ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM
B.E. AUTOMOBILE ENGINEERING

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

1. Students will excel in their professional career in automobile industry and research with the highest professional and ethical standards in their activities by acquiring knowledge in basic engineering, mathematics, science and automobile engineering.
2. Students will exhibit professionalism, team work in their chosen profession and adapt to current trends, technologies and industrial scenarios by pursuing life-long learning.

PROGRAMME OUTCOMES (PO)

1. Graduates will demonstrate strong basics in Mathematics, Science and Engineering
2. Graduates will demonstrate the ability to design and conduct experiments, as well as to analyze and interpret data.
3. Graduates will demonstrate the ability to design a system, component or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
4. Graduates will become familiar with modern engineering tools and analyse the problems within the domains of Automobile Engineering as members of multidisciplinary teams.
5. Graduates will acquire the capability to identify, formulate and solve complex engineering problems related to Automobile Engineering.
6. Graduates will demonstrate an understanding of professional and ethical responsibility with reference to their career in the field of Automobile Engineering.
7. Graduates will be able to communicate effectively both in verbal and non-verbal forms.
8. Graduates will be trained towards developing the impact of Automobile engineering in the global, economic environmental and societal contexts.
9. Graduates will be capable of understanding the value for life-long learning.
10. Graduates will demonstrate knowledge of contemporary issues focusing on the necessity to develop new material, design, and engineering practice in the field of Automobile Engineering.
11. Graduates will demonstrate the ability to use the techniques , skills and modern engineering tools necessary for engineering practice in the field of Automobile Engineering.
12. Graduates will have a firm scientific, technological and communication base that would help them either to find the desired placement or to become an entrepreneur and explore the knowledge in their field.
13. Graduates will be capable of doing higher studies and research in inter and multi-disciplinary areas.

PEO / PO Mapping

PEO \ PO	a	b	c	d	e	f	g	h	i	j	k	l	m
1	√	√	√	√	√	√		√		√	√	√	√
2		√	√	√	√		√		√	√	√	√	√

Semester Course wise PO mapping

		Course Title	a	b	c	d	e	f	g	h	i	j	k	l	m
YEAR I	SEMESTER I	Communicative English	√	√		√		√	√		√	√		√	√
		Engineering Mathematics I	√	√		√	√					√	√	√	√
		Engineering Physics	√	√		√	√					√	√	√	√
		Engineering Chemistry	√	√		√	√					√	√	√	√
		Problem Solving and Python Programming	√	√		√	√					√	√	√	√
		Engineering Graphics	√	√	√	√		√	√	√			√	√	√
		Problem Solving and Python Programming Laboratory	√	√		√	√	√				√	√	√	√
		Physics and Chemistry Laboratory	√	√		√	√					√	√	√	√
	SEMESTER II	Technical English	√	√		√		√			√	√		√	√
		Engineering Mathematics II	√	√		√	√					√	√	√	√
		Materials Science	√	√		√	√					√	√	√	√
		Basic Electrical, Electronics and Instrumentation Engineering	√		√	√	√			√	√		√	√	√
		Environmental Science and Engineering						√		√	√	√			√
		Engineering Mechanics	√	√		√	√		√			√	√	√	√
		Engineering Practices Laboratory		√	√	√			√			√	√	√	
		Basic Electrical, Electronics and Instrumentation Engineering Laboratory	√	√		√	√				√	√	√	√	√
YEAR II	SEM III	Transforms and Partial Differential Equations	√			√	√		√		√		√		√
		Engineering Thermodynamics	√	√	√	√	√			√	√	√	√		√
		Strength of Materials for Mechanical Engineers	√	√		√	√				√	√		√	√
		Spark Ignition Engines	√				√			√	√	√	√	√	√
		Manufacturing Technology	√	√	√	√	√			√		√	√	√	√
		Fluid Mechanics and Machinery	√			√	√						√	√	√

