Proposed for the academic years 2020-2024

FACULTY OF ENGINEERING

Scheme of Instruction & Examination

(AICTE Model Curriculum)

and

Syllabi

of

Four Year Degree Program of

Bachelor of Engineering (B.E)

COMPUTER SCIENCE AND ENGINEERING

Issued by

Dean, Faculty of Engineering

Osmania University, Hyderabad – 500 007

2020

Vision and Mission of Osmania University

Vision	The Vision of the University is to generate and disseminate knowledge through a harmonious blend of ancient and modern wisdom, and to serve the society by developing in students heightened intellectual, cultural, ethical, and humane sensitivities; to foster a scientific temper, and to promote professional and technological expertise. Central to this vision is a commitment to regional and national development in consonance with our culture, heritage, and environment.
Mission	• To achieve excellence in teaching and research. • To generate, disseminate and preserve knowledge. • To meet the challenges of a complex, and modern society through informed social outreach. • To empower through knowledge and information. • To develop a responsible and productive citizenry. • To develop, enhance, and improve the quality of human resources. • To cultivate resolute moral and ethical values. • To meet contemporary regional and national needs and anticipate future social and economic development. • To preserve and promote cultural heritage, humanistic and spiritual values.

Program Outcomes

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12: Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Proposed for the academic years 2020-2024

SCHEME OF INSTRUCTION
BE (COMPUTER SCIENCE AND ENGINEERING)
AICTE MODEL CURRICULUM
CSE: SEMESTER – I

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hours/ Week	CIE	SEE	Duration in Hours	
Theory Courses										
	Three Week Induction Programme									
1	MC 802 CE	Environmental Science	3	-	-	3	30	70	-	-
2	MC 803 PY	Essence of Indian Traditional knowledge	2	-	-	2	30	70	-	-
3	BS 201 MT	Mathematics-I	3	1	-	4	30	70	3	4
4	BS 204 CH	Chemistry	3	1	-	4	30	70	3	4
5	ES 302 CS	Programming for Problem Solving	3	1	-	4	30	70	3	4
Practical/ Laboratory Courses										
6	BS 252 CH	Chemistry Lab	-	-	3	3	25	50	3	1.5
7	ES 352 ME	Workshop Practice	-	-	2x3	6	50	50	3	3
8	ES 351 CS	Programming for Problem Solving Lab	-	-	2	2	25	50	3	1
Total			**14**	**03**	**08**	**27**	**250**	**500**		**17.5**

BS: Basic Sciences **ES: Engineering Sciences** **MC: Mandatory Course**

L: Lectures **T: Tutorials** **P:Practicals** **D: Drawing**

CIE: Continuous Internal Evaluation **SEE: Semester End Examination**

CSE: SEMESTER – II

S. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P	Contact Hrs/Wk	CIE	SEE	Duration in Hours	
Theory Courses										
1	MC 801 PO	Indian Constitution	2	-	-	2	30	70	3	-
2	HS 101 EG	English	2	-	-	2	30	70	3	2
3	BS 202 PH	Physics	3	1	-	4	30	70	3	4
4	BS 203 MT	Mathematics-II	3	1	-	4	30	70	3	4
5	ES 301 EE	Basic Electrical Engineering	3	1	-	4	30	70	3	4
Practical/ Laboratory Courses										
6	HS 151EG	English Lab	-	-	2	2	25	50	3	1
7	BS 251PH	Physics Lab	-	-	2	3	25	50	3	1
8	ES 353CE	Engineering Graphics	-	-	3x2	6	50	50	3	3
9	ES 354 EE	Basic Electrical Engineering Lab	-	-	2	2	25	50	3	1
Total			**13**	3	**12**	**28**	**275**	**550**	-	**20**

CSE: SEMESTER – III

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	HS 103 ME	Operations Research	3	-	-	3	30	70	3	3
2	ES 304 EC	Basic Electronics	3	-	-	4	30	70	3	3
3	ES 305 EC	Digital Electronics	3	1	-	4	30	70	3	3
4	PC 301 CS	Data Structures and Algorithms	3	1	-	4	30	70	3	3
5	PC 302 CS	Discrete Mathematics	3	1	-	4	30	70	3	3
6	PC 303 CS	Programming Languages	3	1	-	4	30	70	3	3
Practical/ Laboratory Courses										
7	PC 351 CS	Data Structures and Algorithms Lab	-	-	2	2	25	50	3	1
8	PC 352 CS	Advanced Computer Skills Lab	-	-	2	2	25	50	3	1
9	ES 351 EC	Basic Electronics Lab	-	-	2	2	25	50	3	1
10	PC 353 CS	Programming Languages Lab	-	-	2	2	25	50	3	1
Total			**18**	**4**	**08**	**30**	**280**	**620**		**22**

CSE: SEMESTER – IV

			Scheme of Instruction	Scheme of Examination	

S. No.	Course Code	Course Title	L	T	P/D	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	HS 104 EG	Effective Technical Communication in English	3	-	-	3	30	70	3	3
2	HS 105 CM	Finance and Accounting	3	1	-	3	30	70	3	3
3	BS 205 MT	Mathematics – III (Probability & Statistics)	3	-	-	3	30	70	3	3
4	ES 306 EC	Signals and Systems	3	-	-	3	30	70	3	3
5	PC 401 CS	OOP using JAVA	3	-	-	3	30	70	3	3
6	PC 402 CS	Computer Organization	3	1	-	4	30	70	3	3
7	PC 403 CS	Database Management Systems	3	1	-	4	30	70	3	3
Practical/ Laboratory Courses										
8	PC 451 CS	Computer Organization Lab	-	-	2	2	25	50	3	1
9	PC 452 CS	OOP using JAVA Lab	-	-	2	2	25	50	3	1
10	PC 453 CS	Database Management Systems Lab	-	-	2	2	25	50	3	1
Total			**21**	**3**	**06**	**30**	**285**	**640**		**24**

CSE: SEMESTER - V

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	PC 501 CS	Software Engineering	3	1	-	4	30	70	3	3
2	PC 502 CS	Operating Systems	3	1	-	4	30	70	3	3
3	PC 503 CS	Automata Languages & Computation	3	1	-	4	30	70	3	3
4	PE-I	Professional Elective-I	3	-	-	3	30	70	3	3
5	PE-II	Professional Elective-II	3	-	-	3	30	70	3	3
6	PE-III	Professional Elective-III	3	-	-	3	30	70	3	3
Practical/Laboratory Courses										
7	PC 551 CS	Software Engineering Lab	-	-	2	2	25	50	3	1
8	PC 552 CS	Operating Systems Lab	-	-	2	2	25	50	3	1
9	PW 533 CS	Mini Project	-	-	4	4	25	50	3	2
Total			**18**	**03**	**08**	**29**	**255**	**570**		**22**

