law of heating – applications of heating effect of electric current Faraday law of electromagnetic induction – applications - Inductor - Self & Mutual inductance - – bar magnets - Pole strength – Magnetic moment –intensity of magnetization – magnetic field - types of magnetic materials and applications		6
Ex.No	Name of the Experiment	
4	Verification of laws of resistance - Ohm's law	15
5	Determination of the internal resistance of the cell using potentiometer	
6	Experimental determination of specific heat capacity of a liquid using Joule's calorimeter.	
7	Draw the V-I characteristics of solar cell and find the efficiency	
8	Comparison of magnetic moments of two small bar magnets - deflection magnetometer Tan A position by equal distance method	
	Test & Assessment	9
TOTAL HOURS		**45**

P204 B	Applied Physics – II (Circuit Branches)	L	T	P	C
Practicum		1	0	2	2

Suggested List of Students Activity

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Presentation/Seminars by students on any recent technological developments based on the course
- Periodic class quizzes conducted on a weekly/fortnightly based on the course
- Micro project that shall be an extension of any practical lab exercise to real-world application

Reference

- XI and XII standard Tamilnadu State Board Physics Text Book, 2023 edition, Textbook Corporation Tamil Nadu
- H.C.Verma, Concepts of Physics Vol 1 & Vol 2, Bharathi Bhavan Publishers, 1st edition, 2021

Web-based/Online Resources

- https://www.youtube.com/watch?v=nVPrWz8Jfgo&list=PLqwfRVlgGdFBVn3o5AmfJGhSv9NXM_XKc&ab_channel=khanacademymedicine
- https://www.youtube.com/watch?v=ZcZQsj6YAgU&list=PLqwfRVlgGdFBHGEZdkmGzKGufuV5I3z0v&ab_channel=KhanAcademyPhysics
- https://www.youtube.com/watch?v=F_vLWkkOETI&list=PLqwfRVlgGdFC7HLoajCVjUk23cqy4QvRL&ab_channel=KhanAcademy

P204 B	Applied Physics – II (Circuit Branches)	L	T	P	C
Practicum		1	0	2	2

Allocation of Marks for End Semester Practical and Practical Tests

Part	Description	Marks
A	Aim	5
B	Apparatus Required	5
C	Formulas, Explanations, Tabular Column and Schematic Diagram	10
D	Observations & Reading Taken	50
E	Calculations	20
F	Result	5
G	Viva voce	5
TOTAL MARKS		**100**

Allocation of Marks for CA2 - Practical Tests

Part	Description	Marks
A	Aim	2
B	Apparatus Required	2
C	Formulas, Explanations, Tabular Column and Schematic Diagram	6
D	Observations & Reading Taken	15
E	Calculations	5
F	Result	5
G	Observation note book	5
TOTAL MARKS		**40**

P205 B	Applied Chemistry – II (Circuit Branches)	L	T	P	C
Practicum		1	0	2	2

Introduction

This course will give the outline and applications of some important chemistry principles which are relevant for circuit polytechnic branches

Course Objectives

The objective of this course is to

- Analyze soft and hard water, EDTA titrations on hardness of water and boiler scale formation.
- To empower the leaner with the fundamental knowledge on components of battery and working.
- To understand the process of electroplating and appreciate the role of electroplating in daily life.
- To build understanding on methods of softening hard water- Ion exchange and reverse osmosis method and drinking water quality parameters (WHO).

Course Outcomes

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

CO1: Differentiate hard water and soft water and reason out the salts responsible for hardness
CO2: Compare the hardness of water samples in different regions
CO3: Identify and apply the methods for effective conversion of hard water into soft water
CO4: Construct the electroplating model and apply the concept in daily life situations

Pre-requisites

10^{th} Standard Chemistry

P205 B	Applied Chemistry – II (Circuit Branches)	L	T	P	C
Practicum		1	0	2	2

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	1	1	1	3
CO2	3	3	2	1	1	1	3
CO3	3	3	2	1	1	1	3
CO4	3	3	2	1	1	1	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their learning confidence.
- To help students learn and appreciate numerous concepts and principles in each area, teachers should provide examples from daily life, realistic situations, and real-world engineering and technological applications.
- The demonstration can make the subject exciting and foster in the students a scientific mindset. Student activities should be planned on all the topics.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome- and employability-based.
- Do not let students work on an activity or an experiment with the expected outcome, rather allow students to be honest about whatever the results of the experiment are. If the results are different from the expectations, students should do an analysis where they could be the source of error, if any.

P205 B	**Applied Chemistry – II** **(Circuit Branches)**	L	T	P	C
Practicum		1	0	2	2

Assessment Methodology

	Continuous Assessment (40 marks)			**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	
Mode	Assignment / MCQ test (Unit – I & II)	Practical Test (8 expts)	Record Work	Practical Exam
Duration	…	2 hour	…	3 hours
Exam Marks	20	40	…	100
Converted to	10	10	…	60
Final Marks	20		20	60

Note:

- Addition of CA 1 and CA 2 should be considered for the internal assessment of total 20 marks
- CA3, 20 marks should be given for Record work and considered for the internal assessment marks

P205 B	**Applied Chemistry – II** (Circuit Branches)	L	T	P	C
Practicum		1	0	2	2

Unit I	**WATER ANALYSIS AND TREATMENT**	
Sources of water – depletion of underground water – Reasons - Hard water and soft water – Hardness of water – Carbonate and Non–carbonate hardness – Methods of expressing hardness – mg/lit and ppm – Estimation of total hardness by EDTA method –simple Problems on total hardness only -- identification of sulphate and chloride ions- identification of heavy metal ions in the given sample of effluent- Softening of hard water – Ion-Exchange method and Reverse Osmosis- Calculation of pH, H^+ ion and TDS of different samples		6
Ex.No	Name of the Exercise	
1	Estimation of total hardness of water by EDTA method	12
2	Determination of alkalinity of sample of hard water	
3	Estimation of residual chlorine in a given water sample	
4	Estimation of copper by Complexometry	

Unit II	**BATTERIES AND CELLS**	
Metallic and electrolytic conduction –differences- Faradays laws of electrolysis- electronic concept of oxidation and reduction - electroplating- definition- examples-chrome plating, copper plating and galvanization-Energy sources – Primary and secondary battery- electrochemical cell – construction and working of dry cell – lead acid battery - advantages construction and working of solar cell.		6
Ex.No	Name of the Exercise	
5	Calculation of pH, H^+ ion and TDS of different samples	12
6	Effluent analysis of heavy metal ions - lead, copper & zinc	
7	Process of electroplating / copper plating using Copper Voltameter	
8	Systematic analysis of acid radicals such as carbonate, nitrate and sulphate ions.	
Test & Revision		**9**
TOTAL HOURS		**45**

P205 B	Applied Chemistry – II (Circuit Branches)	L	T	P	C
Practicum		1	0	2	2

Suggested List of Students Activities

Other than classroom learning, the following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course.

- Presentation/Seminars by students on any recent technological developments based on the course
- Periodic class quizzes conducted on a weekly/fortnightly based on the course
- Micro project that shall be an extension of any practical lab exercise to real-world application

References

1. XIth and XIIth standard Tamilnadu Chemistry Text Book, 2023 edition, Textbook Corporation Tamil Nadu
2. Essentials of Physical Chemistry, Bahl & Tuli, 28th edition, S.Chand Publishing House.
3. A textbook of Engineering Chemistry, Dr.Sunita Rattan, 2020 reprint, S.K.Kataria&Sons
4. Textbook of Physical Chemistry, P.L Soni,O.P.Dharmarha & U.N.Dash,2022 edition, S.Chand Publishing House.

Web-based/Online Resources

1. https://libguides.lib.msu.edu/chemistry/teachonline
2. https://www.khanacademy.org/science/chemistry
3. https://phet.colorado.edu/
4. https://www.sciencebysimulation.com/chemreax/Faq.aspx
5. www.olabs.gov.in

P205 B	Applied Chemistry – II (Circuit Branches)	L	T	P	C
Practicum		1	0	2	2

For Experiment No: 1, 2, 3 & 4

SNo	Description	Marks
1	Short Procedure	5
2	Titration I	35
3	Titration II	35
4	Calculation	15
5	Result	5
6	Viva Voce	5
TOTAL MARKS		**100**

Skill Value

- Less than or equal to 2% with correct tabular column and details - 35 marks
- More than 2% - 15 marks
- More than 4% - 5 marks
- Wrong tabular column even if reading is correct – only 5 marks

For Experiment No: 5

SNo	Description	Marks
1	Definition of pH and formula	10
2	Water quality parameters (any 5)	20
3	pH reading and 3 samples	15
4	Calculation of hydrogen ion concentration	30
5	TDS reading for 3 samples	15
6	Result	5
7	Viva Voce	5
TOTAL MARKS		**100**

P205 B	**Applied Chemistry – II** **(Circuit Branches)**	L	T	P	C
Practicum		1	0	2	2

For Experiment No: 6 (Effluent Analysis)

SNo	Description	Marks
1	Definition	5
2	Any three test for 3 effluents	45
3	Any five sources for each effluent	20
4	Any five harmful effects for each	20
5	Result	5
6	Viva Voce	5
TOTAL MARKS		**100**

For Experiment No: 7 for Circuit Branches (Electroplating)

SNo	Description	Marks
1	Electroplating- definition of chromplating, copper plating and galvanization	10
2	Apparatus required	5
3	Anode cathode and electrolyte	15
4	Circuit diagram	20
5	Cell reaction at anode	20
6	Cell reaction at cathode	20
7	Result	5
8	Viva	5
TOTAL MARKS		**100**

For Experiment No: 8 (Analysis of Acid Radicals)

SNo	Description	Marks
1	Systematic analysis of three acid radicals with five tests for each	60
2	Confirmatory test for each radical	30
3	Result	5
4	Viva Voce	5
TOTAL MARKS		**100**

P205 B	Applied Chemistry – II (Circuit Branches)	L	T	P	C
Practicum		1	0	2	2

Allocation of Marks for CA2-Practical Tests

For Experiment No: 1, 2, 3, 4, 5, 6, 7 & 8

SNo	Description	Marks
1	Short Procedure	5
2	Titration I	10
3	Titration II	10
4	Calculation	5
5	Result	5
6	Record Note Book	5
TOTAL MARKS		**40**

- Less than or equal to 2% with correct tabular column and details - 15 marks
- More than 2% - 10 marks
- More than 4% - 5 marks
- Wrong tabular column even if reading is correct – only 5 marks

For Experiment No: 5

SNo	Description	Marks
1	Definition of pH and formula	5
2	Water quality parameters (any 3)	5
3	pH reading and 3 samples	5
4	Calculation of hydrogen ion concentration	10
5	TDS reading for 3 samples	5
6	Result	5
7	Record Note Book	5
TOTAL MARKS		**40**

P205 B	**Applied Chemistry – II** **(Circuit Branches)**	L	T	P	C
Practicum		1	0	2	2

For Experiment No: 6 (Effluent Analysis)

SNo	Description	Marks
1	Definition	5
2	Any three test for 3 effluents	10
3	Any five sources for each effluent	10
4	Any five harmful effects for each	5
5	Result	5
6	Record Note Book	5
TOTAL MARKS		**40**

For Experiment No: 7 for Circuit Branches (Electroplating)

SNo	Description	Marks
1	Electroplating- definition of chromplating, copper plating and galvanization	3
2	Apparatus required	2
3	Anode cathode and electrolyte	5
4	Circuit diagram	5
5	Cell reaction at anode	10
6	Cell reaction at cathode	5
7	Result	5
8	Record Note Book	5
TOTAL MARKS		**40**

For Experiment No: 8 (Analysis of Acid Radicals)

SNo	Description	Marks
1	Identification of three acid radicals with two tests for each	10
2	Confirmatory test for each radical	20
3	Result	5
4	Record Note Book	5
TOTAL MARKS		**40**

P206	Basic Engineering Practices	L	T	P	C
Practicum		1	0	2	2

Introduction

It has been realized that Tamil Nadu would become a prosperous and a modern state by rising skill levels. It is very much important for fresh technicians to be highly skilled in dealing with the modern technologies in the Mechanical, Electrical, Plumbing and Safety & Security system works of building since the building systems have become more integrated. Besides, having the onsite experience is valid to build up quality craftsmanship.

By understanding the huge demand of the skilled technicians in the basic engineering practices. This course equips participants with the knowledge and skills needed to install water supply and drainage systems, guarantee water quality, Low Voltage power supply installation, and safety & security systems.

Course Objectives

The objective of this course is to prepare the student,

- To understand the work area and piping materials and tools for plumbing.
- To install the water supply system, drainage system, pipes, sanitary fixtures and pipe fittings.
- To install a water pump and to operate and maintain a water purifier unit.
- To perform the basic distribution of electrical supply and installation of electrical fixtures for domestic applications.
- To study and connect the basic security and safety systems.
- To learn about the fire-fighting extinguisher and fire-fighting systems.

Course Outcomes

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

CO1: Execute the installation of assembled pipes, fittings, and other components for water supply and drainage systems.
CO2: Establish the installation of pipes, fittings, and other components for drainage systems.
CO3: Learn and Install the water pump and water purifier.
CO4: Affix electrical fixtures and implement Lightning Arrester and Earthing Systems for Low Voltage System.
CO5: Install the safety and security system.

Pre-requisites

Nil

P206	Basic Engineering Practices	L	T	P	C
Practicum		1	0	2	2

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	2	1	1	1	2
CO2	3	3	2	1	1	1	2
CO3	3	3	2	1	1	1	2
CO4	3	3	2	1	1	1	2
CO5	3	3	2	1	1	1	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- It is advised that teachers take steps to pique pupils' attention and boost their curiosity to learn.
- Implement task-based learning activities where students work on specific tasks or projects.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- Incorporate formative and summative assessments to gauge student progress and provide targeted feedback.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability based.
- All demonstrations/Hand-on practices may be followed in the real environment as far as possible.