Year	Semester	Course	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13
		Strength of Materials and Fluid Mechanics and Machinery Laboratory	√	√		√	√				√	√	√	√	√
		Computer Aided Machine Drawing	√	√	√	√	√			√	√	√	√	√	√
		Interpersonal Skills/Listening & Speaking	√	√		√		√	√		√	√		√	√
	SEMESTER IV	Statistics and Numerical Methods	√	√			√		√		√		√		√
		Compression Ignition Engines	√				√			√	√	√	√	√	√
		Engineering Metallurgy	√	√	√	√	√			√	√	√	√	√	√
		Electronics and Microprocessors	√	√	√	√	√			√	√	√	√	√	√
		Automotive Chassis	√				√			√	√	√	√	√	√
		Mechanics of Machines	√	√		√	√					√	√	√	√
		Automotive Components Laboratory	√	√	√		√			√	√	√	√	√	√
		Electronics and Microprocessors Laboratory	√	√	√	√	√			√		√	√	√	√
YEAR III	SEMESTER V	Design of Machine Elements	√	√	√		√			√	√	√	√	√	√
		Automotive Transmission	√	√	√		√			√	√	√	√	√	√
		Automotive Electrical and Electronics Systems	√	√	√	√	√			√		√			√
		Vehicle Design Data Characteristics	√	√		√	√			√	√	√	√	√	√
		Automotive Fuels and Lubricants	√	√	√		√	√		√		√			
		Open Elective - I													
		Professional Communication	√	√		√		√	√		√	√		√	√
		Automotive Electrical and Electronics Laboratory	√	√			√			√	√	√	√	√	√
		Automotive Fuels and Lubricants Laboratory	√				√	√		√	√	√	√	√	
	S E	Total Quality Management	√		√	√		√	√	√	√	√	√	√	√

Year	Semester	Course	1	2	3	4	5	6	7	8	9	10	11	12	13
YEAR IV		Automotive Engine Components Design	√	√	√		√					√		√	√
		Automotive Chassis Components Design	√	√	√		√					√		√	√
		Two and Three Wheelers	√			√				√	√	√	√	√	√
		Vehicle Dynamics	√	√	√	√	√			√	√	√			√
		Professional Elective – I													
		Computer Aided Engine and Chassis Design Laboratory	√	√		√	√			√	√	√	√	√	√
		Two and Three Wheelers Laboratory	√	√	√					√	√	√	√	√	√
	SEMESTER VII	Engine and Vehicle Management System	√	√	√	√	√			√	√	√	√	√	√
		Finite Element Analysis	√	√	√	√	√			√	√	√	√	√	√
		Vehicle Maintenance	√		√	√	√	√		√	√		√	√	√
		Open Elective - II													
		Professional Elective – II													
		Professional Elective – III													
		Engine Performance and Emission Testing Laboratory	√	√	√		√			√		√	√		√
		Vehicle Maintenance Laboratory	√	√	√	√				√	√	√	√	√	√
	SEM VIII	Vehicle Body Engineering	√	√	√	√	√			√	√	√	√		√
		Professional Elective – IV													
		Professional Elective – V													
		Project Work	√	√	√	√	√	√	√	√	√	√	√	√	√

ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
B.E. AUTOMOBILE ENGINEERING
REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM
I TO VIII SEMESTERS CURRICULA AND SYLLABI

SEMESTER I

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	MA8151	Engineering Mathematics - I	BS	4	4	0	0	4
3.	PH8151	Engineering Physics	BS	3	3	0	0	3
4.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
6.	GE8152	Engineering Graphics	ES	6	2	0	4	4
PRACTICALS								
7.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
8.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
			TOTAL	**31**	**19**	**0**	**12**	**25**

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8251	Technical English	HS	4	4	0	0	4
2.	MA8251	Engineering Mathematics - II	BS	4	4	0	0	4
3.	PH8251	Materials Science	BS	3	3	0	0	3
4.	BE8253	Basic Electrical, Electronics and Instrumentation Engineering	ES	3	3	0	0	3
5.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
6.	GE8292	Engineering Mechanics	ES	5	3	2	0	4
PRACTICALS								
7.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
8.	BE8261	Basic Electrical, Electronics and Instrumentation Engineering Laboratory	ES	4	0	0	4	2
			TOTAL	**30**	**20**	**2**	**8**	**25**