CSE: SEMESTER - VI

S. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	D/P	Contact Hrs/Wk	CIE	SEE	Duration in Hrs/Wk	
Theory Courses										
1	PC 601 CS	Compiler Design	3	1	-	4	30	70	3	3
2	PC 602 CS	Computer Networks	3	1	-	4	30	70	3	3
3	PC 603 CS	Design and Analysis of Algorithms	3	1	-	3	30	70	3	3
4	PE –IV	Professional Elective –IV	3	-	-	3	30	70	3	3
5	PE –V	Professional Elective –V	3	-	-	3	30	70	3	3
6	OE-I	Open Elective-I	3	-	-	-	30	70	3	3
Practical/Laboratory Courses										
7	PC 651 CS	Compiler Design Lab	-	-	2	2	25	50	3	1
8	PC 652 CS	Computer Networks Lab	-	-	2	2	25	50	3	1
9	PC 653 CS	Design and Analysis of Algorithms Lab	-	-	2	2	25	50	3	1
10	SI 671 IT	Summer Internship*	-	-	-	-	-	-	-	-
Total			**18**	**3**	**6**	**27**	**255**	**570**		**21**

CSE: SEMESTER - VII

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	PC 701 CS	Information Security	3	-	-	4	30	70	3	3
2	PC 702 CS	Data Mining	3	1	-	4	30	70	3	3
3	PC 703 CS	Distributed Systems	3	1	-	3	30	70	3	3
4	PE-VI	Professional Elective – VI	3	-	-	3	30	70	3	3
Practical/ Laboratory Courses										
5	PC 751 CS	Distributed Systems Lab	-	-	2	3	25	50	3	1
6	PC 752 CS	Data Mining Lab	-	-	2	3	25	50	3	1
7	PW 751 CS	Project Work – I	-	-	6	6	50	-	-	3
8	SI 752 CS	Summer Internship	`	-	-	-	50	-	-	2
Total			**12**	**02**	**10**	**24**	**270**	**380**		**19**

CSE: SEMESTER - VIII

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P/D	Contact Hrs/Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	OE-II	Open Elective – II	3	-	-	3	30	70	3	3
2	OE-III	Open Elective – III	3	-	-	3	30	70	3	3
Practical/ Laboratory Courses										
3	PW861 CS	Project Work – II	-	-	10	10	50	100	-	8
Total			**06**	**-**	**10**	**16**	**110**	**240**	**-**	**14**

Profession Elective – I	
Course Code	**Course Title**
PE 511 CS	Artificial Intelligence
PE 512 CS	Advanced Computer Architecture
PE 513 CS	Network Security
PE 514 CS	Foundations of Cryptography

Profession Elective – II	
Course Code	**Course Title**
PE 531 CS	Web Technologies
PE 532 CS	Embedded Systems
PE 533 CS	Graph Theory
PE 534 CS	Data Analytics

Profession Elective – III	
Course Code	**Course Title**
PE 521 CS	Block Chain Technologies
PE 522 CS	Information Retrieval Systems
PE 523 CS	Soft Computing
PE 524 CS	Computer Graphics

Profession Elective –I V	
Course Code	**Course Title**
PE 621 CS	Advanced Operating Systems
PE 622 CS	Cloud Computing
PE 623 CS	Natural Language Processing
PE 624 CS	Machine Learning

Profession Elective – V	
Course Code	**Course Title**
PE 631 CS	Image Processing
PE 632 CS	Human Computer Interaction
PE 633 CS	Digital Forensics
PE 634 CS	Internet of things

Profession Elective – VI	
Course Code	**Course Title**
PE 731 CS	Mobile Computing
PE 732 CS	Semantic Web
PE 733 CS	Cyber Security

Scheme of Instruction & Examination

(AICTE Model Curriculum for the Academic Year 2020-2021)

And

Proposed for the academic years 2020-2024

Syllabi

B.E. I and II Semesters

of

Four Year Degree Programme

in

B.E. (Computer Science and Engineering)

Proposed for the academic years 2020-2024

SCHEME OF INSTRUCTION & EXAMINATION

B.E (Computer Science and Engineering)

SEMESTER-I

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P / D	Contact Hrs / Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1.	**Three Week Induction Program**									
2.	MC 802 CE	Environmental Sciences	3	-	-	3	30	70	3	-
3.	MC 803 PY	Essence of Indian Traditional Knowledge	2	-	-	2	30	70	3	-
4.	BS 201 MT	Mathematics-I	3	1	-	4	30	70	3	4
5.	BS 204 CH	Chemistry	3	1	-	4	30	70	3	4
6.	ES 302 CS	Programming for Problem Solving	3	1	-	3	30	70	3	3
Practical / Laboratory Courses										
7.	BS 252CH	Chemistry Lab	-	-	3	3	25	50	3	1.5
8.	ES 351 CS	Programming for Problem Solving Lab	-	-	2	2	25	50	3	1
9.	ES 352 ME	Workshop Practice	-	-	2x3	6	50	50	3	3
Total			**14**	**03**	**08**	**27**	**250**	**500**		**17.5**

BS: Basic Science ES: Engineering Science MC: Mandatory Course

L: Lecture T: Tutorial P: Practical D: Drawing

CIE: Continuous Internal Evaluation SEE: Semester End Evaluation

SEMESTER-II

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination			Credits
			L	T	P / D	Contact Hrs / Wk	CIE	SEE	Duration in Hrs	
Theory Courses										
1	MC 801 PO	Indian Constitution	2	-	-	2	30	70	3	-
2	HS 101 EG	English	2	-	-	2	30	70	3	2
3	BS 202 PH	Physics	3	1	-	4	30	70	3	4
4	BS 203MT	Mathematics-II	3	1	-	4	30	70	3	4
5	ES 301 EE	Basic Electrical Engineering	3	1	-	4	30	70	3	4
Practical / Laboratory Courses										
6	HS 151EG	English Lab	-	-	2	2	25	50	3	1
7	BS 251PH	Physics Lab	-	-	2	2	25	50	3	1
8	ES 353 CE	Engineering Graphics		-	3x2	6	50	50	3	3
9	ES 354 EE	Basic Electrical Engineering Lab	-	-	2	2	25	50	3	1
Total			**13**	**03**	**12**	**28**	**275**	**550**		**20**

Proposed for the academic years 2020-2024

ENVIRONMENTAL SCIENCES

MC 802CE

Instruction: 3 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 0

Objectives:

1. To create awareness and impart basic knowledge about the environment and its allied problems.
2. To know the functions of ecosystems, social and environment related issues and their preventive measures
3. To understand importance of biological diversity, different pollutions and their impact on environment

Outcomes: Student will be able to:

1. Adopt environmental ethics to attain sustainable development
2. Develop an attitude of concern for the environment
3. Conservation of natural resources and biological diversity
4. Creating awareness of Green technologies for nation's security
5. Imparts awareness for environmental laws and regulations

UNIT – I

The Multidisciplinary Nature of Environmental Studies: Definition, scope and importance, need for public awareness.