P206	Basic Engineering Practices	L	T	P	C
Practicum		1	0	2	2

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Practical Test (Ex. 1, 2, 5 & 6)	Practical Test (Ex. 3, 4, 7 & 8)	Model Practical Exam (All Exercises)	Record of Work Done (8 Exercises + 2 Reports)	Practical Examination
Duration	2 hours	2 hours	3 hours	***	3 hours
Exam Marks	80	80	100	100	100
Converted to	15	15	15	10	60
Marks	15		15	10	60

Note:

- **CA1 and CA2:** It should be conducted as per the end semester question pattern for 80 Marks (without written test). The 80 marks will be converted to 15 Marks. The best one will be considered for the Internal Assessment of 15 Marks.

- **CA 3**: After completion of all the exercises, model examination should be conducted as per end semester question pattern. The mark should be converted to 15 Marks for the internal assessment.

- **CA 4:** Record of work done should be maintained and the same have to be evaluated after completion of each practical exercise before the commencement of the next exercise for 10 Marks. Two activity reports should be completed and the same should be evaluated for 10 marks each. The average of 8 practical exercises and 2 reports marks should be converted to 10 Marks for the internal assessment.

P206	Basic Engineering Practices	L	T	P	C
Practicum		1	0	2	2

THEORY	
Plumbing - Sanitary Work - Safety during work - Types of plumbing pipes - Plumbing tools - Cutting Tools - Plumbing Symbols - Pipe Fittings - Types of pipe joints - Pipe bending tools - Pipe Cutting - Threading a Pipe - Methods of Testing Pipelines - Smoke Test - Pressure Hydraulic Test - Plumbing and Sanitary Fixtures - Tap or Faucet - Shower - Water Closets - Flushing Cistern - Geyser - Valves. Types of Pumps - Deep Well Pump - Centrifugal Pump - Reciprocating Pump - Jet Well Pump - Rotary Pump - Water Meter. Causes of Damage to the Pipeline and Plumbing System - Steps for Repair - defects commonly encountered in the functioning of taps and faucets, its causes and remedial measures - The defects commonly encountered during the functioning of stopcock, its causes and remedial measures - The commonly encountered defects during the operation of gate valves, their causes and remedial measures. Types of water purifiers - Reverse Osmosis (RO) water purifiers - Ultra Filter water purifiers - Ultraviolet (UV) Water Purifiers - Gravity Based water purifiers - Activated Carbon water purifiers - Guidelines for Installation of Water Purifier - Identify the Fault - Common problems and their solutions.	5

Ex.No	Name of the Experiment	
1	Install the water supply system as shown in the layout(shower with hot and cold water supply) and prepare the bill of material with specifications.	3
2	Install the drainage system as shown in the layout and prepare the bill of material with specifications.	3
3	Install the given pump for the water supply to storage. Prepare the list of components with specifications.	3
4	Install the Water Purifier and mount the filter. Demonstrate how to replace the damaged components, membrane, filter, valve and water tank.	3

P206	Basic Engineering Practices	L	T	P	C
Practicum		1	0	2	2

THEORY	
Basic Concept of Electricity - Types of electricity - Voltage - Current - Classification of current - Resistance - Electric power - Power factor - Basic Electric Circuit - Series Circuit - Parallel Circuit - Ohm's Law - Kirchhoff's Law - Power - Energy - Tools and Equipment - Importance of Earthing System - Types of Earthing - Pipe Earthing - Plate Earthing - Lightning - Lightning Arrester - Wiring materials - Insulating Materials - Wiring Accessories - Miniature Circuit Breaker (MCB) - Conduit Wiring - Concealed Wiring - Colour Code - Distribution Board - Electrical Hazard - Fire Extinguisher - First Aid for Electrical Emergencies - Electrical Rescue Techniques. Different Types of CCTV Cameras - Components Needed for CCTV Camera Installation - IP Camera Installation - Security Cameras - Best Locations for Indoor and Outdoor Camera - Installing Network Video Recorders (NVR) for CCTV Systems - Configuring and Testing the CCTV Systems - Maintenance and Troubleshooting of CCTV Camera Systems - Tips for Mounting Cameras Safely. Fire Alarm System Components - Alarm Signaling Systems - Automatic Alarm-Initiating Devices - Manually Actuated Alarm-Initiating Devices - Inspection and Testing / Smoke Detector using Arduino and Smoke Sensor: Components used - Arduino UNO development board - 16×2 LCD - Smoke Sensor - Breadboard - Connecting wires. - Fire alarm - Installation procedure.	6

Ex.No	Name of the Experiment	
5	Connect the single phase power supply for domestic applications as per the circuit diagram. List the bill of materials with specifications.	3
6	Prepare an earth bit and erect the earth electrode / plate. Mention the importance of Earthing and Lightning arrester.	3
7	Install a CCTV camera and configure. Mention the list of components.	3
8	Install the Smoke Detector Alarm / Fire alarm system as per the circuit. (Electrical / IoT based)	3
Assessment Test		10
TOTAL HOURS		**45**

P206	Basic Engineering Practices	L	T	P	C
Practicum		1	0	2	2

Suggested List of Student Activity

- Study the existing water supply / drainage system / water recycling plant and prepare the report.
- Study the existing water treatment plant and prepare the report.
- Study the existing CCTV system and prepare the report.
- Study the existing fire-fighting system and prepare the report.

Note: Four students can be grouped as a batch to prepare and submit the activity report. Each batch should submit any two reports from the above activity. The report should have the layout of the system, bill of materials with specifications and important common troubles/errors and rectification procedure.

References

- Multi Skill Technician (Electrical) QP Code: ELE/Q3115.
- Plumber Practical (I Year) - Neelkanth, English NSQF Level - 3 ITI Book.
- Plumber Theory - Manish Sharma
- Plumber Trade Practical NIMI, Chennai.
- Craftsmen Training Scheme (CTS) NSQF Level-3 Central Staff Training and Research Institute, Kolkata.
- IoT Based Smart Home Automation and Energy Management.
- Multi Skill Technician (Electrical) ELE/Q3109 v1.0.
- Jal Vitaran Sanchaalak (Water Distribution Operator) (Multi - Skill) PSC/Q0122.
- CCTV Camera Equipment Installation, Service & Maintenance.
- CCTV Camera installation Book Mr.Prabhu, Prabhu and Manikanda Prabhu
- Selection, Installation and Maintenance of First-Aid Fire Extinguishers — Code of Practice (Third Revision)

P206	Basic Engineering Practices	L	T	P	C
Practicum		1	0	2	2

- Selection, Installation and Maintenance of Control and indicating equipment for fire detection and alarm system - Code of practice.

Web-based/Online Resources

- Major Water Supply Schemes | TWAD (tn.gov.in)
- Deposit Works | TWAD (tn.gov.in)
- Rural Water Supply Schemes | TWAD (tn.gov.in)
- Urban Water Supply Schemes | TWAD (tn.gov.in)
- Under Ground Sewerage Schemes | TWAD (tn.gov.in)
- https://youtu.be/OTI9iSGIObU
- https://youtu.be/FBu_DU-hK04
- https://youtu.be/xNrZ1uZS8uU
- https://youtu.be/Hyjr44BcazA
- https://youtu.be/JAiwJP7l3ko
- https://youtu.be/kDg-0DbVsxQ
- https://youtu.be/2bCLDM74F2k
- https://youtu.be/obkUNBH1xnY
- https://youtu.be/USajjGYjUH4
- https://youtu.be/UrWgV1F7JFs
- https://youtu.be/Y8duhoCdDz4
- https://youtu.be/GUmI_lH9cAc
- https://youtu.be/JWXh-WwqlwI

Additional Instructions

- For the record of work done for practical exercises, a notebook or printed manual may be used. In this, the student should draw a diagram, and mention the readings/observations, calculations and result manually. The same has to be submitted for the end-semester examination on the first attempt.

- The proper safety procedure and norms should be followed with proper uniform (Khaki pants & half-hand shirt) with safety shoes during the practices.

P206	Basic Engineering Practices	L	T	P	C
Practical		1	0	2	2

- All the exercises should be completed before the Board Practical Examinations. Students will be permitted to select any one exercise by lot or the question paper provided by the DOTE.

Allocation of Marks for End Semester Practical and Model Practical Examination

Part	Description	Marks
A	Layout / Circuit	10
B	List of Tools / Equipments and Materials	10
C	Procedure / Observation / Installation	30
D	Finish / Completion	20
E	Written test (MCQ question) *	20
F	Viva voce	10
TOTAL MARKS		**100**

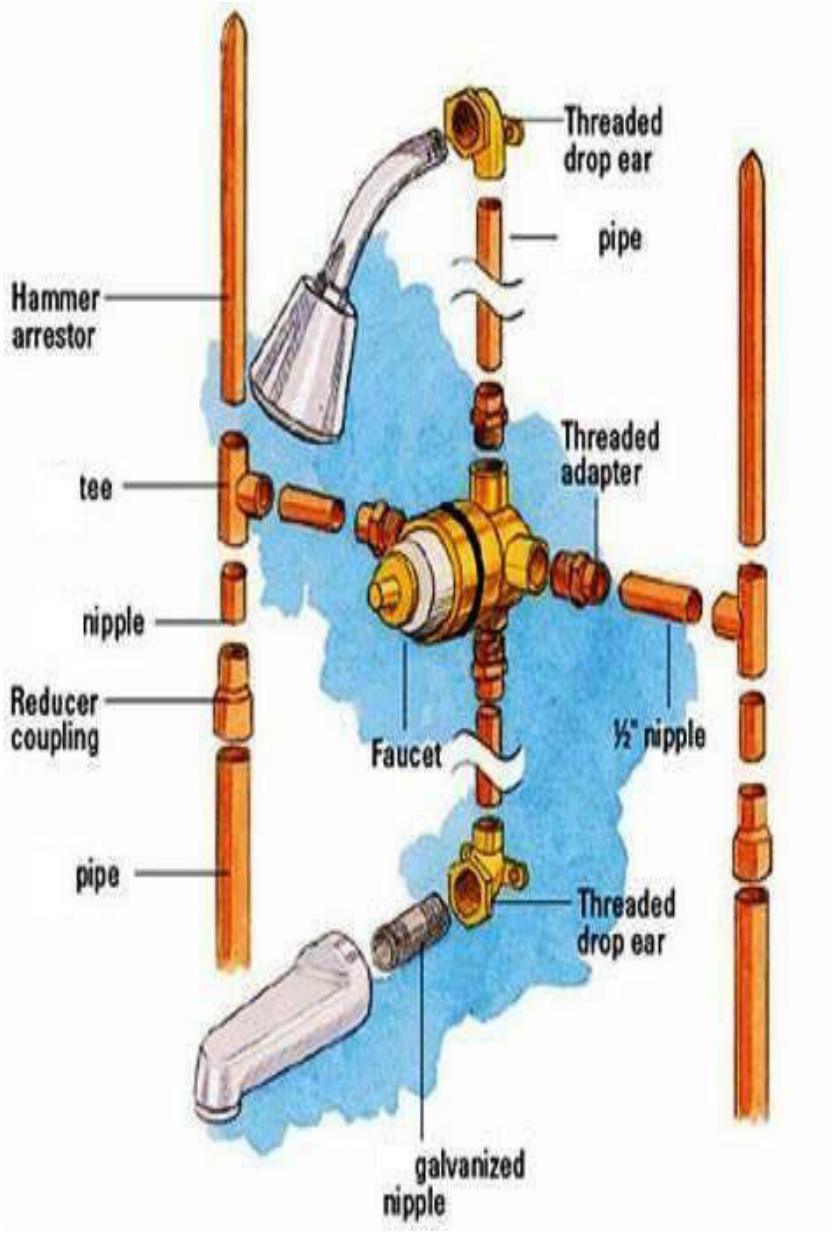
*Written Test (MCQ): Twenty questions (one mark each) shall be asked from the Theory Portions.

P206	Basic Engineering Practices	L	T	P	C
Practicum		1	0	2	2

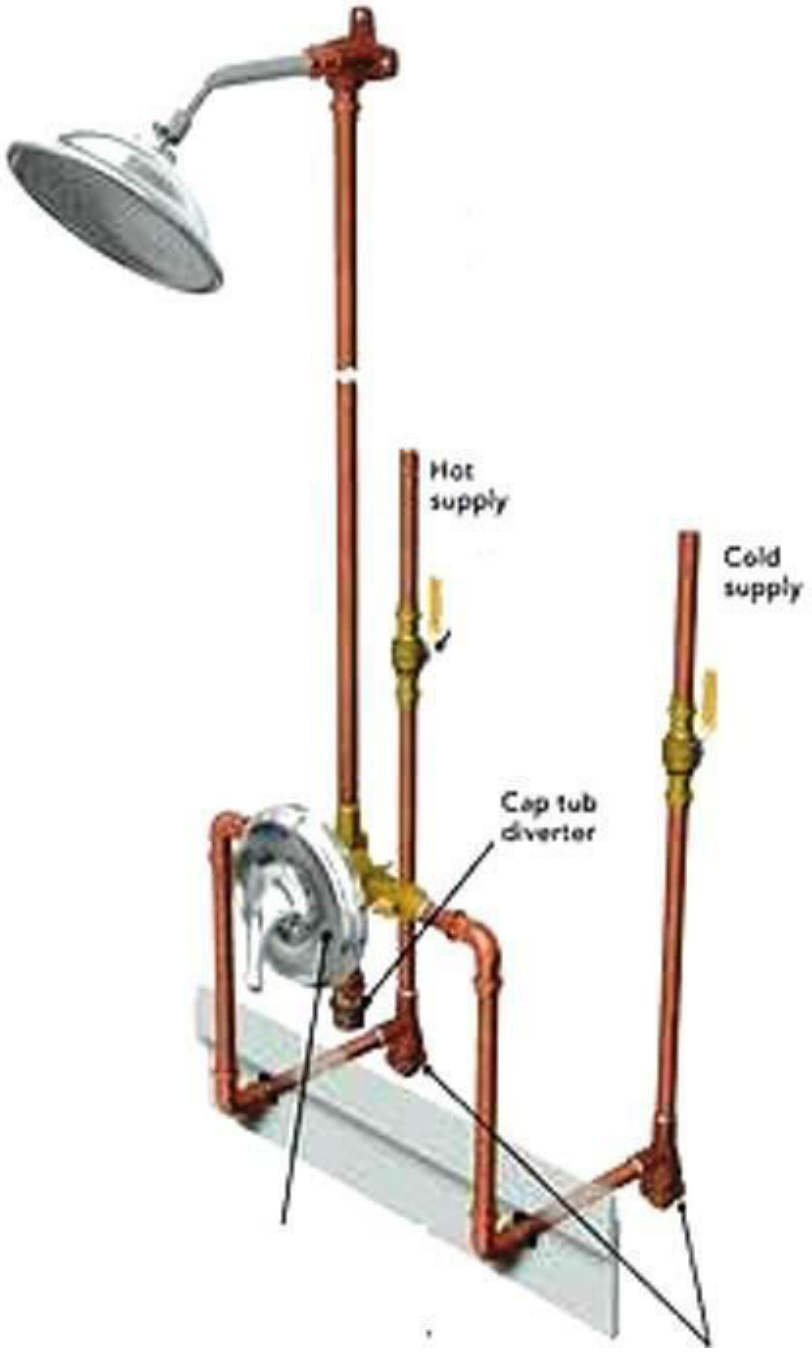
Sample diagram / Layout for Practical Exercises.