SEMESTER III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8353	Transforms and Partial Differential Equations	BS	4	4	0	0	4
2.	ME8391	Engineering Thermodynamics	PC	5	3	2	0	4
3.	CE8395	Strength of Materials for Mechanical Engineers	ES	3	3	0	0	3
4.	AT8301	Spark Ignition Engines	PC	3	3	0	0	3
5.	ME8392	Manufacturing Technology	PC	3	3	0	0	3
6.	CE8394	Fluid Mechanics and Machinery	ES	4	4	0	0	4
PRACTICAL								
7.	CE8381	Strength of Materials and Fluid Mechanics and Machinery Laboratory	ES	4	0	0	4	2
8.	ME8381	Computer Aided Machine Drawing	PC	4	0	0	4	2
9.	HS8381	Interpersonal Skills/Listening & Speaking	EEC	2	0	0	2	1
			TOTAL	**32**	**20**	**2**	**10**	**26**

SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8452	Statistics and Numerical Methods	BS	4	4	0	0	4
2.	AT8401	Compression Ignition Engines	PC	3	3	0	0	3
3.	ME8491	Engineering Metallurgy	PC	3	3	0	0	3
4.	EC8396	Electronics and Microprocessors	ES	3	3	0	0	3
5.	AT8402	Automotive Chassis	PC	3	3	0	0	3
6.	PR8451	Mechanics of Machines	PC	3	3	0	0	3
PRACTICAL								
7.	AT8411	Automotive Components Laboratory	PC	4	0	0	4	2
8.	EC8382	Electronics and Microprocessors Laboratory	ES	4	0	0	4	2
			TOTAL	**27**	**19**	**0**	**10**	**23**

SEMESTER V

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	ME8593	Design of Machine Elements	PC	3	3	0	0	3
2.	AT8501	Automotive Transmission	PC	3	3	0	0	3
3.	AT8502	Automotive Electrical and Electronics Systems	PC	3	3	0	0	3
4.	AT8503	Vehicle Design Data Characteristics	PC	3	3	0	0	3
5.	AT8504	Automotive Fuels and Lubricants	PC	3	3	0	0	3
6.		Open Elective - I	OE	3	3	0	0	3
PRACTICAL								
7.	AT8511	Automotive Electrical and Electronics Laboratory	PC	4	0	0	4	2
8.	AT8512	Automotive Fuels and Lubricants Laboratory	PC	4	0	0	4	2
9.	HS8581	Professional Communication	EEC	2	0	0	2	1
			TOTAL	**28**	**18**	**0**	**10**	**23**

SEMESTER VI

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	GE8077	Total Quality Management	HS	3	3	0	0	3
2.	AT8601	Automotive Engine Components Design	PC	3	3	0	0	3
3.	AT8602	Automotive Chassis Components Design	PC	3	3	0	0	3
4.	AT8603	Two and Three Wheelers	PC	3	3	0	0	3
5.	AT8604	Vehicle Dynamics	PC	3	3	0	0	3
6.		Professional Elective – I	PE	3	3	0	0	3
PRACTICAL								
7.	AT8611	Computer Aided Engine and Chassis Design Laboratory	PC	4	0	0	4	2
8.	AT8612	Two and Three Wheelers Laboratory	PC	4	0	0	4	2
			TOTAL	**26**	**18**	**0**	**8**	**22**

SEMESTER VII

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	AT8701	Engine and Vehicle Management System	PC	3	3	0	0	3
2.	ME8692	Finite Element Analysis	PC	3	3	0	0	3
3.	AT8702	Vehicle Maintenance	PC	3	3	0	0	3
4.		Open Elective - II	OE	3	3	0	0	3
5.		Professional Elective – II	PE	3	3	0	0	3
6.		Professional Elective – III	PE	3	3	0	0	3
PRACTICAL								
7.	AT8711	Engine Performance and Emission Testing Laboratory	PC	4	0	0	4	2
8.	AT8712	Vehicle Maintenance Laboratory	PC	4	0	0	4	2
			TOTAL	**26**	**18**	**0**	**8**	**22**