***Natural Resources*:** Water Resources – Use and over utilization of surface and ground water, flood, drought, conflicts over water, Dams: Benefits and Problems. Food Resources –World Food Problems, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, Forest Resources – Use and over exploitation, deforestation & its effect on tribal people.Land Resources –Land Degradation, environmental effect of mining, man induced landslides, soil erosion and desertification. Energy Resources –Growing energy needs, Renewable and Non-renewable energy resources.

UNIT – II

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in ecosystem, food chains, ecological pyramids, ecological succession, types of ecosystems (marine, pond, river, forest, grassland, desert)

UNIT – III

Biodiversity: Levels of Biodiversity, Bio-geographical classification of India, Value of biodiversity, Threats to biodiversity, endangered and endemic species of India, Conservation of biodiversity, global and national efforts.

UNIT – IV

Environmental Pollution: Definition, Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution, solid waste management.

Environment Protection Act: Air, water, forest and wildlife Acts, issues in the enforcement of environmental legislation

UNIT – V

Social Issues and the Environment: Watershed management and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.

Environmental Disaster Management: Types of disasters, impact of disasters on environment,

infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology. Disaster management cycle and disaster management in India. ***Field Work:***Visit to a local area to document environmental issues- agricultural area/ pond/lake/terrestrial ecosystem.Visit to a local polluted area- market/slum area/Industrial area/traffic area.

Suggested Readings:

1	De Anil Kumar, "*Environmental Chemistry",* New Age Publisher International Pvt Ltd, New Delhi , 2016
2	E.P. Odum, '*Fundamentals of Ecology',* W.B. Sunders Co., USA.,1971
3	M.N. Rao and A.K. Datta, "*Waste Water Treatment",* Oxford and IBK Publications, New Delhi, 2009.
4	Benny Joseph, "*Environmental Studies",* Tata McGraw Hill, New Delhi, 2009
5	V.K. Sharma, "*Disaster Management",* National Centre for Disaster Management, IIPE, New Delhi, 1999

Proposed for the academic years 2020-2024

ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

MC 803 PY

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits : 0

Objectives:

1. To get a knowledge in Indian Culture
2. To Know Indian Languages and Literature and the fine arts in India
3. To explore the Science and Scientists of Medieval and Modern India

Outcomes: Student will be able to:

1. Understand philosophy of Indian culture
2. Distinguish the Indian languages and literature.
3. Learn the philosophy of ancient, medieval and modern India.
4. Acquire the information about the fine arts in India
5. Know the contribution of scientists of different eras.

UNIT – I

Introduction to Culture: Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India

UNIT – II

Indian Languages, Culture and Literature: Indian Languages and Literature-I: the role of Sanskrit, significance of scriptures to current society, Indian philosophies, other Sanskrit literature, literature of south India.

Indian Languages and Literature-II: Northern Indian languages & literature

UNIT – III

Religion and Philosophy: Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (selected movements only)

UNIT – IV

***Fine Arts in India (Art, Technology& Engineering*)**: Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India.

UNIT – V

Education System in India: Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

Suggested Readings:

1	Kapil Kapoor, "*Text and Interpretation*: *The India Tradition*", D. K. Print world, 2005
2	Gopala Krishnan , "*Science in Samskrit*", Samskrita Bharti Publisher, New Delhi, 2017
3	NCERT, "*Position paper on Arts, Music, Dance and Theatre*" NCERT, New Delhi, 2010.
4	S. Narain, "*Examinations in Ancient India*", Arya Book Depot, New Delhi, 1993
5	Satya Prakash, "*Founders of Sciences in Ancient India*", Vijay Kumar Publisher, New Delhi, 1989
6	M. Hiriyanna, "*Essentials of Indian Philosophy*", Motilal Banarsidass Publishers, New Delhi, 2005

MATHEMATICS-I

BS 201 MT

Instruction: 3+1 periods per week *Duration of SEE: 3 hours*

CIE: 30 marks *SEE: 70 marks*

Credits : 4

Objectives:

1.To introduce the concepts of sequences, series and their properties
2.To introduce the concepts of functions of several variables and multiple integrals
3.To study vector differential and integral calculus

Outcomes: Student will be able to:

1.Find the nature of sequences and series
2.Apply this knowledge to solve the curriculum problems
3.Evaluate multiple integrals

UNIT – I

Sequences and Series: Sequences, Series, General properties of series, Series of positive terms, Comparison tests, tests of Convergence D'Alembert's ratio test, Cauchy's n^{th} root test, Raabe's test, Logarithmic test, Alternating series, Series of positive and negative terms, Absolute convergence and Conditional convergence.

UNIT – II

Calculus of one Variable: Rolle's theorem, Lagrange's, Cauchy's mean value theorems, Taylor's series, Curvature, Radius of curvature, Circle of curvature, Envelope of a family of curves, Evolutes and Involutes.

UNIT – III

Multivariable Calculus (Differentiation): Functions of two variables, Limits and continuity, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions (Chain rule), Change of variables, Jacobian, Higher order partial derivatives, Taylor's series of functions of two variables, Maximum and minimum values of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT – IV

***Multivariable Calculus* (*Integration*):** Double integrals, Change of order of integration, Change of Variables from Cartesian to plane polar coordinates, Triple integrals

UNIT – V

Vector Calculus: Scalar and vector fields, Gradient of a scalar field, Directional derivative, Divergence and Curl of a vector field, Line, Surface and Volume integrals, Green's theorem in a plane, Gauss's divergence theorem, Stoke's theorem (without proofs) and their verification.

Suggested Readings:

	R.K. Jain & S.R.K Iyengar, "*Advanced Engineering Mathematics"*, Alpha Science

1	International Limited, 2014.
2	Erwin Kreyszig, "*Advanced Engineering Mathematics"*, John Wiley, 9th Edition, 2012.
3	B.S. Grewal, "*Higher Engineering Mathematics"*, Khanna Publishers, 43rd Edition, 2014.
4	G.B. Thomas, Maurice Weir and Joel Hass, "*Thomas' Calculus"*, Pearson Education, 12th Edition,2010.
5	B.V. Ramana, "*Higher Engineering Mathematics*", Tata Mc Graw Hill Education, 23rd reprint, 2017.

Proposed for the academic years 2020-2024

CHEMISTRY

BS 204 CH

Instruction: 3+1 periods per week *Duration of SEE: 3 hours*

CIE: 30 marks *SEE: 70 marks*

Credits : 4

Objectives:

1. Correlate the properties of materials with their internal structure and use for Engineering applications
2. Apply the principles of electrochemistry in storage of electrical energy in batteries.
3. Gains knowledge about the causes of corrosion and its prevention.
4.Attains knowledge about the hard water and treatment of water for drinking purpose.
5.Exposed to qualitative and quantitative parameters of chemical fuels and aware of eco-friendly materials and processes.