The following diagrams are suggestions for the practical exercise not limited to this. The practical exercises should have minimum practices to learn and meet the course outcome.

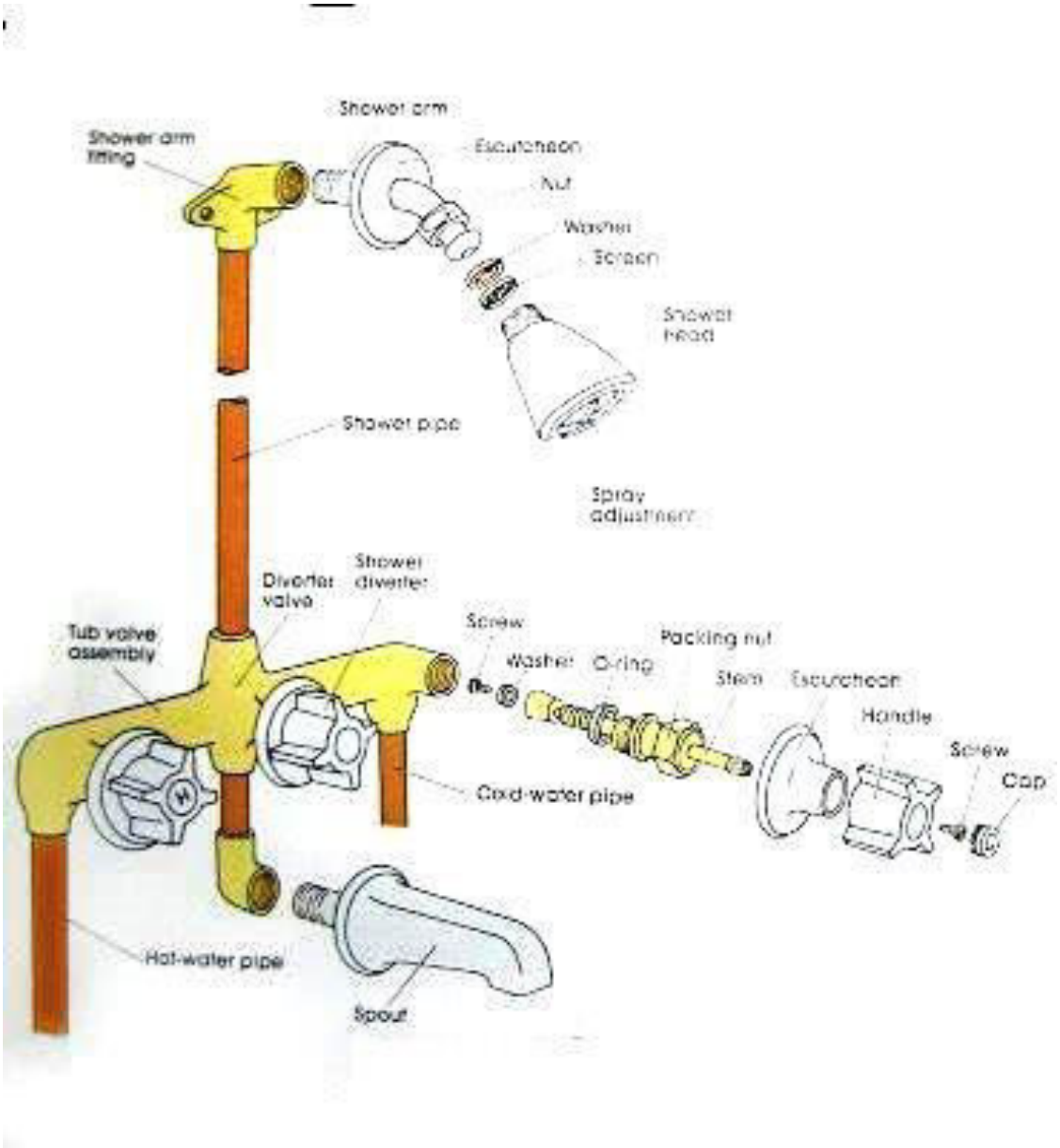
Exercise 1 – Water Supply System



P206	Basic Engineering Practices	L	T	P	C
Practicum		1	0	2	2

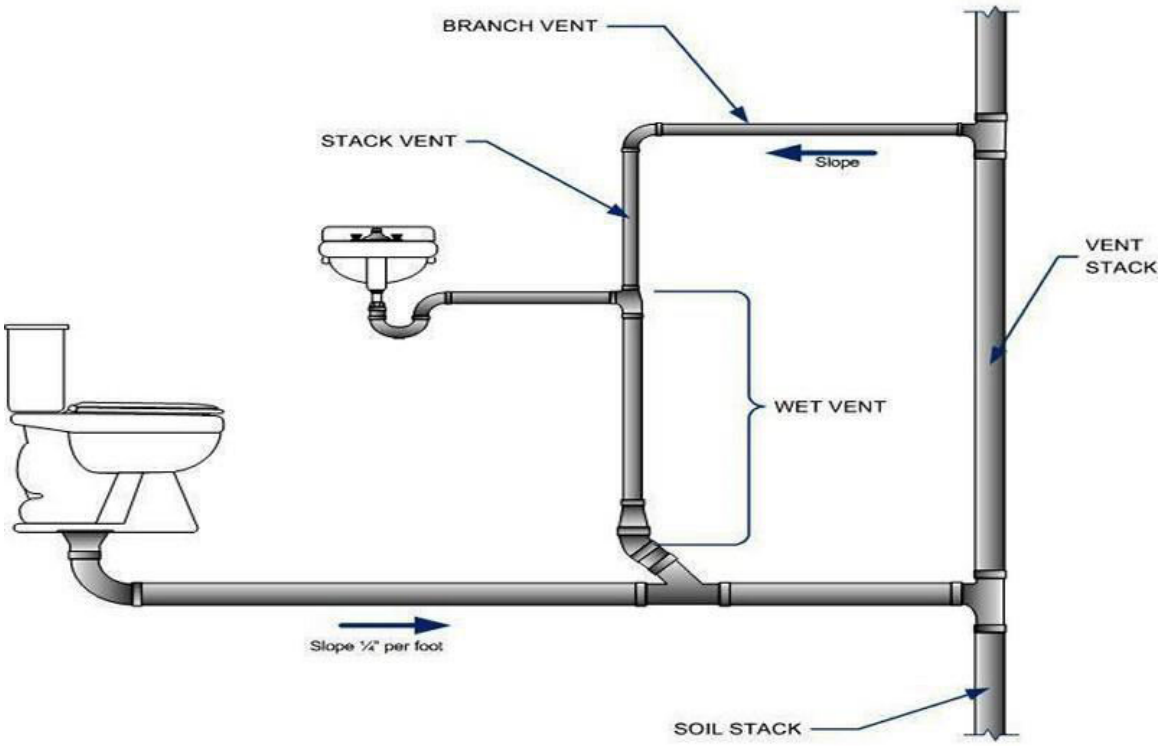


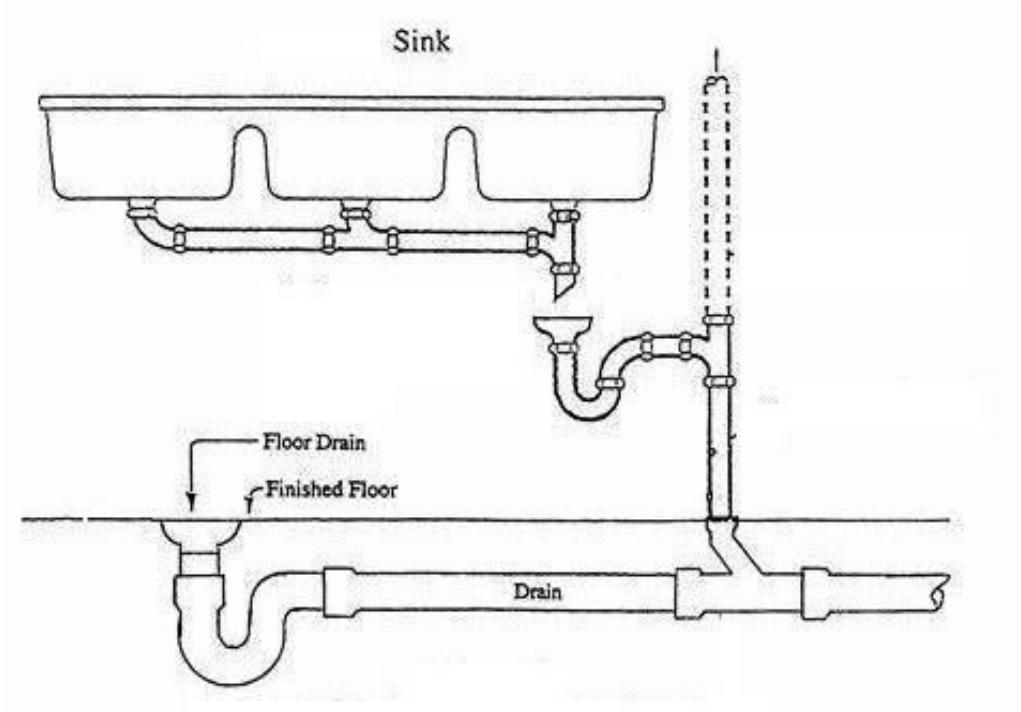
P206	Basic Engineering Practices	L	T	P	C
Practicum		1	0	2	2