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	AT8801	Vehicle Body Engineering	PC	3	3	0	0	3
2.		Professional Elective – IV	PE	3	3	0	0	3
3.		Professional Elective – V	PE	3	3	0	0	3
PRACTICAL								
4.	AT8811	Project Work	EEC	20	0	0	20	10
			TOTAL	**29**	**9**	**0**	**20**	**19**

TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE = 185

HUMANITIES AND SOCIAL SCIENCES (HS)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	HS8251	Technical English	HS	4	4	0	0	4
3.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
4.	GE8077	Total Quality Management	HS	3	3	0	0	3

BASIC SCIENCES (BS)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA8151	Engineering Mathematics I	BS	5	3	2	0	4
2.	PH8151	Engineering Physics	BS	3	3	0	0	3
3.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
4.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
5.	MA8251	Engineering Mathematics II	BS	4	4	0	0	4
6.	PH8251	Materials Science	BS	3	3	0	0	3
7.	MA8353	Transforms and Partial Differential Equations	BS	4	4	0	0	4
8.	MA8452	Statistics and Numerical Methods	BS	4	4	0	0	4

ENGINEERING SCIENCES (ES)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
2.	GE8152	Engineering Graphics	ES	6	2	0	4	4
3.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
4.	BE8253	Basic Electrical, Electronics and Instrumentation Engineering	ES	3	3	0	0	3
5.	GE8292	Engineering Mechanics	ES	5	3	2	0	4
6.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
7.	BE8261	Basic Electrical, Electronics and Instrumentation Engineering Laboratory	ES	4	0	0	4	2
8.	CE8395	Strength of Materials for Mechanical Engineers	ES	3	3	0	0	3
9.	CE8394	Fluid Mechanics and Machinery	ES	4	4	0	0	4
10.	CE8381	Strength of Materials and Fluid Mechanics and Machinery Laboratory	ES	4	0	0	4	2
11.	EC8396	Electronics and Microprocessors	ES	3	3	0	0	3
12.	EC8382	Electronics and Microprocessors Laboratory	ES	4	0	0	4	2

PROFESSIONAL CORE (PC)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	ME8391	Engineering Thermodynamics	PC	5	3	2	0	4
2.	AT8301	Spark Ignition Engines	PC	3	3	0	0	3
3.	ME8392	Manufacturing Technology	PC	3	3	0	0	3
4.	ME8381	Computer Aided Machine Drawing	PC	4	0	0	4	2
5.	AT8401	Compression Ignition Engines	PC	3	3	0	0	3
6.	ME8491	Engineering Metallurgy	PC	3	3	0	0	3
7.	AT8402	Automotive Chassis	PC	3	3	0	0	3
8.	PR8451	Mechanics of Machines	PC	3	3	0	0	3
9.	AT8411	Automotive Components Laboratory	PC	4	0	0	4	2
10.	ME8593	Design of Machine Elements	PC	3	3	0	0	3
11.	AT8501	Automotive Transmission	PC	3	3	0	0	3
12.	AT8502	Automotive Electrical and Electronics Systems	PC	3	3	0	0	3
13.	AT8503	Vehicle Design Data Characteristics	PC	3	3	0	0	3
14.	AT8504	Automotive Fuels and Lubricants	PC	3	3	0	0	3
15.	AT8511	Automotive Electrical and Electronics Laboratory	PC	4	0	0	4	2
16.	AT8512	Automotive Fuels and Lubricants Laboratory	PC	4	0	0	4	2
17.	AT8601	Automotive Engine Components Design	PC	3	3	0	0	3
18.	AT8602	Automotive Chassis Components Design	PC	3	3	0	0	3
19.	AT8603	Two and Three Wheelers	PC	3	3	0	0	3
20.	AT8611	Computer Aided Engine and Chassis Design Laboratory	PC	4	0	0	4	2
21.	AT8612	Two and Three Wheelers Laboratory	PC	4	0	0	4	2
22.	AT8701	Engine and Vehicle Management System	PC	3	3	0	0	3
23.	ME8692	Finite Element Analysis	PC	3	3	0	0	3
24.	AT8702	Vehicle Maintenance	PC	3	3	0	0	3
25.	AT8604	Vehicle Dynamics	PC	3	3	0	0	3
26.	AT8711	Engine Performance and Emission Testing Laboratory	PC	4	0	0	4	2
27.	AT8712	Vehicle Maintenance Laboratory	PC	4	0	0	4	2
28.	AT8801	Vehicle Body Engineering	PC	3	3	0	0	3