Outcomes: Student will be able to:

1.Apply concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries.
2. Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.
3. Estimate the physical & chemical parameters of quality of water and explain the process of water treatment
4.Analyze the influence of chemical structure on properties of materials and their choice in engineering applications.
5. Classify chemical fuels and grade them through qualitative analysis and relate the concept of green c chemistry to modify engineering processes and materials.

UNIT – I

***Electrochemistry*:** Electrochemical cells, Electrolytic and Galvanic cells-notation, cell reaction and cell potentials. Types of electrodes, Calomel Quinhydrone and Glass electrodes. Determination of pH of a solution by using Quinhydrone electrode. Thermodynamics of emf of cells, Nernst equation and its derivation. Applications of Nernst equation to electrode potential and emf of cells. Numerical problems.

Battery Chemistry: Primary batteries: Zn - Carbon battery. Secondary batteries: Pb-Acid battery and Li-Ion battery, Applications. Flow batteries (Fuel cells): Methanol-Oxygen fuel cells, Construction, Applications.

UNIT – II

Water Chemistry: Hardness of Water-Types and units of hardness, estimation of temporary and permanent hardness of water by EDTA method. Alkalinity of water and its determination. Water softening by Ion exchange and Reverse Osmosis methods. Numerical problems. Specifications of potable water. Sterilization by Chlorination. Break Point Chlorination.

Corrosion: Causes and its effects. Types of Corrosion-Dry or Chemical corrosion and

Wet or Electrochemical corrosion and their mechanism. Electrochemical corrosion – Waterline and Pitting Corrosion. Factors influencing rate of corrosion.

Corrosion control methods: Cathodic protection methods - Sacrificial anodic and impressed current methods.

Surface coating methods: Hot Dipping-Galvanizing.

UNIT – III

Engineering Materials: Polymers: Basics of terms polymers: Monomer and its functionality, Polymers and degree of polymerization. Classification of polymers - Thermoplastics & Thermosetting resins.

Types of Polymerization-Addition, Condensation, Co-Polymerization. Mechanism of free radical polymerization.Preparation, Properties & Uses of the following polymers: Plastics - PVC and Bakelite, Fibres - Nylon 6:6, and Kevlar, Elastomers - Buna-S, Butyl and Silicone Rubbers.

Conducting polymers: Introduction, Classification and Mechanism of conduction in Poly-acetylene, Applications of conducting polymers.

Biodegradable polymers: Introduction preparation, properties and applications of polylactic acid.

UNIT – IV

Chemical Fuels: Classification of fuels: Introduction, definition and classification of chemical fuels-Primary and secondary fuels. Solid, liquid and gaseous fuels. Requirements of a good fuel. Calorific Value – HCV and LCV. Theoretical calculations of calorific value by Dulong's formula – Numerical problems.

Solid Fuels: Coal and its Ranking. Analysis of coal - Proximate and Ultimate analysis.

Liquid Fuels: Fractionation of Petroleum. Composition and uses of Gasoline, Diesel and Kerosene. Cracking & its Significance- Catalytic cracking by moving bed method, Knocking. Fuel rating – Octane and Cetane numbers.

Gaseous Fuels: LPG, CNG -Composition and Uses.

Combustion: Ignition temperature of a fuel, calculation of air quantities by weight and volume required for combustion of a fuel- Numerical problems.

UNIT – V

Green Chemistry: Concept, Principles of green chemistry – Atom Economy, Catalysis. and examples of clean technology.

Biodiesel: Sources, Concept of Transesterification and carbon neutrality, Properties and significance

Composites: Introduction to composites, composition and characteristic properties of composites.

Classification of composites based on matrix, reinforcement and ply. Applications of composites.

Suggested Readings:

1	B.R. Puri, L.R. Sharma, Madan S. Pathania , "*Principles of Physical Chemistry*", S.N. Chand & Co. New Delhi,1987
2	P C Jain and M Jain ,"*Engineering Chemistry*", Dhanpat Rai & Sons , 15th Edition, New Delhi, 2004
3	J C Kuriacose and J Rajaram ,"*Chemistry in Engineering and Technology* ", Tata Mc Graw Hill, New Delhi, 2010
4	O G Palanna, "*Engineering Chemistry*", Tata Mc Graw Hill, New Delhi, 2009
	S S Dara and SS Umare, "*Engineering Chemistry*", S.N. Chand & Co. New Delhi, 2004

5	
6	Sashi Chawla, "*Engineering Chemistry*", Dhanpat Rai & Sons, New Delhi, 2017
7	Prasanta Rath, "*Engineering Chemistry*", Cengage Learning India Pvt. Ltd, 2015

Proposed for the academic years 2020-2024

PROGRAMMING FOR PROBLEM SOLVING

ES 302 CS

Instruction: 3+1 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 3

Objectives:

1.To introduce the concepts of Computing environment, number systems, flowcharts and algorithms
2.To familiarize the basic constructs of C language – data types, operators and expressions
3.To understand modular and structured programming constructs in C
4.To learn the usage of structured data types and memory management using pointers
5.To learn the concepts of data handling using pointers

Outcomes: Student will be able to:

1. Formulate simple algorithms and translate the algorithms to programs using C language.
2. Implement conditional branching, and iteration and arrays.
3.Apply the function concepts to implement searching and sorting algorithms
4. Analyse the usage of structures and pointer variables.

UNIT – I
Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numerical problems. ***Representation of Algorithm***: Flowchart / Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.
UNIT – II
Control Structures: Arithmetic expressions and precedence, Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching. ***Arrays:*** Arrays (1-D, 2-D), Character arrays and Strings.
UNIT – III
Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble and Selection), Finding roots of Equations. ***Functions:*** Functions (including using built in libraries), Parameter passing in functions, call by value. Passing arrays to functions: idea of call by reference
UNIT – IV
Recursion: Recursion, Example programs, such as Finding Factorial, Fibonacci series ***Structure***: Structures, Defining structures and Array of Structures
UNIT – V
Pointers : Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation), Introduction to File Handling.

Suggested Readings:

1	Byron Gottfried, "*Theory and practice of Programming with C"*, Schaum's Outline McGraw-Hill, 1996
2	A.K. Sharma, "*Computer Fundamentals and Programming in C*", Universities Press, 2nd Edition, 2018.
3	E. Balaguruswamy, "*Programming in ANSI C*", Tata McGraw-Hill Education, 2008
4	Brian W. Kernighan and Dennis M. Ritchie,"*The C Programming Language*", Prentice Hall of India,1988.