P206	Basic Engineering Practices	L	T	P	C
Practicum		1	0	2	2

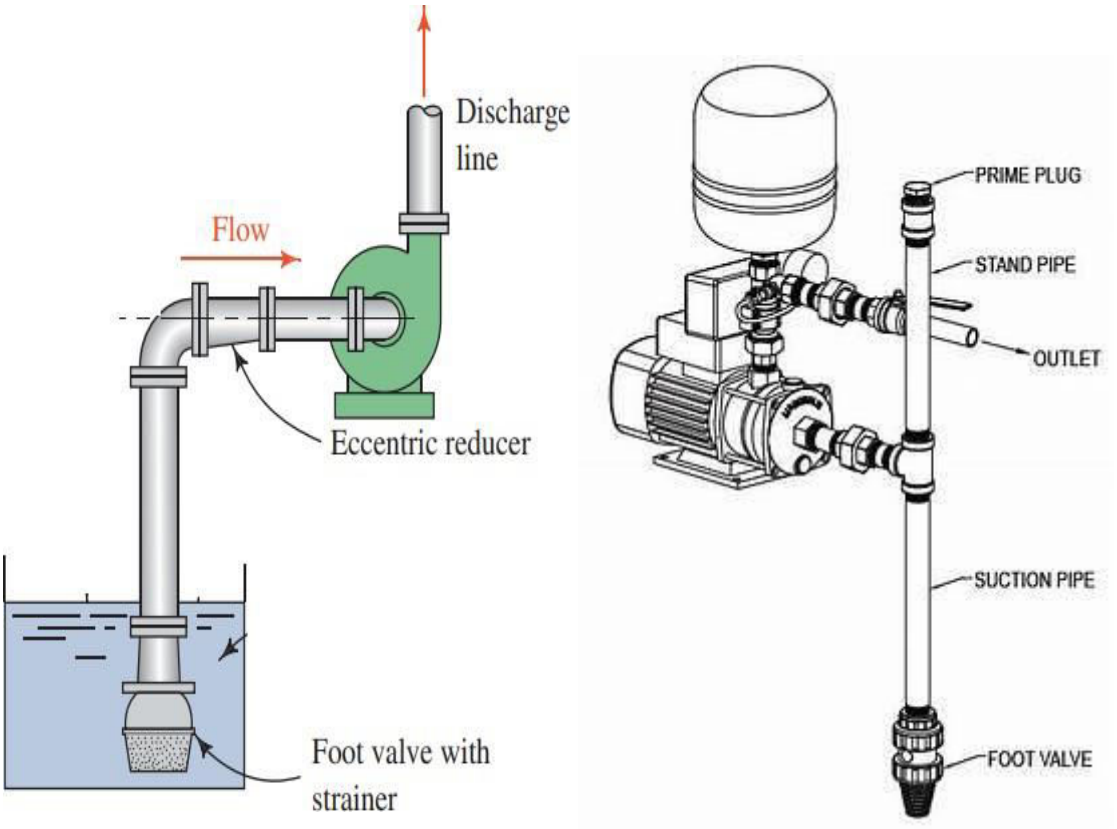
Exercise 2 – Drainage System

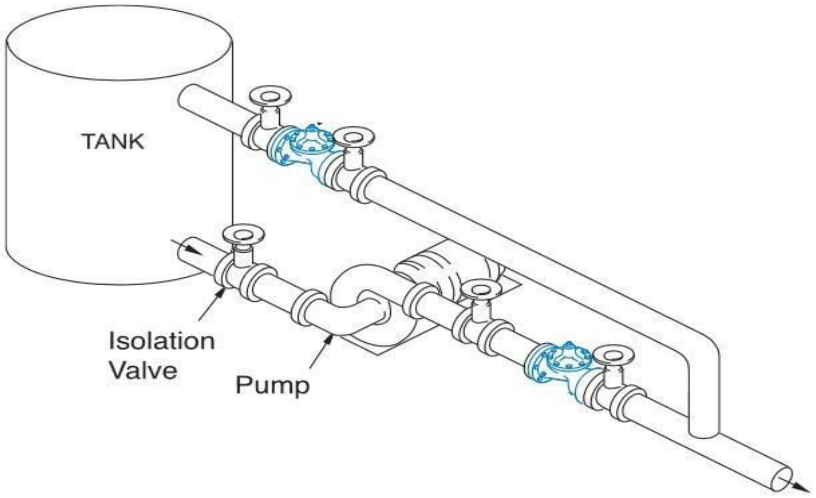




P206	Basic Engineering Practices	L	T	P	C
Practicum		1	0	2	2

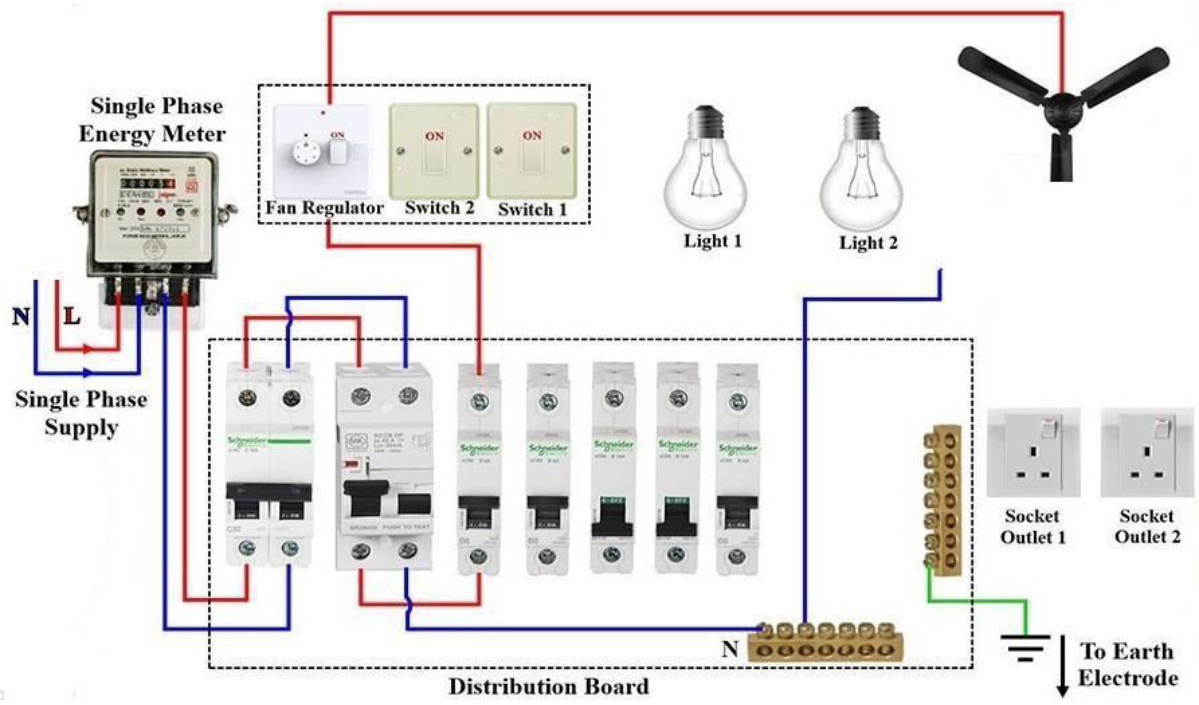
Exercise 3: Water pump Installation

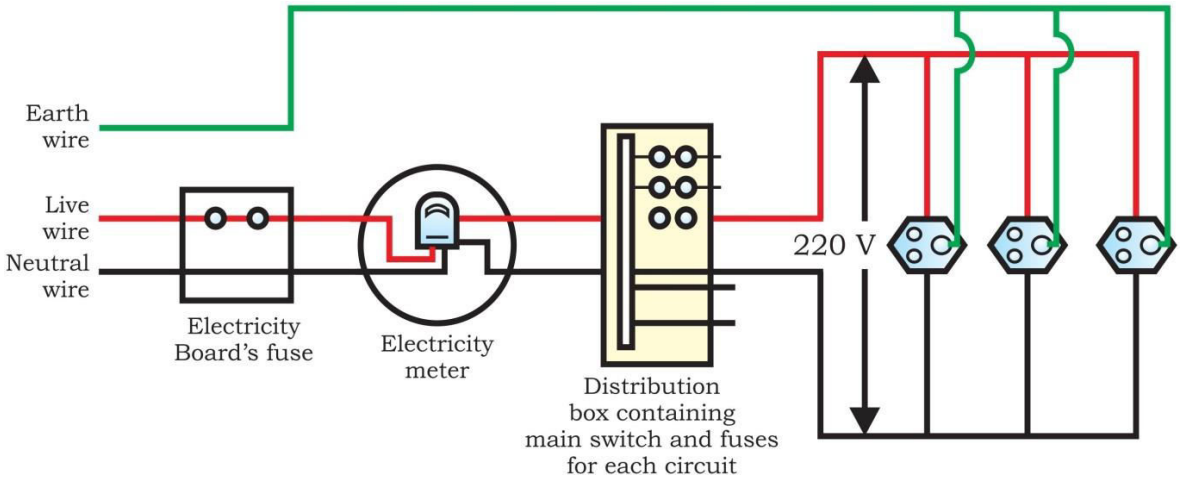




P206	Basic Engineering Practices	L	T	P	C
Practicum		1	0	2	2

Exercise 5: Electrical Power Supply for Domestic Applications





P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

Introduction

Engineering drawing is the language of engineers. By means of drawing, the shape, size, finish, colour, and construction of any object can be described accurately and clearly. Hence, drawing is a way for communicating engineer's ideas, designs, and thoughts to others. It is necessary for the engineers to develop their skill in preparing engineering drawings.

This subject is planned to include sufficient practices which would help the student in visualization of two-dimensional objects and developing the drawing skills. Nowadays, Computer Aided Drafting (CAD) practices are used invariably in all the industries to create drawings easily and quickly. Hence this subject is aimed to acquire basic knowledge in manual drafting as well as in CAD.

The chapters are arranged in sequence and starts from the basic concepts of lettering, dimensioning, geometrical constructions, construction of polygon and department specific drawings.

Course Objectives

The objective of this course is to enable the student to

- List the usage of various drawing instruments.
- Understand the basics of lettering and dimensioning of drawings.
- Acquire the ability to draw the basic geometrical constructions.
- Understand the basics of CAD.
- Use CAD in designing and developing department specific drawings.

Course Outcomes (CO)

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

CO1: Utilize various drawing instruments to create manual drawing.
CO2: Construct the drawings as per BIS
CO3: Build the basic geometrical constructions
CO4: Create department specific drawings using various commands in CAD

Pre-requisites

Nil

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	-	-	-	-
CO2	2	3	2	-	-	-	-
CO3	2	1	3	-	-	-	-
CO4	-	-	-	3	-	-	-
CO5	-	-	-	-	-	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- **Engage and Motivate:** Instructors should actively engage students to boost their learning confidence.
- **Real-World Relevance:** Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- **Interactive Learning:** Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- **Application-Based Learning:** Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome- driven learning and employability.
- **Simulation and Real-World Practice:** Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- **Encourage Critical Analysis:** Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	CA2	CA3	CA4	
Mode	Manual Drafting (Unit – I)	Manual Drafting (Unit – II)	Model Exam	Practices and Record of Work Done	Practical Examination
Duration	2 hours	2 hours	3 hours	***	3 hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	10	60
Marks	40				60

Note:

CA1: Three questions should be given from Unit – I to draw in the drawing sheet and the same should be evaluated for 60 Marks. Each question carries 20 Marks.

CA2: Three questions should be given from Unit – II to draw in the drawing sheet and the same should be evaluated for 60 Marks. Each question carries 20 Marks.

CA3: Model Examination for 100 Marks.

CA4: All exercises [4 Drawing sheets (each 5 marks) + 8 CAD Drawings (each 10 marks)]. The same should be submitted for the board examination as a record of work done.

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

COMMON TO ALL BRANCHES

PART – A (Manual Drafting)

[The drawings (Ex. No: 1 to 4) should be drawn on drawing sheets and the same should be submitted for evaluation]

Unit I	**BASICS OF DRAWING AND DIMENSIONING**	
Importance of engineering drawing - drawing practice as per BIS code - drawing instruments: drawing board, mini drafter, drawing sheets, drawing pencils, set squares, etc. Lettering and numbering as per BIS - single stroke letters - uppercase and lowercase letters. Dimensioning – need for dimensioning - terms and notations as per BIS - parallel, chain and progressive dimensioning.		4
Ex.No	Name of the Experiment	
1	a) Rewrite the given statement in a single stroke vertical uppercase letters (5 statements) b) Rewrite the given statement in a single stroke vertical lowercase letters (5 statements)	4
2	Redraw the given drawing and dimension it as per BIS. (Figure: 1 to 4)	6
Unit II	**GEOMETRIC CONSTRUCTION AND CONSTRUCTION OF POLYGONS**	
Geometric Constructions: Bisect a straight line, an arc and an angle – divide a straight line and circle into a number of equal divisions – construct an arc touching two straight lines at any angle – construct an arc touching two arcs. **Construction of Polygons:** Triangle, square, rectangle, pentagon and hexagon – various positions – side of the polygon is parallel, perpendicular and inclined to principal planes.		4
Ex.No	Name of the Experiment	
3	a) Divide a straight line and circle into given number of equal divisions b) Construct an arc touching two straight lines c) Construct an arc touching two arcs	4
4	Construct the polygon of given size (Choose any suitable method) (Triangle, Rectangle, Square, Pentagon and Hexagon)	4

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

PART – B (Computer Aided Drafting)

[Note: The drawings (Figure: 1 to 8) should be created using CAD Software and the printout should be submitted for evaluation]

Unit III	**BASICS OF COMPUTER AIDED DRAFTING (CAD)**	
Introduction to CAD – applications – advantages of CAD over manual drafting – understanding user interface – types of coordinate systems - absolute, relative, polar – drafting settings – Limits – Units – Creating objects using draw commands – Line, Arc, Circle, Rectangle, Ellipse, Polygon, Point, Pline, Sketch – Creating text – Dtext, Mtext, Text styles – Mline, spline – Drawing with precision – Osnap options – drawing aids – Fill, Snap, Grid, Ortho lines – Function keys – Editing and modify commands – Object selection methods – Erasing object – Oops – Canceling and undoing a command – Copy – Move – Array – Offset – Scale – Rotate – Mirror – Break – Trim – Extend – Explode – Divide – Measure – Stretch – Lengthen – Changing properties – Color, Line types, LT scale – Matching properties – Editing with grips – Pedit – Ddedit – Mledit. Basic dimensioning – Editing dimensions – Dimension styles – Adding leaders – Creation of blocks – Wblock – Inserting a block – Block attributes – Hatching – Pattern types – Boundary hatch – Working with layers – View group commands – Zoom, redraw, regen, pan – Enquiry tools. Page setup in layout – Viewports – Plotting drawings.		8
Ex.No	Name of the Experiment		
5	Draw the given drawing and dimension it as per BIS using CAD (Figure: 1 to 4)		5

FOR MECHANICAL ENGINEERING AND ALLIED BRANCHES ONLY

Unit IV	**ORTHOGRAPHIC VIEWS USING CAD**	
Orthographic projections – planes of projection – principal orthographic views – first angle projection – third angle projection – Construction of orthographic views of simple components using CAD.		4
Ex.No	Name of the Experiment	
6	Draw the orthographic views of the given component using CAD (Figure: 5 to 8)	4

P207	**Drafting Practices**	L	T	P	C
Practical		0	0	4	2

FOR CIVIL AND ALLIED COURSES ONLY		
Unit IV	**BASIC CIVIL ENGINEERING DRAWINGS USING CAD**	
Important terminologies used in Civil Engineering Drawing – Basic conventional symbols – materials, doors, windows, stairs, walls, sanitary fittings, etc. – Basic civil engineering drawing using CAD.		4
Ex.No	Name of the Experiment	
6	Draw the given civil engineering drawing using CAD (Figure: 5 to 8) a) Cross sectional view of L -section, T-section, Channel and I - Section b) Plan, Elevation and Sectional view of a Single storey, Single room consisting of RCC Flat Roof, Masonry walls, Lintel cum Sunshade, Door and windows of standard size. c) Floor plan of a 2BHK residential building. d) Plan and Sectional Elevation of a RCC Column with square isolated footings	8

FOR EEE AND ALLIED COURSES ONLY		
Unit IV	**BASIC ELECTRICAL WIRING CIRCUITS USING CAD**	
Basic electrical symbols - fuse, main switch, electrical bell, earth, SPST, DPST, TPST, Neutral link, ammeter, voltmeter, wattmeter, energy meter, frequency meter, power factor meter, timer, buzzer, MCB, etc. – Drawing of basic electrical circuits diagrams using CAD.		4
Ex.No	Name of the Experiment	
6	Draw the given electric circuit diagram using CAD. (Figure: 5 to 8) a) Stair-case wiring electric circuit b) Control and main circuit of automatic star delta starter c) Control circuit for jogging in cage induction motor d) Single phase wiring circuit	8

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

FOR ECE, COMPUTER AND ALLIED COURSES ONLY		
Unit IV	**BASIC ELECTRONIC CIRCUITS USING CAD**	
Basic electronics symbols - Resistor, Capacitor, Inductor, PN Junction Diode, Zener Diode, BJT, JFET, MOSFET, GND and VCC, Transformer, Switch, Buzzer, Battery, etc. Drawing of basic electronics circuits diagram using CAD.		4
Ex.No	Name of the Experiment	
6	Draw the given electronics circuit diagram using CAD. (Figure: 5 to 8) a) Half Wave Rectifier circuit b) Bridge Rectifier circuit c) Common Emitter Amplifier circuit d) Fire Alarm circuit	8
Continuous Assessment Test & Revision		8
TOTAL HOURS		**60**

Note: Suitable drawings should be provided to students for Ex. Nos: 2, 5 & 6

Suggested List of Students Activities

- Download and learn the BIS Codes for various engineering practices.
- Prepare 3D models of drawings with the help of cardboard to visualize and understand the orthographic views.
- Presentation/Seminars by students on any recent technological developments based on the course
- Periodic class quizzes conducted on a weekly/fortnightly based on the course
- Mini project that shall be an extension of any practical lab exercise to real-world application

Text Books

- Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53 Edition, 2019.
- Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
- T. Jayapoovan, "Engineering Drawing & Graphics Using Autocad", Vikas Publishing House Pvt. Ltd.