ELECTIVES FOR B.E. AUTOMOBILE ENGINEERING
SEMESTER VI, ELECTIVE – I

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	AT8001	Automotive Air-Conditioning	PE	3	3	0	0	3
2.	AT8002	Advance Theory of IC Engines	PE	3	3	0	0	3
3.	AT8003	Metrology and Measurements for Automobile Engineers	PE	3	3	0	0	3
4.	PR8072	New Product Development	PE	3	3	0	0	3
5.	GE8075	Intellectual Property Rights	PE	3	3	0	0	3
6.	GE8073	Fundamentals of Nanoscience	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE – II

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	AT8091	Manufacturing of Automotive Components	PE	3	3	0	0	3
2.	AT8004	New Generation and Hybrid Vehicles	PE	3	3	0	0	3
3.	AT8005	Automotive Aerodynamics	PE	3	3	0	0	3
4.	AT8006	Off Road Vehicles	PE	3	3	0	0	3
5.	MG8491	Operations Research	PE	3	3	0	0	3
6.	GE8071	Disaster Management	PE	3	3	0	0	3

SEMESTER VII, ELECTIVE – III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	AT8007	Noise, Vibration and Measurements	PE	3	3	0	0	3
2.	PR8071	Lean Six Sigma	PE	3	3	0	0	3
3.	ME8099	Robotics	PE	3	3	0	0	3
4.	ME8092	Composite Materials and Mechanics	PE	3	3	0	0	3
5.	GE8072	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3
6.	GE8074	Human Rights	PE	3	3	0	0	3

SEMESTER VIII, ELECTIVE – IV

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	AT8008	Transport Management	PE	3	3	0	0	3
2.	MG8091	Entrepreneurship Development	PE	3	3	0	0	3
3.	AT8009	Automotive Safety	PE	3	3	0	0	3
4.	AT8010	Automotive Pollution and Control	PE	3	3	0	0	3
5.	AT8011	Automotive Testing	PE	3	3	0	0	3

SEMESTER VIII, ELECTIVE – V

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	PR8491	Computer Integrated Manufacturing	PE	3	3	0	0	3
2.	AT8012	Alternative Fuels and Energy Systems	PE	3	3	0	0	3
3.	MG8591	Principles of Management	PE	3	3	0	0	3
4.	GE8076	Professional Ethics in Engineering	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8381	Interpersonal Skills/Listening and Speaking	EEC	2	0	0	2	1
2.	HS8581	Professional Communication	EEC	2	0	0	2	1
3.	AT8811	Project Work	EEC	20	0	0	20	10

SUMMARY

SL NO	SUBJECT AREA	CREDITS AS PER SEMESTER								CREDITS TOTAL	Percentage %
		I	II	III	IV	V	VI	VII	VIII		
1.	HS	04	07	00	00	00	03	00	00	14	7.56
2.	BS	12	07	04	04	00	00	00	00	27	14.59
3.	ES	09	11	09	05	00	00	00	00	34	17.83
4.	PC	00	00	12	14	19	16	13	03	77	42.00
5.	PE	00	00	00	00	00	03	06	06	15	8.10
6.	OE	00	00	00	00	03	00	03	00	06	3.24
7.	EEC	00	00	01	00	01	00	00	10	13	7.02
	Total	25	25	26	23	23	22	22	19	185	
8	Non Credit/ Mandatory										