Proposed for the academic years 2020-2024

CHEMISTRY LAB

ES 252 CH

Instruction:3 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 1.5

Objectives:

1.Conduct experiments, take measurements and analyse the data though hands-on experience in order to demonstrate understanding of the theoretical concepts of quantitative Analysis while working in small group.
2.Interpret the electro analytical principles with experimental results graphically
3.Demonstrate writing skills through clear laboratory reports

Outcomes: Student will be able to:

1.Apply the principles of Colourimetry and Electrochemistry in quantitative estimations.
2.Estimate the rate constants of reactions from concentration of reactants/ products as a function of time.
3. Synthesize small drug molecules.

List of Experiments:

1. Introduction to Chemical Analysis.
2. Techniques of Weighing. Volumetric Analysis:
3. Preparation of Standard Mohr's salt solution, Standardization of $KMnO_4$ and estimation ferrous ion.
4. Estimation Iron(II) by Dichromatometry
5. Water Analysis:
6. Preparation of Standard Magnesium sulphate solution, standardization of EDTA and Estimation of Total Hardness.
7. Preparation of Standard Sodium Carbonate Solution, Standardization of HCL and Estimation of Carbonate and Bicarbonate Alkalinity.
   Conductometry: Estimation of HCL
8. Estimation of CH_3COOH and mixture of Acids
   Potentiometry
9. Estimation of HCL
10. Estimation of Iron
    pH Metry:
11. Estimation of HCL
    Colorimetry:
12. Verification of Beer-Lambert's law and estimation of Manganese.
    Chemical Kinetics:
13. Determination of rate constant of acid catalysed hydrolysis of methyl acetate.
14. Drug Synthesis Preparation of spirin

Note: Minimum ten experiments should be conducted in the semester

Suggested Readings:

1	B.D. Khosla, A. Gulati and V. Garg , "*Senior Practical Physical Chemistry*", R. Chand & Co., Delhi, 2011.
2	K. K. Sharma and D.S. Sharma , "*An Introduction to Practical Chemistry*", Vikas publishers, New Delhi, 1982.

Proposed for the academic years 2020-2024

WORKSHOP PRACTICE

ES 352 ME

Instruction:6 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 3

Objectives:

1.Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
2.To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
3.To gain a good basic working knowledge required for the production of various engineering products.
4.To Study different hand operated power tools, uses and their demonstration.
5.Adopt safety practices while working with various tools

Outcomes: Student will be able to:

1. Demonstrate an understanding of and comply with workshop safety regulations.
2. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
3. Study and practice on machine tools and their operations
4.Undertake jobs connected with Engineering Workshop trades including fitting, carpentry, sheet metal, house wiring, welding, smithy and foundry.
5.Apply basic electrical engineering knowledge for house wiring practice

List of Experiments:

A. TRADE FOR EXERCISES:

1. Carpentry
2. Fitting
3. House wiring
4. Sheet metal working
5. Smithy
6. Welding
7. Plumbing

B. TRADES FOR DEMONSTRATION AND EXPOSURE:

1. Machining (Lathe & Drilling)
2. Injection moulding
3. Mould making and casting
4. Basic Electronics lab instruments

C. PRESENTATIONS AND VIDEO LECTURES

1. Manufacturing Methods
2. Rapid Prototyping
3. Glass Cutting
4. 3D printing
5. CNC LATHE

D. IT WORKSHOP: Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, operating system installation.

Note: At least two exercises from each trade.

Suggested Readings:

1	Venugopal, K, "*Workshop Manual*", Anuradha Publications, Kumbakonam, TN, 2012
2	K.C. John, "*Mechanical Workshop*" 2nd Edn., PHI, 2010.
3	Hajra Choudary, "*Elements of Workshop Technology*" Vol. 1, Asian Publishers, Edn., 1993.
4	G.S. Sawhney, "*Mechanical Experiments and Workshop Practice*", I.K. International Publishing House, New Delhi, 2009.

PROGRAMMING FOR PROBLEM SOLVING LAB

ES 351 CS

Instruction:2 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 1

Objectives:

1. Understand the fundamentals of programming in C Language
2. Write, compile and debug programs in C
3. Formulate solution to problems and implement in C.
4. Effectively choose programming components to solve computing problems

Outcomes: Student will be able to:

1.Choose appropriate data type for implementing programs in C language
2.Design and implement modular programs involving input output operations, decision making and looping constructs.
3.Implement search and sort operations on arrays.
4.Apply the concept of pointers for implementing programs on dynamic memory management and string handling.
5.Design and implement programs to store data in structures and files.

List of Experiments:

1. Finding maximum and minimum of given set of numbers, finding roots of quadratic equation.
2. Sin x and Cos x values using series expansion.
3. Conversion of binary to decimal, octal, hexadecimal and vice versa.
4. Generating Pascal triangle, pyramid of numbers.
5. Recursion: factorial, Fibonacci, GCD.
6. Matrix addition and multiplication using arrays, linear search and binary search using recursive and non-recursive procedures.
7. Bubble sort and selection sort.
8. Programs on pointers: pointer to arrays, pointer to functions.
9. Functions for string manipulations.
10. Programs on structures and unions.
11. Finding the number of characters, words and lines of given text file.
12. File handling programs

Suggested Readings:

1	Byron Gottfried, "*Theory and practice of Programming with C"*, Schaum's Outline McGraw-Hill, 1996
2	A.K. Sharma, "*Computer Fundamentals and Programming in C*", Universities Press, 2nd Edition, 2018.
3	E. Balaguruswamy, "*Programming in ANSI C*", Tata McGraw-Hill Education, 2008
4	Brian W. Kernighan and Dennis M. Ritchie,"*The C Programming Language*", Prentice Hall of India,1988.

Proposed for the academic years 2020-2024

INDIAN CONSTITUTION

MC 801 PO

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 0

Objectives:

1. To create awareness among students about the Indian Constitution.
2.To acquaint the working conditions of union, state, local levels, their powers and functions
3. To create consciousness in the students on democratic values and principles articulated in the constitution.
4.To expose the students on the relations between federal and provincial units.
5.To divulge the students about the statutory institutions.

Outcomes: Student will be able to:

1. Know the background of the present constitution of India
2.Understand the working of the union, state and local levels
3.Gain consciousness on the fundamental rights and duties
4.Be able to understand the functioning and distribution of financial resources between the centre and states
5.Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.

UNIT – I
Evolution of the Indian Constitution: 1909 Act, 1919 Act and 1935 Act. Constituent Assembly: Composition and Functions; Fundamental features of the Indian Constitution
UNIT – II
Union Government: Executive-President, Prime Minister, Council of Minister ***State Government***: Executive: Governor, Chief Minister, Council of Minister ***Local Government***: Panchayat Raj Institutions, Urban Government
UNIT – III
Rights and Duties: Fundamental Rights, Directive principles, Fundamental Duties
UNIT – IV
Relation between Federal and Provincial units: Union-State relations, Administrative, legislative and Financial, Inter State council, NITI Ayog, Finance Commission of India.
UNIT – V
Statutory Institutions: Elections-Election Commission of India, National Human Rights Commission, National Commission for Women.