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

- M. Yogesh, B. S. Nagaraja, N. Nandan, "Computer Aided Electrical Drawing", PHI Learning Pvt. Ltd.
- Thomas Tumilty, "AutoCAD for Electronics", PHI Learning Pvt. Ltd.

References

- Basant Agrawal, Agrawal C M "Engineering Drawing", McGraw hill HED
- Venugopal.K, Prabhu Raja V, "Engineering Graphics", New Age International Publishers.
- Mark Dix, Paul Riley, "Fundamentals of AutoCAD" PHI Learning Pvt. Ltd.
- BL Theraja, AK Theraja, "A Textbook of Electrical Technology", S. Chand & Company Ltd.
- D Chattopadhyay, PC Rakshit, "Fundamentals of Electric Circuit Theory", S. Chand & Company Ltd.
- R. S. Sedha, "A Textbook of Electronic Circuits", S. Chand & Company Ltd.

Web-based / Online Resources

https://www.autodesk.in/campaigns/autocad-tutorials
https://www.mycadsite.com/tutorials.html

BOARD EXAMINATIONS

Allocation of Marks

Description	Marks
Part – A:Short Answer Questions	
2 Five marks Questions from Unit– I, II (02 x05= 10 Marks)	10
Part –B:ComputerAidedDrafting	
1) Drawing and dimensioning using CAD from Unit-III Any **on**e drawing out of four drawings (01 x 25 = 25 Marks)	25
2) Department specific drawing using CAD from Unit– IV Any **one** drawing out of four drawings (1x 60= 60 Marks)	60
Viva –voce	5
TOTAL MARKS	**100**

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

DRAWINGS FOR LAB EXERCISES

COMMON FOR ALL BRANCHES *(All dimensions are in mm)*

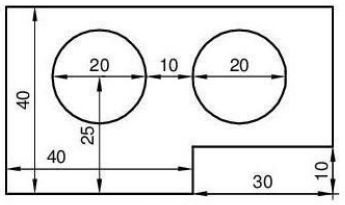


Fig.1

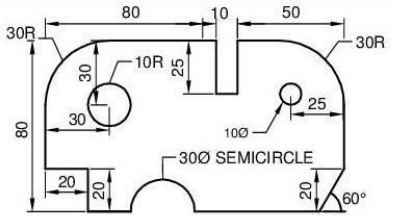


Fig.2

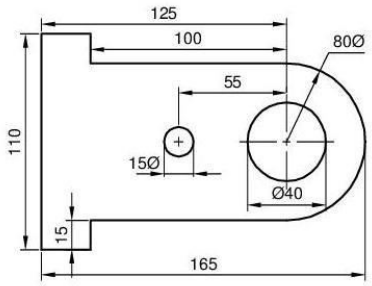


Fig.3

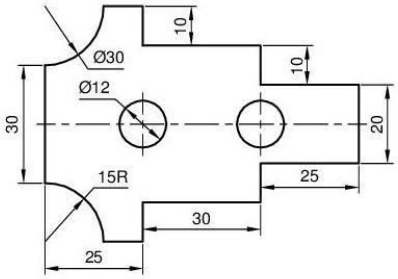


Fig.4

FOR MECHANICAL ENGINEERING AND ALLIED COURSES ONLY

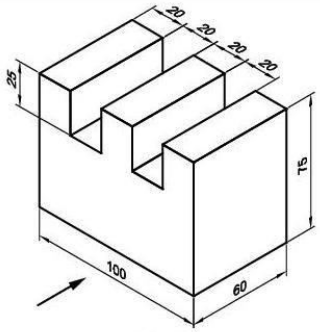


Fig.5

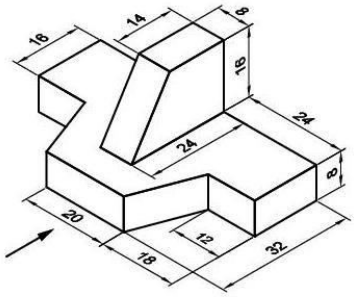


Fig.6

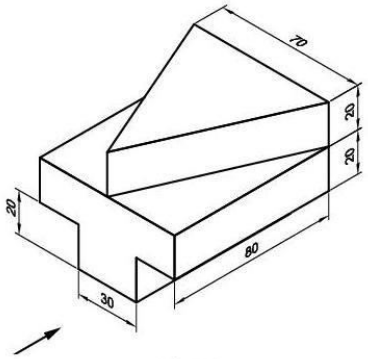


Fig.7

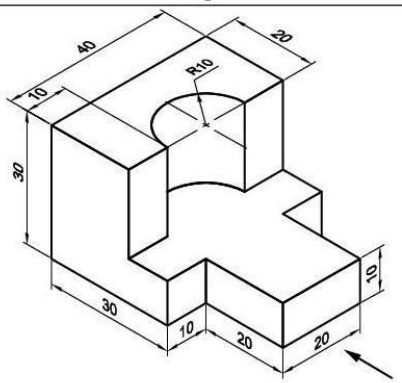


Fig.8

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

FOR CIVIL ENGINEERING AND ALLIED COURSES ONLY

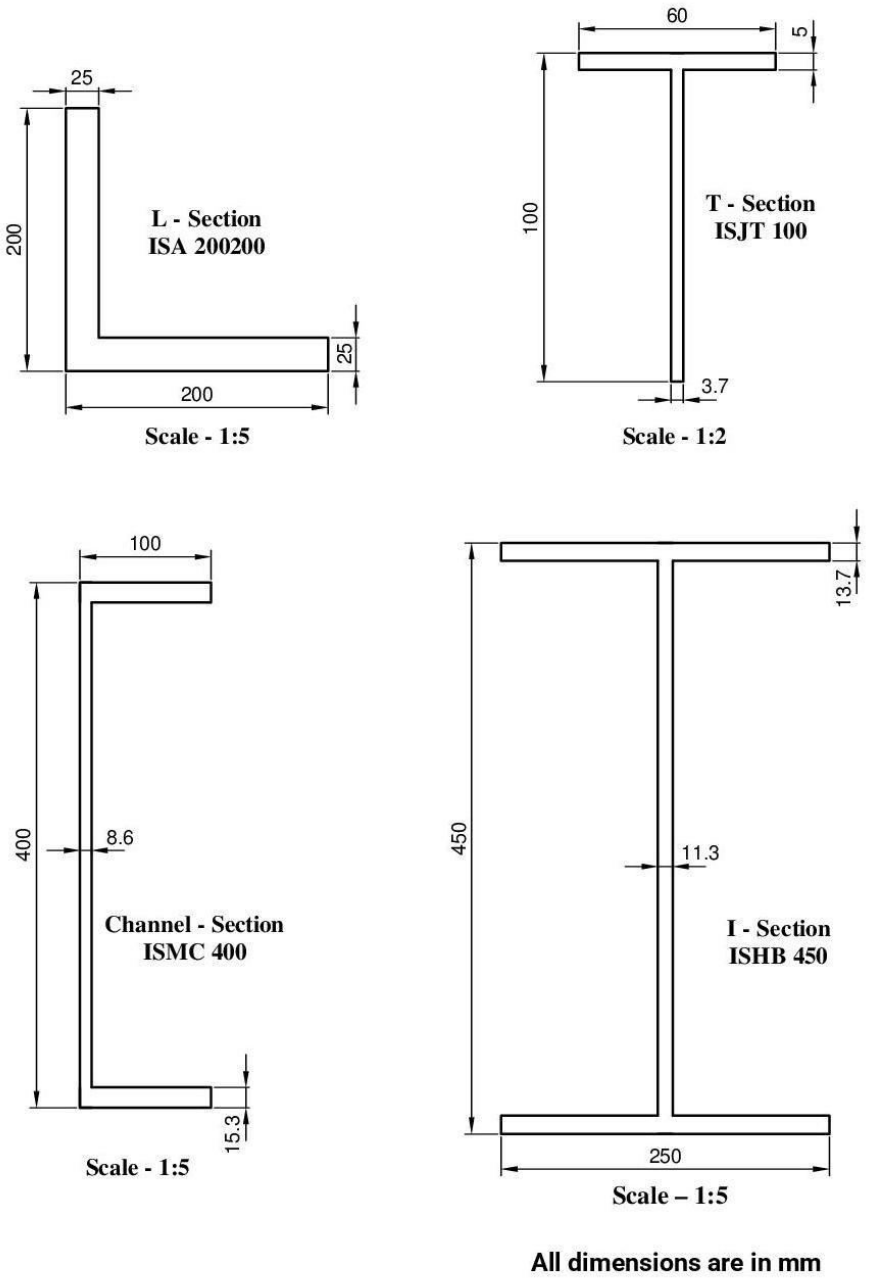


Fig.5. Cross sectional view of L -section, T-section, Channel section and I- Section

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

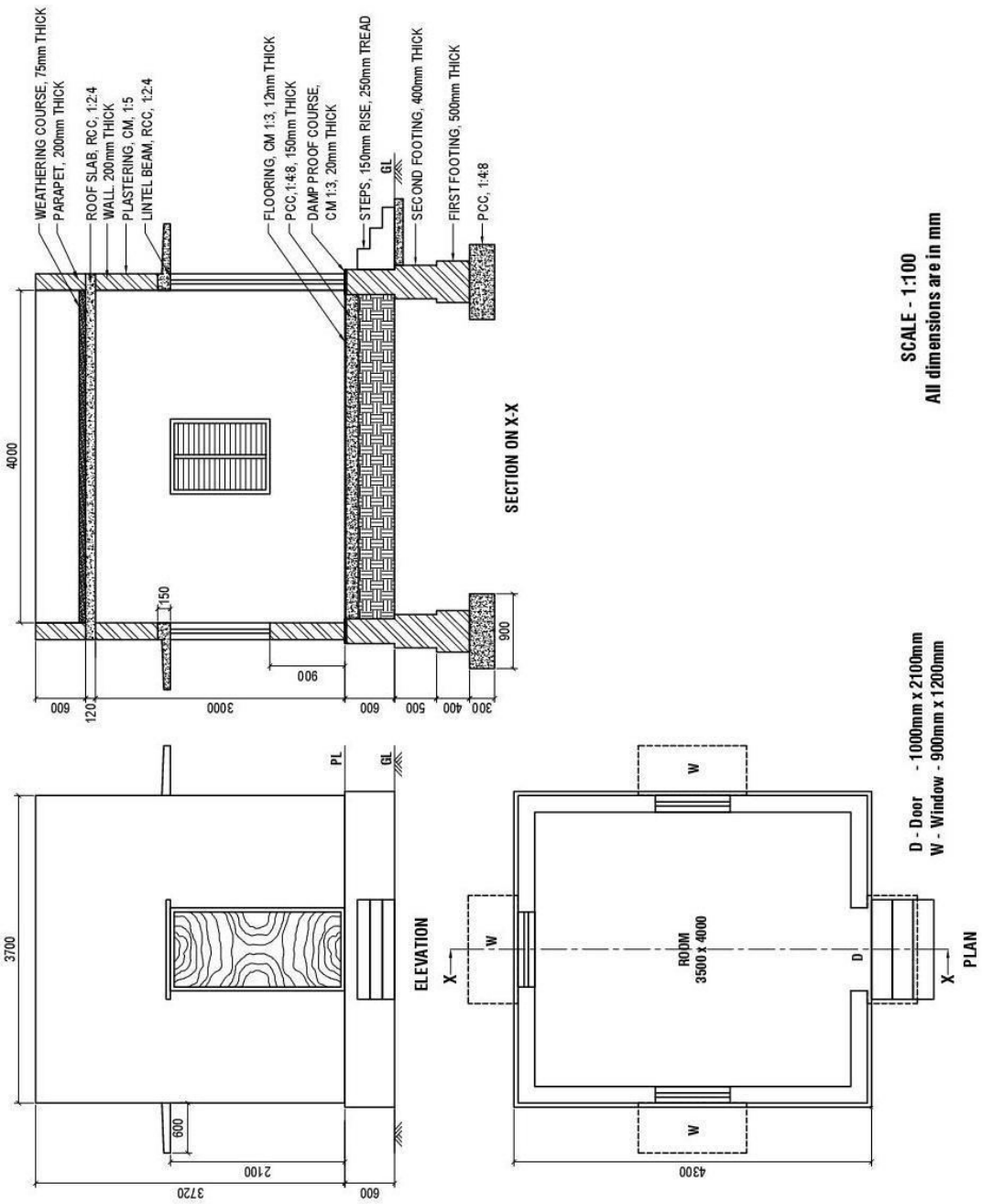
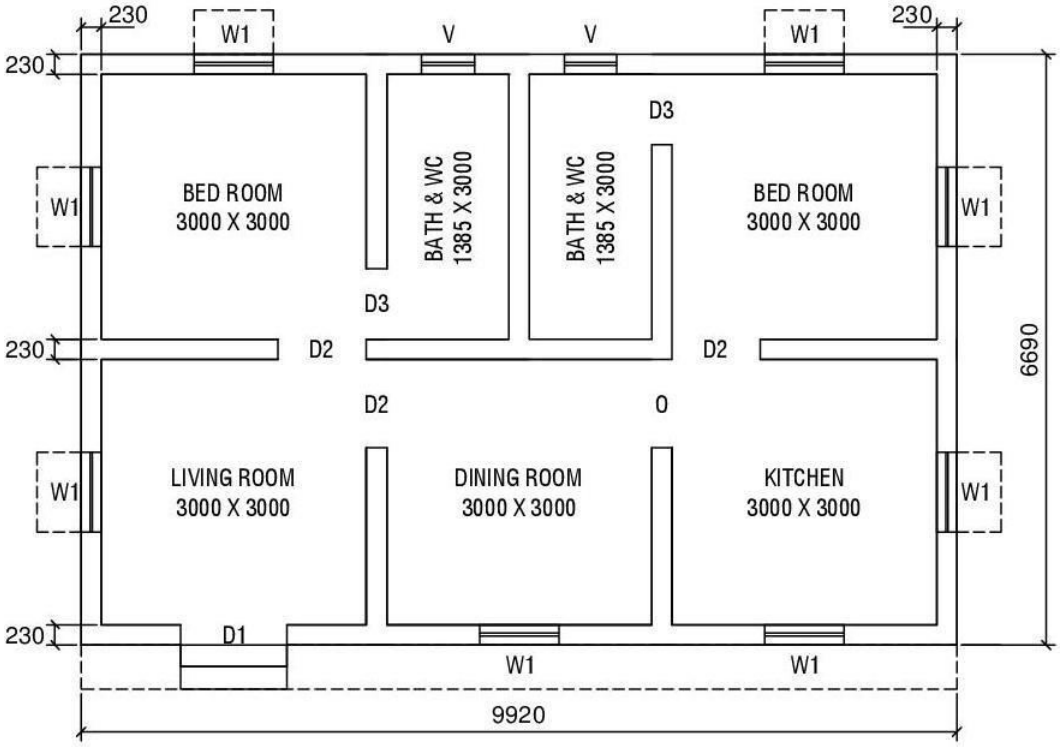