HS8151

	L	T	P	C
COMMUNICATIVE ENGLISH	**4**	**0**	**0**	**4**

OBJECTIVES:
- To develop the basic reading and writing skills of first year engineering and technology students.
- To help learners develop their listening skills, which will, enable them listen to lectures and comprehend them by asking questions; seeking clarifications.
- To help learners develop their speaking skills and speak fluently in real contexts.
- To help learners develop vocabulary of a general kind by developing their reading skills

UNIT I   SHARING INFORMATION RELATED TO ONESELF/FAMILY& FRIENDS   12

Reading- short comprehension passages, practice in skimming-scanning and predicting- Writing-completing sentences- - developing hints. Listening- short texts- short formal and informal conversations.   Speaking- introducing oneself - exchanging personal information- Language development- Wh- Questions- asking and answering-yes or no questions- parts of speech. Vocabulary development-- prefixes- suffixes- articles.- count/ uncount nouns.

UNIT II   GENERAL READING AND FREE WRITING   12

Reading - comprehension-pre-reading-post reading- comprehension questions (multiple choice questions and /or short questions/ open-ended questions)-inductive reading- short narratives and descriptions from newspapers including dialogues and conversations (also used as short Listening texts)- register- Writing – paragraph writing- topic sentence- main ideas- free writing, short narrative descriptions using some suggested vocabulary and structures –Listening- telephonic conversations. Speaking – sharing information of a personal kind—greeting – taking leave- Language development – prepositions, conjunctions Vocabulary development- guessing meanings of words in context.

UNIT III   GRAMMAR AND LANGUAGE DEVELOPMENT   12

Reading- short texts and longer passages (close reading) Writing- understanding text structure- use of reference words and discourse markers-coherence-jumbled sentences Listening – listening to longer texts and filling up the table- product description- narratives from different sources. Speaking- asking about routine actions and expressing opinions. Language development- degrees of comparison-pronouns- direct vs indirect questions- Vocabulary development – single word substitutes- adverbs.

UNIT IV   READING AND LANGUAGE DEVELOPMENT   12

Reading- comprehension-reading longer texts- reading different types of texts- magazines Writing-letter writing, informal or personal letters-e-mails-conventions of personal email- Listening- listening to dialogues or conversations and completing exercises based on them. Speaking- speaking about oneself- speaking about one's friend- Language development- Tenses- simple present-simple past-present continuous and past continuous- Vocabulary development- synonyms-antonyms- phrasal verbs

UNIT V   EXTENDED WRITING   12

Reading- longer texts- close reading –Writing- brainstorming -writing short essays – developing an outline- identifying main and subordinate ideas- dialogue writing-Listening – listening to talks-conversations- Speaking – participating in conversations- short group conversations-Language development-modal verbs- present/ past perfect tense - Vocabulary development-collocations- fixed and semi-fixed expressions

TOTAL = 60 PERIODS

OUTCOMES:

At the end of the course, learners will be able to:
- Read articles of a general kind in magazines and newspapers.
- Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.
- Comprehend conversations and short talks delivered in English
- Write short essays of a general kind and personal letters and emails in English.

TEXT BOOKS:

1. Board of Editors. Using English A Course book for Undergraduate Engineers and Technologists. Orient Black Swan Limited, Hyderabad: 2015
2. Richards, C. Jack. Interchange Students' Book-2 New Delhi: CUP, 2015.

REFERENCES

1. Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge, 2011.
2. Means,L. Thomas and Elaine Langlois. English & Communication For Colleges. CengageLearning ,USA: 2007
3. Redston, Chris &Gillies Cunningham Face2Face (Pre-intermediate Student's Book& Workbook) Cambridge University Press, New Delhi: 2005
4. Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skillsfor Business English. Cambridge University Press, Cambridge: Reprint 2011
5. Dutt P. Kiranmai and RajeevanGeeta. Basic Communication Skills, Foundation Books: 2013

MA8151		**ENGINEERING MATHEMATICS – I**		**L**	**T**	**P**	**C**
				4	**0**	**0**	**4**

OBJECTIVES :

The goal of this course is to achieve conceptual understanding and to retain the best traditions of traditional calculus. The syllabus is designed to provide the basic tools of calculus mainly for the purpose of modeling the engineering problems mathematically and obtaining solutions. This is a foundation course which mainly deals with topics such as single variable and multivariable calculus and plays an important role in the understanding of science, engineering, economics and computer science, among other disciplines.