Suggested Readings:

1	Durga Das Basu, "*Introduction to the Constitution of India*", Lexis Nexis Butterworths Wadhwa Nagpur, 2008
	Subhash Kashyap, "*Our Parliament*", National Book Trust, India, 2004.

2	
3	Peu Ghosh, "*Indian Government and Politics*", Prentice Hall of India, New Delhi,2012.

Proposed for the academic years 2020-2024

ENGLISH

HS 101 EG

Instruction: 2 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 2

Objectives:

1.Using authentic material for language learning
2.Exposing them to a variety of content-rich texts
3.Strengthening their grammar and vocabulary
4.Improving their reading and comprehension skills
5.Honing their writing skills
6.Encouraging them to think creatively and critically

Outcomes: Student will be able to:

1.Read, understand, and interpret a variety of written texts
2.Use appropriate vocabulary and correct grammar
3. Undertake guided and extended writing with confidence

UNIT – I
Reading: RK Narayan, "A Horse and Two Goats"***Vocabulary***: Word formation—Prefixes, Suffixes, Root Words ***Grammar:*** Articles, Prepositions, Determiners
UNIT – II
Reading: Rudyard Kipling, "If" ***Vocabulary***: Word formation—Compounding and Blending, Contractions ***Grammar***: Transitions, Connectives ***Writing***: Paragraph Writing
UNIT – III
Reading: Martin Luther King Jr., "I Have a dream" ***Vocabulary***: Synonyms, Antonyms, One Word Substitutes ***Grammar***: Voice ***Writing:*** Letter Writing
UNIT – IV
Reading: Robert Frost, "Road Not Taken" ***Vocabulary***: Homophones, Homonyms, Homographs ***Grammar***: Narration (Direct-Indirect Speech) ***Writing:*** Report Writing
UNIT – V
Reading: George Orwell, "The Sporting Spirit" (Excerpt) ***Vocabulary***: Inclusive Language, Euphemisms ***Grammar***: Tense ***Writing:*** SOP

Suggested Readings:

1	Board of Editors," *Language and Life: A Skills Approach*", Orient Black Swan, 2018.
2	Sudharshana, NP and C Savitha," *English for Engineers*", Cambridge University Press, 2018
3	Kumar, Sanjay and Pushp Lata," *English Language and Communication Skills for Engineers*", Oxford University Press, 2018

Proposed for the academic years 2020-2024

PHYSICS

BS 202 PH

Instruction: 3+1 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 4

Objectives:

1. Aware of limits of classical free electron free theory and to apply band theory of solids
2.Acquire knowledge on various properties of semiconductors.
3. Grasp the intricacies in semiconductor-optical interaction

Outcomes: Student will be able to:

1.Distinguish materials based on band theory of solids.
2.Classify semiconductors on the basis doping and to estimate conductivity and learn transport phenomenon in semiconductors.
3.Appreciate use of optical absorption by semiconductors.

UNIT – I
Crystallography: Introduction, Types of crystal systems, Bravais lattices, Lattiee planes and Miller Indices (Cubic system), Inter planar spacing (Cubic system), Bragg's law, Powder diffraction method. ***Crystal Defects***: Classification of point defects, Concentration of Schottky defects in metals and ionic crystals, Concentration of Frankel defects, Line defects, Screw and Edge dislocations, Burger's vector.
UNIT – II
Band Theory of Solids & Semiconductors: Classical free electron theory (qualitative), Kronig Penney model (qualitative treatment), Energy band formation in solids, Intrinsic and Extrinsic semiconductors, Concept of a hole, Carrier concentration and conductivity in intrinsic semiconductors, Formation of P-N junction diode and its I – V characteristics, Thermistor and its characteristics, Hall effect and its applications. ***Dielectric Materials:*** Dielectrics, Types of polarizations, Electronic, Ionic, Orientational and Space charge polarizations, Expression for Electronic polarizability, Frequency and temperature dependence of dielectric polarizations, Determination of dielectric constant by capacitance Bridge method, Ferro electricity, Barium titanate, Applications of Ferroelectrics.
UNIT – III
Wave Mechanics: Matter waves –de-Broglie wavelength, properties of wave function, Physical significance, Schrodinger time dependent and time in-dependent wave equation. Particle in a 1-D box. ***Electromagnetic Theory***: Basic laws of electricity and magnetism, Maxwell's equations in integral and differential forms, Conduction and displacement current, Relation between D, E and P – Electromagnetic waves: Equation of plane wave in free space, Poynting theorem.
UNIT – IV
Magnetic Materials: Classification of magnetic materials: dia, para, ferro, antiferro and ferrimagnetic materials, Weiss molecular field theory of ferromagnetism, Magnetic domains, Hysteresis curve, soft and hard magnetic materials, Ferrites: Applications of ferrites. ***Superconductivity:*** Introduction, General properties of super conductors, Meissner effect, Type I and Type II superconductors, BCS theory (qualitative), Introduction to High T_c superconductors, Applications of superconductors
UNIT – V
Lasers: Characteristics of Lasers, spontaneous and stimulated emission of radiation, Einstein's Coefficients, population inversion, Ruby Laser, Helium Neon Laser, Semi-Conductor Laser and applications of lasers. ***Fiber Optics:*** Introduction, Propagation of light through an optical fiber, Acceptance angle, Numerical aperture (NA), Types of Optical fibers and Refractive index profiles, Fiber drawing

process (double Crucible Method), Losses in optical fibers, applications of optical fibers.

Suggested Readings:

1	B.K. Pandey and S. Chaturvedi," *Engineering Physics*", Cengage Learning, 2012
2	A.K. Bhandhopadhya, "*Nano Materials*", New Age International, 1st Edition, 2007
3	M.S. Avadhanulu and P.G. Kshirusagar," *Engineering Physics*", S. Chand & Co. 1st Edition,1992
4	C.M. Srivastava and C. Srinivasan , "*Science of Engineering Materials*", New Age International, 2001
5	R.K Gaur and S.L Gupta, "*Engineering Physics*", McGraw-Hill Education (India) Pvt Limited, 1992
6	Sanjay D Jain and Girish G Sahasrabudhe, "Engineering Physics", Orient Black swan Pvt Limited, 2016

Proposed for the academic years 2020-2024

MATHEMATICS-II

BS 203 MT

Instruction: 3+1 periods per week *Duration of SEE: 3 hours*

CIE: 30 marks *SEE: 70 marks*

Credits: 4

Objectives:

1.To study matrix algebra and its use in solving system of linear equations and in solving eigen value problems
2. To provide an overview of ordinary differential equations
3. To study special functions like Legendre and Beta Gamma functions
4.To learn Laplace Transforms and its properties

Outcomes: Student will be able to:

1.Solve system of linear equations and eigen value problems
2.Solve certain first order and higher order differential equations
3.Solve basic problems of Beta Gamma and Legender's Function
4.Apply Laplace Transforms; solve ordinary Differential Equations by using it