Fig.6. Plan, Elevation and Sectional view of a single storey building with single room

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2



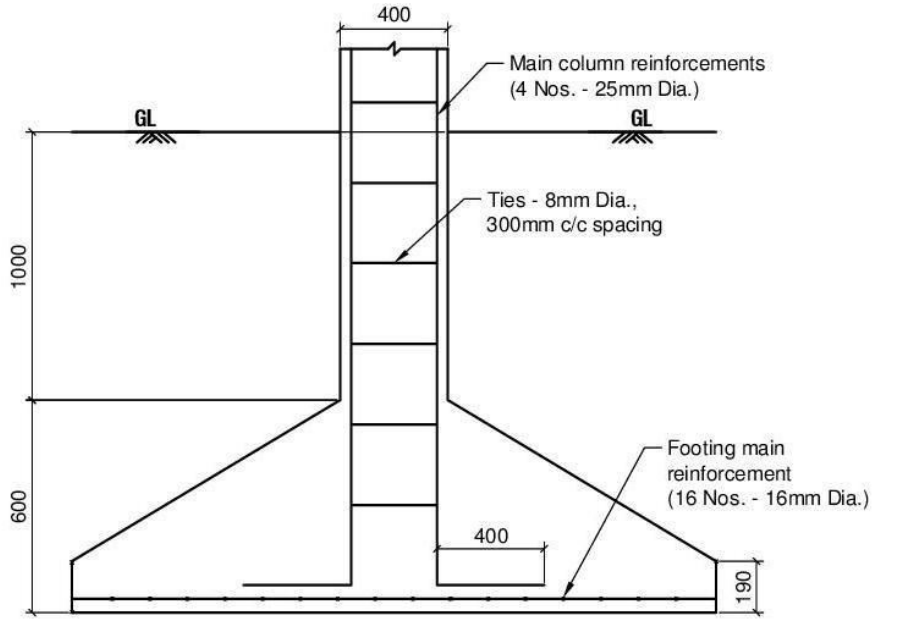
Window (W) - 900 mm x 1200 mm
Ventilator (V) - 600 mm x 600 mm

Door (D1) - 1200 mm x 2100 mm
Door (D2) - 1000 mm x 2100 mm
Door (D3) - 800 mm x 2100 mm