UNIT I   DIFFERENTIAL CALCULUS   12

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Maxima and Minima of functions of one variable.

UNIT II   FUNCTIONS OF SEVERAL VARIABLES   12

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT III   INTEGRAL CALCULUS   12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT IV   MULTIPLE INTEGRALS   12

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

UNIT V   DIFFERENTIAL EQUATIONS   12

Higher order linear differential equations with constant coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients - Method of undetermined coefficients.

TOTAL : 60 PERIODS

OUTCOMES :

After completing this course, students should demonstrate competency in the following skills:
- Use both the limit definition and rules of differentiation to differentiate functions.
- Apply differentiation to solve maxima and minima problems.
- Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.
- Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
- Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.
- Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.
- Apply various techniques in solving differential equations.

TEXT BOOKS :
1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015. [For Units I & III - Sections 1.1, 2.2, 2.3, 2.5, 2.7(Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1(Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES :
1. Anton, H, Bivens, I and Davis, S, "Calculus", Wiley, 10th Edition, 2016.
2. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
3. Narayanan, S. and Manicavachagom Pillai, T. K., "Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2007.
4. Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.
5. Weir, M.D and Joel Hass, "Thomas Calculus", 12th Edition, Pearson India, 2016.

	L	**T**	**P**	**C**

PH8151   **ENGINEERING PHYSICS**   **3**   **0**   **0**   **3**

OBJECTIVES:
- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I   PROPERTIES OF MATTER   9
Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.

UNIT II   WAVES AND FIBER OPTICS   9
Oscillatory motion – forced and damped oscillations: differential equation and its solution – plane progressive waves – wave equation. Lasers : population of energy levels, Einstein's A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Semiconductor lasers: homojunction and heterojunction – Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, mode) – losses associated with optical fibers - fibre optic sensors: pressure and displacement.

UNIT III   THERMAL PHYSICS   9
Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conduction, convection and radiation – heat conductions in solids – thermal conductivity - Forbe's and Lee's disc method: theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.

UNIT IV   QUANTUM PHYSICS   9
Black body radiation – Planck's theory (derivation) – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box – tunnelling (qualitative) - scanning tunnelling microscope.

UNIT V   CRYSTAL PHYSICS   9
Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors, stacking faults – role of imperfections in plastic deformation - growth of single crystals: solution and melt growth techniques.

TOTAL :   45   PERIODS

OUTCOMES:
Upon completion of this course,
- the students will gain knowledge on the basics of properties of matter and its applications,
- the students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,
- the students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,
- the students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and
- the students will understand the basics of crystals, their structures and different crystal growth techniques.

TEXT BOOKS:
1. Bhattacharya, D.K. & Poonam, T. "Engineering Physics". Oxford University Press, 2015.
2. Gaur, R.K. & Gupta, S.L. "Engineering Physics". Dhanpat Rai Publishers, 2012.
3. Pandey, B.K. & Chaturvedi, S. "Engineering Physics". Cengage Learning India, 2012.

REFERENCES:
1. Halliday, D., Resnick, R. & Walker, J. "Principles of Physics". Wiley, 2015.
2. Serway, R.A. & Jewett, J.W. "Physics for Scientists and Engineers". Cengage Learning, 2010.
3. Tipler, P.A. & Mosca, G. "Physics for Scientists and Engineers with Modern Physics'. W.H.Freeman, 2007.