UNIT – I
Matrices: Rank of a matrix, Echelon form, System of linear equations, Linearly dependence and independence of vectors, Linear transformation, Orthogonal transformation, Eigen values, Eigenvectors, Properties of eigen values, Cayley - Hamilton theorem, Quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation, Nature of quadratic forms.
UNIT – II
Differential Equations of First Order: Exact differential equations, Integrating factors, Linear differential equations, Bernoulli's, Riccati's and Clairaut's differential equations, Orthogonal trajectories of a given family of curves.
UNIT – III
Differential Equations of Higher Orders: Solutions of second and higher order linear homogeneous equations with constants coefficients, Method of reduction of order for the linear homogeneous second order differential equations with variable coefficients, Solutions of non-homogeneous linear differential equations, Method of variation of parameters, solution of Euler-Cauchy equation.
UNIT – IV
Special Function: Gamma Functions, Beta Functions, Relation Between Beta and Gamma Function, Error Functions. Power Series Method, Lengender's Differential Equations and Legender's Polynomial $P_n(x)$, Rodrigue's Formula (without proof).
UNIT – V
Laplace Transforms: Laplace Transforms, Inverse Laplace Transforms, Properties of Laplace Transforms and inverse Laplace Transforms, Convolution Theorem (without proof). Solution of ordinary Differential Equations using Laplace Transforms.

Suggested Readings:

1	R.K. Jain & S.R.K. lyengar, "*Advanced Engineering Mathematics",* Narosa Publications, 4th Edition, 2014.
2	Erwin Kreyszig, "*Advanced Engineering Mathematics"*, John Wiley, 9th Edition, 2012
3	Dr.B.S. Grewal*, "Higher Engineering Mathematics",* Khanna Publications, 43rd Edition, 2014
4	B.V. Ramana, "*Higher Engineering Mathematics"*, Tata Mc Graw Hill, 2008
5	N. Bali and M. Goyal," *A text book of Engineering Mathematics"*, Laxmi Publications, 7th Edition, 2010
6	H.K. Dass, Er. Rajnish Varma, "*Higher Engineering Mathematics",* S. Chand and Company Ltd, 3rd Edition, 2008

Proposed for the academic years 2020-2024

BASIC ELECTRICAL ENGINEERING

ES 301 EE

Instruction: 3+1 periods per week *Duration of SEE: 3 hours*
CIE: 30 marks *SEE: 70 marks*
Credits: 4

Objectives:

1. To provide an understanding of basics in Electrical circuits.
2. To provide an overview of ordinary differential equations

Outcomes: Student will be able to:

1. To analyse Electrical circuits to compute and measure the parameters of Electrical Energy
2.To comprehend the working principles of Electrical DC Machines
3. To Identify and test various Electrical switchgear, single phase transformers and assess the ratings needed in given application
4.To comprehend the working principles of electrical AC machines

UNIT – I
DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.
UNIT – II
AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.
UNIT – III
Transformers and 3-ph Induction Motors: Transformers: Electromagnetic induction, Faradays laws, statically induced emf, Lenz law, BH characteristics, ideal and practical transformer, losses and efficiency, Auto-transformer and three-phase transformer connections. ***Three Phase Induction motor:*** Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Applications
UNIT – IV
Single-phase induction motor and DC Machines: Single-phase induction motor: Construction and principle of operation, Capacitor start & capacitor run motor, applications. ***DC Generators***: Dynamically induced emf, Flemming's Right hand and Left hand rules, Construction and principle of operation of DC generator, EMF equation, Types of DC Generators, OCC characteristics, applications. ***DC Motors:*** principle of operation of DC Motor, Types of DC motors, applications
UNIT – V
Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Suggested Readings:

1	N. K. De, "*Basic Electrical Engineering*", Universities Press, 2015.
2	J.B. Gupta, "*Fundamentals of Electrical Engineering and Electronics*" S.K. Kataria & Sons Publications, 2002
3	J.B. Gupta, "*Utilization of Electric Power and Electric Traction*" S.K. Kataria & Sons Publications, 2010
4	Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, "*Basic Electrical Engineering*" Tata McGraw Hill, Publications, 2009
5	Hughes, "*Electrical Technology*", 7th Edition, Addison Welsey Longman Inc., 1995

Proposed for the academic years 2020-2024

ENGLISH LAB

HS 151 EG

Instruction:2 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 1

Objectives:

1. Giving them sufficient practice in listening with comprehension
2. Providing them ample opportunities to improve their public speaking skills
3. Training them in the use of correct pronunciation, stress, and intonation
4. Sensitizing them to the use of verbal and non-verbal communication appropriate to the context
5. Encouraging them to learn the art of conversation to suit formal and informal situations
6.Preparing them to make formal presentations and face interviews

Outcomes: Student will be able to:

1.Listen, understand, and interpret formal and informal spoken language
2. Speak English with acceptable pronunciation, stress, and intonation
3.Present themselves with confidence in formal situations
4. Participate in individual and group activities with relative ease

List of Experiments:

1. Listening for Comprehension
2. Pronunciation, Intonation, Stress, and Rhythm
3. Conversation Skills
4. Introducing Oneself and Others
5. Asking for and Giving Information
6. Making Requests and Responding to them Appropriately
7. Giving Instructions and Responding to them Appropriately
8. Making Formal Announcements and Emceeing
9. Group Discussions
10. JAM
11. Role Play
12. Debate
13. Public Speaking Skills and Body Language
14. Interviews
15. Formal Presentations

Suggested Readings:

1	Board of Editors, "*Language and Life: A Skills Approach*", Orient Black Swan, 2018
2	T. Balasubramanian, "*Textbook of English Phonetics for Indian Students*", Macmillan publishers, 1981
3	CIEFL Exercises in Spoken English. Parts. I-III. Oxford University Press
4	Pillai, Radhakrishna G, "*Spoken English For You - Level II*", 8th Edition, Emerald Publishers, 2014
5	Sethi, J and PV Dhamija, "*A Course in Phonetics and Spoken English*", 2nd Edition, Prentice Hall India Learning Private Limited, 1999

Proposed for the academic years 2020-2024

PHYSICS LAB

BS 251 PH

Instruction:2 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 1

Objectives:

1. Make precise measurements using basic physical principles and acquire skills to handle the instruments
2. Relates the theoretical Knowledge to the behavior of Practical Physical world
3.Analyse errors in the experimental data
4.Plot graphs between various physical parameters

Outcomes: Student will be able to:

1.Conduct experiments, take measurements independently
2. Write appropriate laboratory reports
3.Compute and compare the experimental results and draw relevant conclusions
4.Use the graphical representation of data and estimate results from graphs

List of Experiments:

1. To determine the Dielectric constant and Phase transition temperature of Lead Zirconium Titanate (PZT).
2. To draw the I - V Characteristics of P-N Junction diode and to evaluate the resistance.
3. To find the values of Electrical conductivity and energy gap of Ge crystal.
4. Determination of rigidity of modulus of Torsion pendulum.
5. Determination of carrier concentration, Mobility and Hall Coefficient of Ge crystal using Hall Effect Experiment.
6. To determine the constants of A, B and α using Thermistor characteristics.
7. To draw the curve between the magnetizing field and the intensity of magnetization of the specimen (soft iron rod) and to find out
   i) Coercivity ii) Retentivity and iii) Hysteresis loss.
8. To draw the I - V Characteristics of a solar cell and to calculate the
   i) Fill factor Efficiency and ii) Series resistance.
9. To Determine the Numerical Aperture (NA) of Optical fiber.
10. To determine the wave length of the given Laser source.