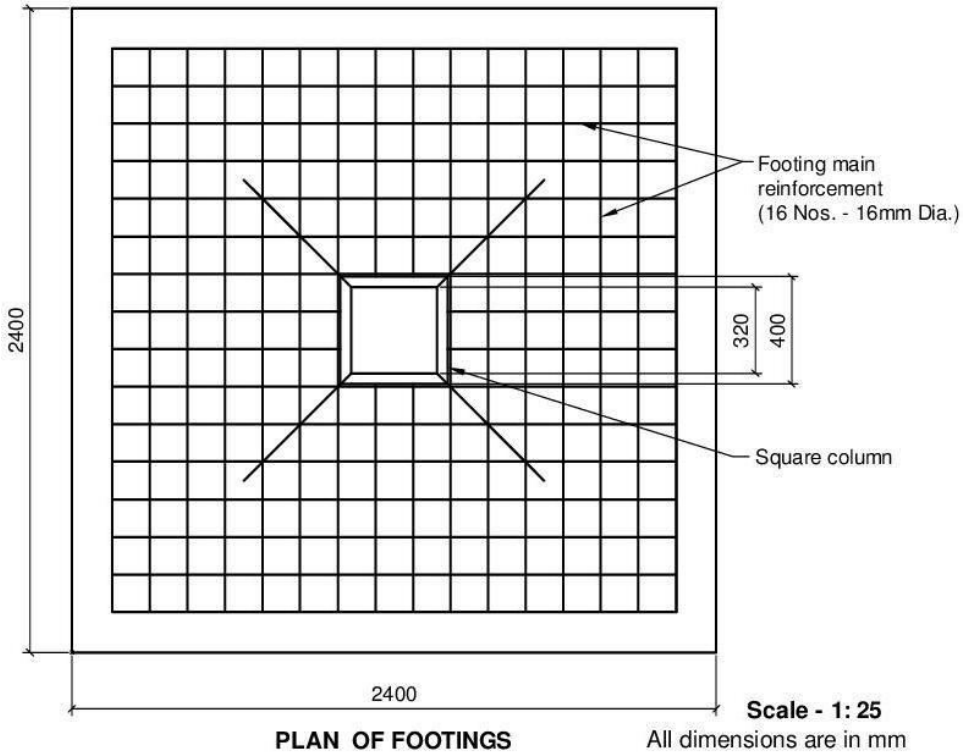
SCALE – 1:100
All dimensions are in mm

Fig.7. Floor plan of 2 BHK residential building

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2



SECTIONAL ELEVATION OF COLUMN AND FOOTINGS



PLAN OF FOOTINGS

Scale - 1: 25

All dimensions are in mm

Fig.8 RCC column with square isolated footing

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

FOR EEE AND ALLIED COURSES ONLY

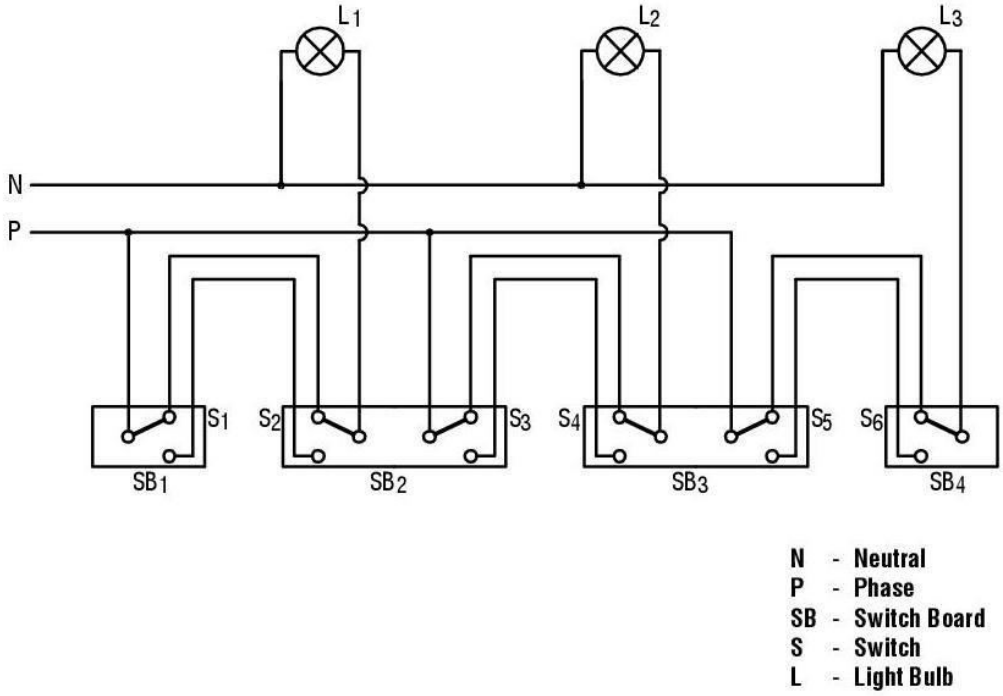


Fig.5. Staircase wiring electric circuit

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

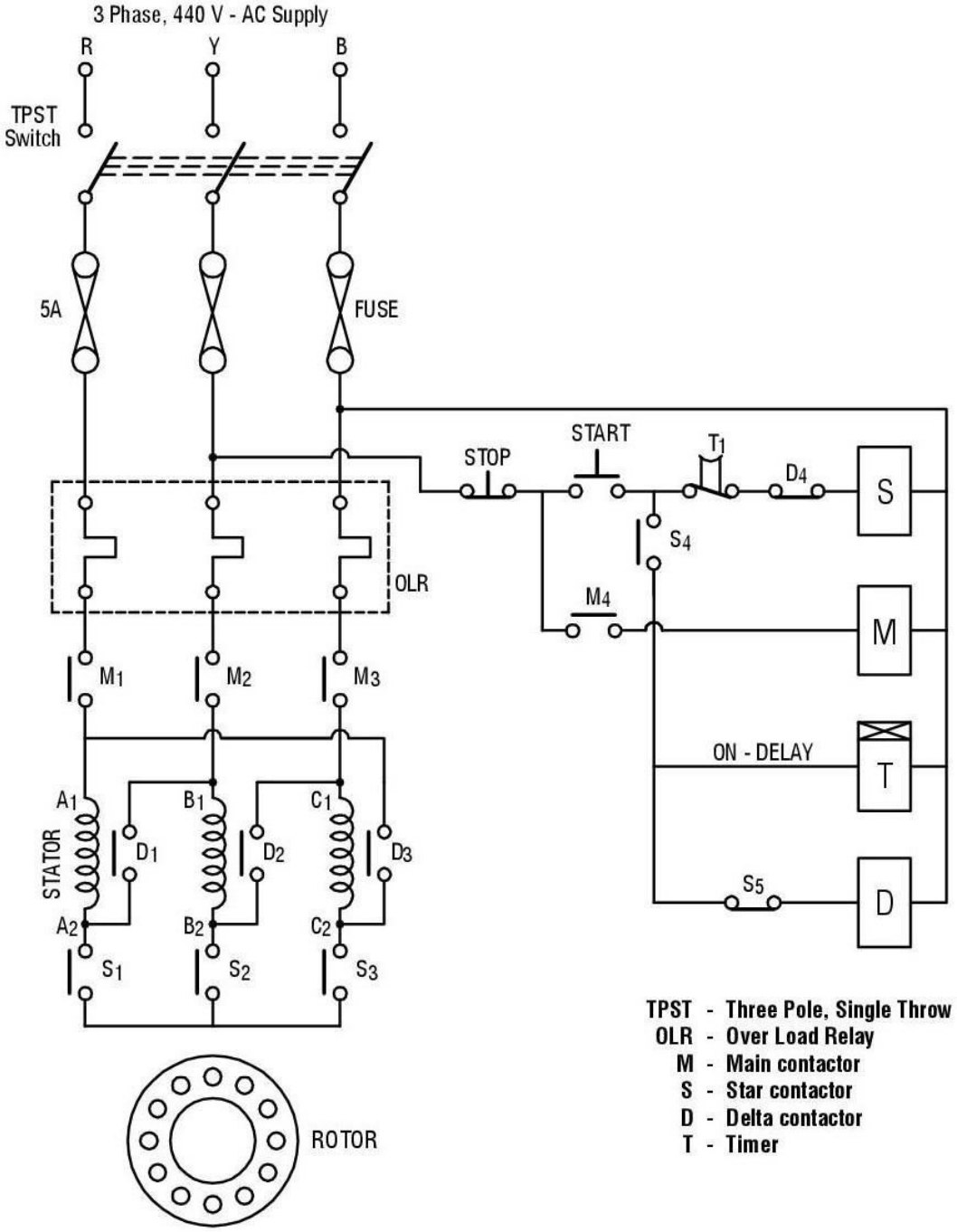


Fig.6. Control and main circuit for automatic star delta starter

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

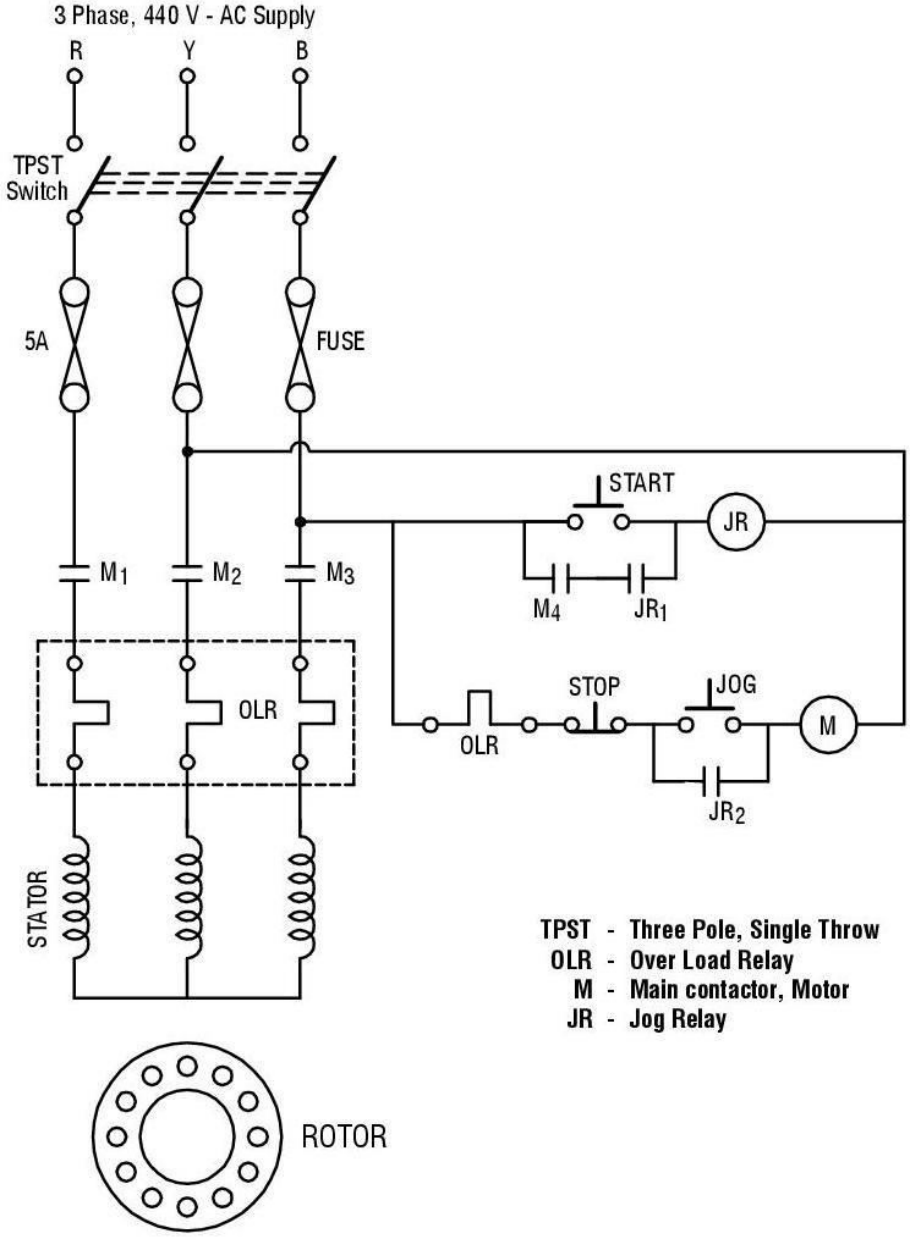


Fig.7. Control circuit for jogging in cage induction motor

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

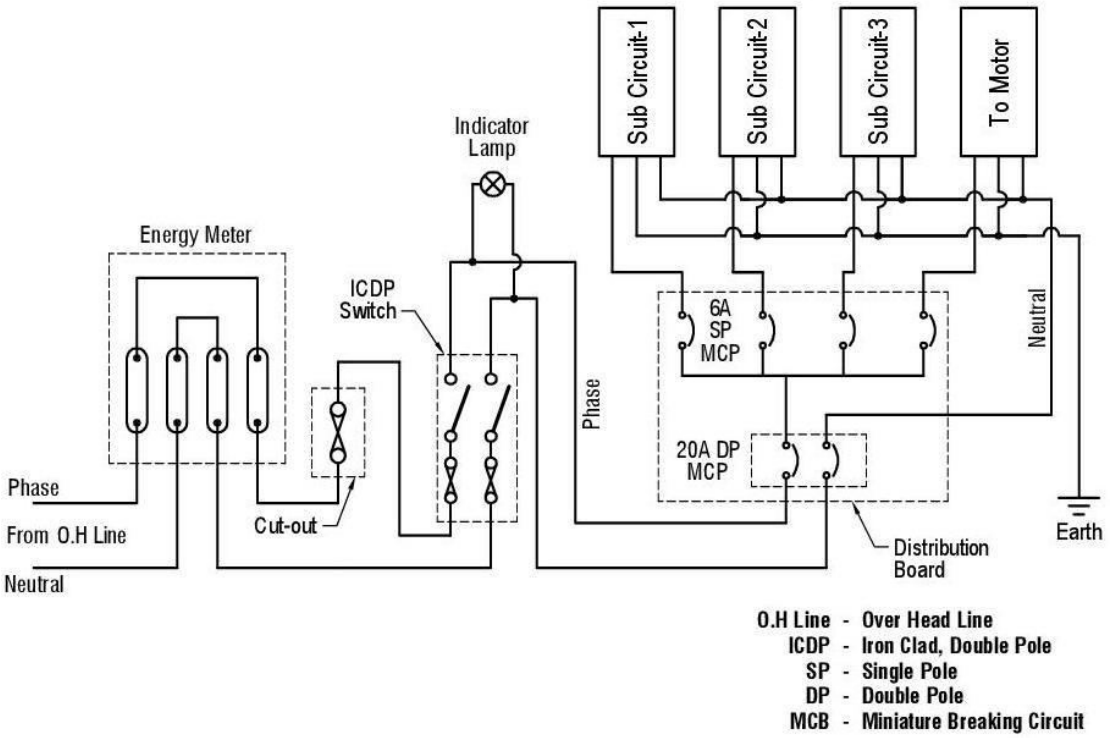


Fig.8. Single phase wiring circuit

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

FOR ECE, COMPUTER ENGINEERING AND ALLIED COURSES ONLY

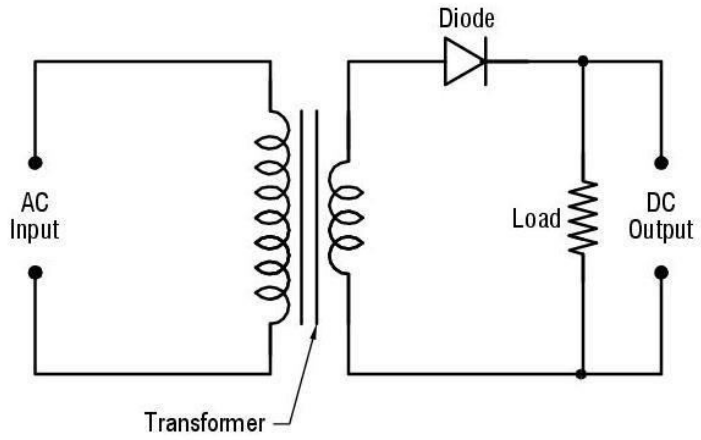


Fig.5. Half wave rectifier circuit

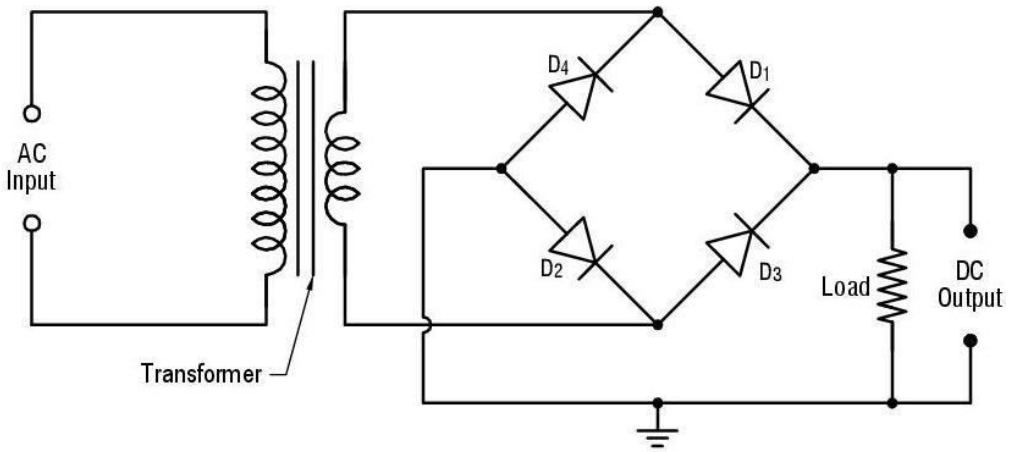


Fig.6. Bridge rectifier circuit

P207	Drafting Practices	L	T	P	C
Practical		0	0	4	2

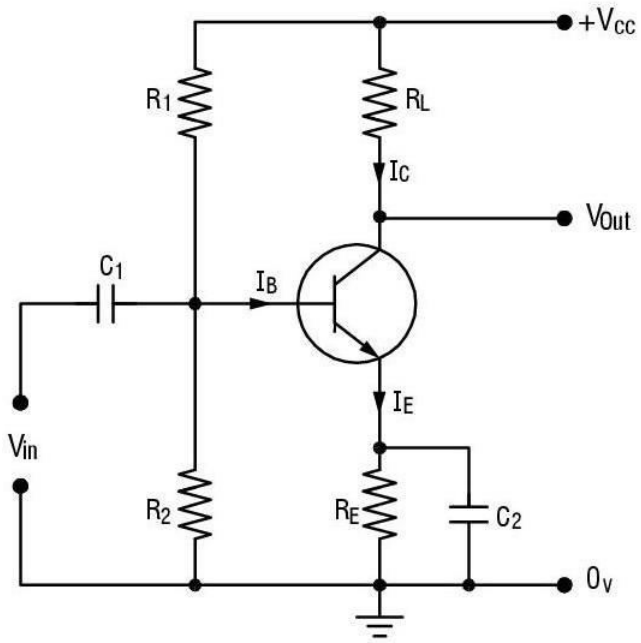


Fig.7. Common emitter amplifier circuit

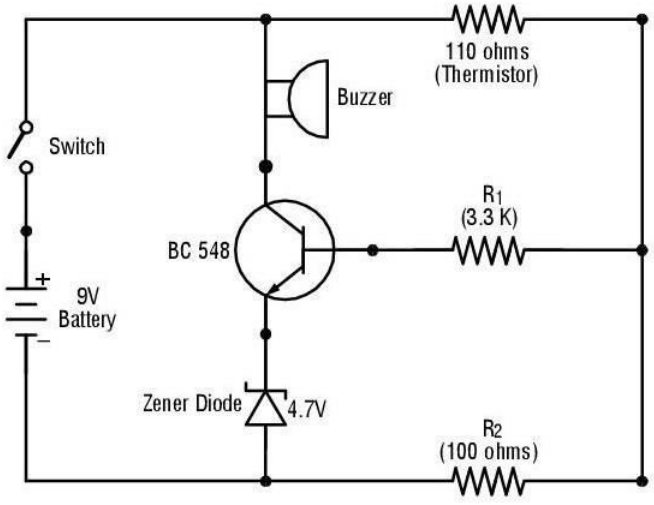


Fig.8. Fire alarm circuit

P208	Communicative English II	L	T	P	C
Practicum		1	0	2	2

Introduction

Communication is the foundation for all human relationships and language is one of the prime tools of communication. Communication is reliant on cognitive skills such as eloquent speech, vocabulary, reading comprehension and critical thinking. The present syllabus focuses on four Language Skills Listening, Speaking, Reading, and Writing. It enables the students to shed their inhibitions be confident in their approach and acquire the skills to build good working relationships in their career. It helps the student at the Diploma level to gain confidence and enhance them to face their career commitments with globalized standards.

Course Objectives

The objective of this course is to enable the students to

- Improve the communicative competence in English.
- Enhance the vocabulary and LSRW Skills.
- Foster their confidence in group communication skills.
- Learn the techniques of effective writing.
- Enable them to communicate effectively and appropriately in real-life situations.

Course Outcomes

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

CO1: Boost confidence in expressing ideas, and plans, interpreting the same in social and professional situations.

CO2: Frame grammatically correct sentences with clarity and coherence both in oral and written communication.

CO3: Analyze and evaluate the information with supporting ideas logically and coherently.

CO4: Communicate effectively using appropriate vocabulary and grammar in every situational context.

CO5: Provide adequate exposure and opportunities to imbibe, develop, practice and use LSRW skills and seek opportunities for further language development outside the classroom.

P208	Communicative English II	L	T	P	C
Practicum		1	0	2	2

Pre-requisites

Nil

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	-	-	-	-	-	3	2
CO2	-	-	-	-	-	3	2
CO3	-	-	-	-	-	3	2
CO4	-	-	-	-	-	3	2
CO5	-	-	-	-	-	3	2

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

The instructional strategy for Communicative English classes employs a learner-centered and communicative approach that focuses on active student participation and engagement. Here are some key strategies to be followed.

- **Communicative Activities:** Activities that develop active vocabulary and encourage role plays and language games for everyday applications.
- **Pair and Group Work:** Promotes student interaction in a confident way in day-to-day conversation. It also reinforces their language skills through communication with their peers.
- **Authentic Materials:** News articles, videos, and podcasts develop comprehension and critical thinking skills.
- **Task-Based Learning:** Implement task-based learning activities for students and use English for real-world purposes.

P208	Communicative English II	L	T	P	C
Practicum		1	0	2	2

- **Language Output and Output Balance**: Ensure a balance between language input like exposure to domain-specific vocabulary and grammar structures with examples. Enable language output by giving opportunities for students to build both receptive skills (Listening and Reading) and productive skills (Speaking and Writing).
- **Use of Technology:** Technology tools and resources such as language learning apps, online platforms, and virtual communication tools can be used to provide practice opportunities.
- **Regular Assessment:** Formative and Summative assessments are conducted to gauge students' progress and encourage them in their language learning journey

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)	
	CA1	CA2	CA3	CA4		
Mode	Written Test (Theory + Writing Skill)	Written Test (Theory + Writing Skill)	Model Exam Oral (S & R)*	Model Exam (T, L & W)*	Oral Exam (S,R)*	Written Exam
	Unit I & II	Unit III, IV & V	Unit I to V	Unit I to V	All Units	All Units
Duration	2 hours	2 hours	2 hours	2 hours	3 hours	
Exam Marks	30 + 10 (Record Marks) Unit I & II	30 + 10 (Record Marks) Unit III, IV & V	50	50	50	50
Converted to	20	20	20	20	60	
Marks	Best of CA1 & CA2 (20 marks)		Average of CA3 & CA4 (20 marks)		60	

*L – Listening Skill, S – Speaking Skill, R – Reading Skill, W – Writing Skill and T – Theory

Note:

- **CA1** - 30 Marks [Written Exam from Unit I & II].
- **CA2** - 30 Marks [Written Exam from Unit III, IV & V].
- **Record Writing** - 10 Marks for each exercise

P208	Communicative English II	L	T	P	C
Practicum		1	0	2	2

- **CA3** - Model Exam (Unit I, II, III, IV & V) – Speaking Skills and Reading Skills.
- **CA4** - Model Exam (Unit I, II, III, IV & V) – Theory, Listening Skills and Writing Skills.
- **End Semester Examination**
  - **Oral** (Speaking and Reading Skills)
  - **Written** (Theory, Listening Skills and Writing Skills)
- Selected lists will be provided in the e-Text Book wherever mentioned.