Note: Minimum eight experiments should be conducted in the semester

Suggested Readings:

1	N.K. De, "*Basic Electrical Engineering*", Universities Press, 2015
2	J.B. Gupta, "*Fundamentals of Electrical Engineering and Electronics*" S.K. Kataria & Sons Publications, 2002
3	J.B. Gupta, "*Utilization of Electric Power and Electric Traction*" S.K. Kataria & Sons Publications, 2010

Proposed for the academic years 2020-2024

BASIC ELECTRICAL ENGINEERING LAB

ES 354 EE

Instruction:2 periods per week *Duration of SEE: 3 hours*
CIE: 25 marks *SEE: 50 marks*
Credits: 1

Objectives:

1. To impart the practical knowledge on testing of DC and AC Machines.
2. To learn the usage of common electrical measuring instruments

Outcomes: Student will be able to:

1.Get an exposure to common electrical components and their ratings
2. Analyse the performance of DC and AC Machines
3.Comprehend the usage of common electrical measuring instruments
4. Test the basic characteristics of transformers and electrical machines

List of Experiments:

Dem1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.

Exp 1. Verification of KVL and KCL, superposition theorem (with DC excitation)

Exp 2 Verification of Thevinens and Nortons theorems (with DC excitation)

Exp 3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Power factor calculation

Exp 4. Transformers: Observation of the no-load current waveform on an oscilloscope (nonsinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics).

Exp 5. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.

Exp 6. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents).

Exp 7. Measurement of phase voltage/current, line voltage/current and power in a balanced three-phase circuit connected in star and delta.

Dem2. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.

Exp 8. OCC characteristics of DC Generator

Exp 9. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections.

Exp 10. Power factor improvement of Induction Motor using static capacitors

Exp 11. Load Test of DC Motor

Note - 1:

(i) List of Experiments and Demonstrations suggested above are already available in the Laboratory of the electrical department. No need to purchase any extra equipment except Demonstration2 equipments

iii)	Procurement of Demonstration 2 equipments can be done during the course work of that semester. It can be included in the laboratory.

Suggested Readings:

1	J.B. Gupta, "*Fundamentals of Electrical Engineering and Electronics*" ,S.K. Kataria & Sons Publications, 2002.
2	J.B. Gupta, "*Utilization of Electric Power and Electric Traction*" S.K. Kataria & Sons Publications, 2010
3	Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, "*Basic Electrical Engineering*", Tata McGraw Hill, Publications, 2009
4	Hughes, "*Electrical Technology*", 7th Edition, Addison Wesley Longman Inc., 1995

Proposed for the academic years 2020-2024

ENGINEERING GRAPHICS

ES 353 CE

Instruction:6 periods per week *Duration of SEE: 3 hours*
CIE: 50 marks *SEE: 50 marks*
Credits: 3

Objectives:

1.To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
2. To prepare you to use the techniques, skills, modern engineering tools to use for Engineering practice.

Outcomes: Student will be able to:

1. Introduction to engineering design and its place in society
2. Exposure to the visual aspects of engineering design
3. Exposure to engineering graphics standards
4. Exposure to solid modelling
5. Exposure to computer-aided geometric design
6. Exposure to creating working drawings
7. Exposure to engineering communication

S.No	Description	Lectures	Drawing
1	Principles of Engineering Graphics and their significance, usage of drawing instruments	1	
2	Conic Sections – I, Construction of ellipse, parabola and hyperbola given focus and eccentricity.	1	2
3	Conic Sections – II, Construction of ellipse (given major and minor axis), parabola (given bas and height), rectangular hyperbola	-	2
4	Cycloids (cycloid & epicycloid)	1	2
5	Involutes (involute of triangle, square & circle)	-	2
6	Scales (plain & diagonal scales)	1	2+2
7	Introduction to AutoCAD –Basic commands and simple drawings	-	2+2
8	Orthographic Projection , Projection of points situated in different quadrants	1	2
9	Projections of straight lines-I Lines parallel to both the reference planes, lines perpendicular or inclined to one reference plane	1	2
10	Projections of straight lines-II Lines parallel to both the reference planes	1	2
11	Projections of planes-I Perpendicular planes	1	2
12	Projections of planes-II Oblique planes	-	2
13	Projections of solids – I Polyhydra and solids revolution, projections of solids in simple position	1	2
14	Projections of solids – II Polyhydra and solids when the axes inclined to one or both the reference planes.	1	2

15	Section of solids – I When the sectional plane is parallel or perpendicular to one reference plane	1	2
16	Section of solids – II When the sectional plane is inclined to one reference plane	-	2
17	Development of surfaces – I Prisms and Cylinders	1	2
18	Development of surfaces – II Pyramids and Cones	-	2
19	Intersection of surfaces – I Intersection of cylinder and cylinder	1	2
20	Intersection of surfaces – I Intersection of cylinder and cones	-	2
21	Isometric projection – I- planes and simple solids	1	2
22	Isometric projection – I – Combination of two or three solids	-	2
23	Conversion of Isometric Views to Orthographic Views	1	2
24	Floor plans of 2 or 3 rooms including windows, doors, and fixtures such as WC, bath, sink, shower, etc.	1	2

Suggested Readings:

1	Bhatt N.D., Panchal V.M. & Ingle P.R.,"*Engineering Drawing"*, Charotar Publishing House, 2014
2	Shah, M.B. & Rana B.C., " *Engineering Drawing and Computer Graphics"*, Pearson Education, 2008
3	S.N Lal, " *Engineering Drawing with Introduction to Auto CAD"*, Cengage Learning India Pvt Ltd, New Delhi, 2018
4	Agarwar B. & Agrawal C. M., "*Engineering Graphics*", TMH Publication, 2012
5	Narayana, K.L. & P Kannaiah," *Text book on Engineering Drawing*", Scitech Publishers, 2008
6	(Corresponding set of) CAD Software Theory and User Manuals

NOTE:

1. At least 20 sheets must be covered.
2. Sheet number 1 to 6 (Graph sheets / drawing sheets)
3. Sheet number 7 to 24 (AutoCAD drawings.