P208	Communicative English II	L	T	P	C
Practicum		1	0	2	2

Unit I	SITUATIONAL ENGLISH	
Theory (Prose): Science Fiction Story [Any Short Story with Technical Words] **Focus on:** a) Technical words [Textual] b) Conversions: Nouns, Verbs, Adjectives and Adverbs using affixes [Textual/General]		3
PRACTICAL (Lab/Activity) **Exercise No: 1**		
Listening a) Listening to Scientific and Technological Passages. ◦ Minimum 3 passages ◦ Conversions: Nouns, verbs, adjectives, and adverbs using affixes ◦ Minimum 5 conversions from each of the 3 passages b) One Word Substitution [Technical] ◦ Minimum 5 words from each passage (To be recorded in the Record Notebook)		6
Speaking a) Process Description ◦ Making of working models and Lab procedures b) Situational dialogues: WH, Yes or No		
Reading Short passages based on Professional Ethics		
Writing a) Rules for email etiquette b) Email writing (Business Letters and Job Applications)		
Unit II	**FUNCTIONAL ENGLISH**	
Theory (Poem): The Bangle Sellers by Sarojini Naidu **Focus on:** a) Poetry Comprehension (poetry lines to be given with related questions to be answered in one or two lines) b) Comparison of Adjectives (Textual) c) Fill in the blanks with suitable forms of adjectives (General)		3
Listening Listening to Lyrical Poems and noting down the Descriptive Adjectives		

P208	Communicative English II	L	T	P	C
Practicum		1	0	2	2

PRACTICAL (Lab/Activity) Exercise No: 2	
Speaking a) Word Cloud ◦ Minimum 3 word clouds ◦ Frame 5 sentences from each Word Cloud (Minimum 5 words) b) Homophones and their meanings (General) ◦ A selected list of 25 homophones will be provided (To be recorded in the Record Notebook)	6
Reading a) Reading Comprehension (News articles) Questions and Answers, Synonyms/ Antonyms, Completing the Sentence b) Newspaper Reading Practice is to be given.	
Writing a) Collocations of Technical Words (Match the Collocations) ◦ With 5 words in one set ◦ A selected list of 25 Collocations will be provided b) Punctuations ◦ Sentences and Passages	

Unit III	EXPRESSIVE ENGLISH	
Theory (Prose): Narrative Essay: On Saying Please by A.G. Gardiner **Focus on:** a) MCQs (based on the Prose) b) Short questions with one or two-line answers (Prose) c) Reporting Dialogues ◦ Textual/General ◦ Change into Reported Speech		3

P208	Communicative English II	L	T	P	C
Practicum		1	0	2	2

Listening: • Listen to Scientific Passages (Questions and Answers) **Speaking:** (a) Facing an Interview • Preparations (Checklist) • Body Language (Tips) (b) Mock Interviews (Practical Model to be given)	
PRACTICAL (Lab/Activity) **Exercise No: 3**	
Reading • Reading Idiomatic Expressions with their meanings. • Matching the idioms with their meanings • 5 Idioms in each set • A selected list of 25 idioms with their meanings will be provided (To be recorded in the Record Notebook)	6
Writing • Info graphics/Picture Reading (General/Technical) (Comprehending it as a Paragraph)	
Unit IV **EFFECTIVE ENGLISH**	
Theory (Prose): General Prose Passage (Speech by a famous Indian Personality) **Focus on:** • Identification of Types of Sentences • Four Types: Assertive, Interrogative (Wh-type and Yes or No type), Imperative and Exclamatory (Textual/General)	3
Listening: Speeches of Great Personalities (Note-Taking)	
Speaking: • Group Discussion (General Topics: Environmental and Creating Awareness)	
Reading: • Reading various types of sentences with intonation [Four Types: Assertive, Interrogative (Wh-type and Yes or No type) Imperative and Exclamatory (Falling Tone and Rising Tone)]	

P208	Communicative English II	L	T	P	C
Practicum		1	0	2	2

PRACTICAL (Lab/Activity) **Exercise No: 4**	
Writing ◦ Advertisement Writing (Classifieds: Educational, Rental, Real Estate, Automotive & Business Offers) ◦ Minimum one from each classified (To be recorded in the Record Notebook)	6
Unit V **CREATIVE ENGLISH**	
Theory: Passages on Motivational Topics (Minimum 3) **Focus on**: a) Identification of Phrasal Verbs from the passages. (Textual) b) Phrasal Verbs [General] ◦ Framing sentences using the Phrasal Verbs: Textual and General ◦ A selected list of 25 Phrasal Verbs will be provided under General Category	3
Listening Listening to the Weather Reports (Fill up the information gaps)	
PRACTICAL (Lab/Activity) **Exercise No: 5**	
Speaking ◦ Describing Oneself (Physical Features, Character Traits, Likes and Dislikes) ◦ Describe in Points under each aspect. (To be recorded in the Record Notebook)	6
Reading ◦ Interpreting Graphics into Verbal (Pie Chart / Bar Diagram/Flow Chart)	
Writing (a) Completing a story (b) Caption writing for News Reports	
TOTAL HOURS	**45**

P208	Communicative English II	L	T	P	C
Practicum		1	0	2	2

Incorporate some of these activities in the Language Class

- New Words and Meanings
- Proverbs and its Meanings
- Contextual Vocabulary
- Frequently Mispronounced Words
- Cross Word Puzzles (General/Technical)
- Abbreviations (social media)
- Newspaper Reading Practice

Suggested List of Student Activities

- Presentation/Seminars by students on any recent technological developments based on the branch of study.
- Quizzes are to be conducted based on the course on a weekly/fortnightly basis.
- Role Plays to Practice Speaking and Listening Skills.
- Descriptive Presentations about a specific topic using appropriate vocabulary.
- Language Games like word puzzles, vocabulary quizzes, and interactive games.
- News Discussions to express their opinions on several topics.
- Collaborative writing promotes teamwork which improves writing skills.

References

- Cambridge English Skills: Real Listening and Speaking by Miles Craven
- Writing Better English for ESL Learners by Ed Swick
- English Grammar in Use by Raymond Murphy
- Practical English Usage by Michael Swan
- Oxford Basics – Simple Reading Activities by Jill Hadfield. Charles Hadfield
- Oxford Basics – Simple Speaking Activities by Jill Hadfield, Charles Hadfield

Web-based/Online Resources

- https://www.bbc.co.uk/learningenglish/
- https://www.fluentu.com/
- https://www.englishclub.com/

P208	Communicative English II	L	T	P	C
Practicum		1	0	2	2

Assessment Pattern

Continuous Assessment – I
(30 Marks)

Unit I & II (Theory & Writing Skills only)

I	Pick out any 5 technical words from the given passage. **(Passage from Science Fiction Short Story – Textual)**	5 x 1 = 5
II	Read the given poetry lines and answer the following questions. **Poem: The Bangle Sellers – Sarojini Naidu (5 questions)**	5 x 1 = 5
III	Match the technical words and form corresponding collocations. **(5 words in one set)**	5 x 1 = 5
IV	Correct the paragraph by adding appropriate punctuation and capitalization. **(2 small paragraphs)**	2 x 2½ = 5
V	Convert the following words into their corresponding derivatives. **(Textual/General – N/V/Adj/Adv)**	5 x 1 = 5
VI	E-Mail Writing: Business/Job Applications. **(Under any one of the mentioned categories)**	1 x 5 = 5

P208	Communicative English II	L	T	P	C
Practicum		1	0	2	2

Continuous Assessment – II
(30 Marks)

Unit III, V & II (Theory & Writing Skills only)

I	Choose the correct answer. (Multiple Choice) **Prose: On Saying Please by A.G. Gardiner (5 Questions)**	5 x 1 = 5
II	Identify the types of sentences. **General/Textual –Affirmative, Interrogative: Wh-type and Yes or No type, Imperative and Exclamatory (5 sentences)**	5 x 1 = 5
III	Frame sentences using the given Phrasal Verbs. **(General/Textual: 5 phrasal verbs)**	5 x 1 = 5
IV	Write a paragraph of 50 words using the given info graphics/picture. **(General/Technical)**	1 x 5 = 5
V	Write classified advertisement – (Educational / Rental / Real Estate / Automotive / Business Offers) **(Under any one of the specified categories)**	1 x 5 = 5
VI	Write suitable captions for the given news reports. **(2 news reports)**	2 x 2½ = 5

P208	Communicative English II	L	T	P	C
Practicum		1	0	2	2

Continuous Assessment – III
(50 Marks)

Oral Exam (Speaking and Reading Skills)

TEST ON SPEAKING SKILLS (40 marks)		
I	Describe the process of (Making working models / Lab procedures) **(Under any one of the mentioned categories)**	1 x 10 = 10
II	Describe oneself: (Physical features / Character traits / Likes and dislikes**) (Under any one of the aspects)**	1 x 10 = 10
III	Interpret the given Graphics into Verbal. (Pie chart / Bar Diagram / Flow chart) **(Under any one of the mentioned categories)**	1 x 10 = 10
IV	Frame questions using WH and YES or NO type for the given situations. **(5 situations to be given)**	5 x 1 = 5
V	Frame sentences using any 5 words from the given word cloud.	5 x 1 = 5
TEST ON READING SKILLS (10 marks)		
VI	Match the idiomatic expressions with their corresponding meanings. **(5 idiomatic expressions in one set)**	5 x 1 = 5
VII	Read the following sentences with proper intonation. **(5 sentences - under 4 types of sentences - Affirmative, Interrogative (Wh-type and Yes or No type) Imperative and Exclamatory) (Falling Tone and Rising Tone)**	5 x 1 = 5

P208	Communicative English II	L	T	P	C
Practicum		1	0	2	2

Continuous Assessment – IV
(50 Marks)

Written Exam (Theory, Listening and Writing Skills)

TEST ON THEORY PART (15 marks)		
I	Read the given poetry lines and answer the following questions: **(Poem: The Bangle Sellers by Sarojini Naidu – 5 Questions with Poetry lines)**	5 x 1 = 5
II	Answer the following short questions in one or two lines: **(Prose: On Saying Please by A.G. Gardiner – 5 Questions)**	5 x 2 = 10
TEST ON LISTENING SKILLS (5 marks)		
III	Listen to weather reports and fill in the information gaps. **(2 weather reports)**	2 x 2½ = 5
TEST ON WRITING SKILLS (30 marks)		
IV	Fill in the blanks with suitable adjectives. **(General - 5 fill-ups with options)**	5 x 1 = 5
V	Change the following dialogue into reported speech. **(General/Textual – 2 dialogues)**	2 x 2½ = 5
VI	E-Mail Writing – Business / Job Applications. **(Under any one of the mentioned categories)**	1 x 5 = 5
VII	Write a paragraph of about 50 words using the given info graphics/picture.	1 x 5 = 5
VIII	Complete the story within 3 to 5 lines and give a title.	1 x 5 = 5
IX	Match the technical words and form collocations. **(5 words in one set)**	5 x 1 = 5

P208	**Communicative English II**	L	T	P	C
Practicum		1	0	2	2

Board Examination (100 Marks)
(Oral Skills: 50 Marks + Written Skills: 50 Marks)

ORAL SKILLS (50 marks)

TEST ON SPEAKING SKILLS (30 marks)		
I	Describe Oneself: (Physical features / Character traits / Likes and dislikes**) (Under any one of the aspects)**	1 x 10 = 10
II	a) Frame questions using (WH / Yes or No) for the given situations**. (5 Situations to be given)**	5 x 1 = 5
	OR	
	b) Give the meaning for the set of homophones. **(2 homophones in one set)**	2 x 2½ = 5
III	Frame sentences using any 5 words in the word cloud.	5 x 1 = 5
IV	Group Discussion: (Environmental / Creating Awareness) **(Topics given according to the groups divided)**	1 x 10 = 10
TEST ON READING SKILLS (20 marks)		
V	Interpret the given Graphics into Verbal. (Pie chart / Bar Diagram / Flow chart) **(Under any of the mentioned categories)**	1 x 10 = 10
VI	Match the idiomatic expressions with their corresponding meanings. **(5 idiomatic expressions in one set)**	5 x 1 = 5
VII	Read the following sentences with proper intonation. **(5 sentences - under 4 types of sentences - Affirmative, Interrogative: Wh-type and Yes or No type, Imperative and Exclamatory)**	5 x 1 = 5

P208	**Communicative English II**	L	T	P	C
Practicum		1	0	2	2

WRITTEN SKILLS (50 marks)

TEST ON THEORY PART (10 marks)		
I	Read the poetry lines and answer the following questions: **(Poem: The Bangle Sellers by Sarojini Naidu – 4 Questions with Poetry lines)**	4 x 1 = 4
II	Answer the following short questions in one or two lines: **(Prose: On Saying Please by A.G. Gardiner – 3 Questions)**	3 x 2 =6
TEST ON LISTENING SKILLS (20 marks)		
III	Listen to the speech of the **(great personality)** and take down notes.	1 x 10 = 10
IV	Listen to the **(scientific passage)** and answer the following questions:	1 x 10 = 10
TEST ON WRITING SKILLS (20 marks) (Answer ANY FOUR questions)		
V	Fill in the blanks with suitable adjectives: **(General – 5 fill-ups)**	1 x 5 = 5
VI	Frame sentences using phrasal verbs: **(5 phrasal verbs)**	5 x 1 = 5
VII	E-Mail Writing – Business / Job Applications. **(Under any one of the mentioned categories)**	1 x 5 = 5
VIII	Write a paragraph of about 50 words using the given info graphics/picture.	1 x 5 = 5
IX	Match the technical words and form collocations. **(5 words in one set)**	5 x 1 = 5
X	Write suitable captions for the news reports given: **(2 news reports)**	2 x 2½ = 5