CY8151	ENGINEERING CHEMISTRY	L T P C
		3 0 0 3

OBJECTIVES:
- To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
- To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
- Preparation, properties and applications of engineering materials.
- Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.
- Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

UNIT I   WATER AND ITS TREATMENT   9
Hardness of water – types – expression of hardness – units – estimation of hardness of water by EDTA – numerical problems – boiler troubles (scale and sludge) – treatment of boiler feed water – Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning) external treatment – Ion exchange process, zeolite process – desalination of brackish water - Reverse Osmosis.

UNIT II   SURFACE CHEMISTRY AND CATALYSIS   9
Adsorption: Types of adsorption – adsorption of gases on solids – adsorption of solute from solutions – adsorption isotherms – Freundlich's adsorption isotherm – Langmuir's adsorption isotherm – contact theory – kinetics of surface reactions, unimolecular reactions, Langmuir - applications of adsorption on pollution abatement.
Catalysis: Catalyst – types of catalysis – criteria – autocatalysis – catalytic poisoning and catalytic promoters - acid base catalysis – applications (catalytic convertor) – enzyme catalysis– Michaelis – Menten equation.

UNIT III   ALLOYS AND PHASE RULE   9
Alloys: Introduction- Definition- properties of alloys- significance of alloying, functions and effect of alloying elements- Nichrome and stainless steel (18/8) – heat treatment of steel. Phase rule: Introduction, definition of terms with examples, one component system -water system - reduced phase rule - thermal analysis and cooling curves - two component systems - lead-silver system - Pattinson process.

UNIT IV   FUELS AND COMBUSTION   9

Fuels: Introduction - classification of fuels - coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - manufacture of synthetic petrol (Bergius process) - knocking - octane number - diesel oil - cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) - power alcohol and biodiesel. Combustion of fuels: Introduction - calorific value - higher and lower calorific values- theoretical calculation of calorific value - ignition temperature - spontaneous ignition temperature - explosive range - flue gas analysis (ORSAT Method).

UNIT V   ENERGY SOURCES AND STORAGE DEVICES   9

Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant - breeder reactor - solar energy conversion - solar cells - wind energy. Batteries, fuel cells and supercapacitors: Types of batteries – primary battery (dry cell) secondary battery (lead acid battery, lithium-ion-battery) fuel cells – H_2-O_2 fuel cell.

TOTAL: 45 PERIODS

OUTCOMES:

- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

1. S. S. Dara and S. S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company LTD, New Delhi, 2015
2. P. C. Jain and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company (P) LTD, New Delhi, 2015
3. S. Vairam, P. Kalyani and Suba Ramesh, "Engineering Chemistry", Wiley India PVT, LTD, New Delhi, 2013.

REFERENCES:

1. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
2. Prasanta Rath, "Engineering Chemistry", Cengage Learning India PVT, LTD, Delhi, 2015.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2015.

GE8151   **PROBLEM SOLVING AND PYTHON PROGRAMMING**   **L T P C**
     3 0 0 3

OBJECTIVES:

- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures –- lists, tuples, dictionaries.
- To do input/output with files in Python.

UNIT I   ALGORITHMIC PROBLEM SOLVING   9
Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II   DATA, EXPRESSIONS, STATEMENTS   9
Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions,   statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments;   Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III   CONTROL FLOW, FUNCTIONS   9
Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV   LISTS, TUPLES, DICTIONARIES   9
Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, mergesort, histogram.

UNIT V   FILES, MODULES, PACKAGES   9
Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

OUTCOMES:
Upon completion of the course, students will be able to
- Develop algorithmic solutions to simple computational problems
- Read, write, execute by hand simple Python programs.
- Structure simple Python programs for solving problems.
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python Programs.

TOTAL : 45 PERIODS

TEXT BOOKS:
1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/think-python/)
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:
1. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,, 2015.

4. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
5. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC, 2013.

GE8152   **ENGINEERING GRAPHICS**   **L T P C**
                                                                                 2 0 4 4

OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.
- T o expose them to existing national standards related to technical drawings.

CONCEPTS AND CONVENTIONS (Not for Examination)   **1**

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

UNIT I   PLANE CURVES AND FREEHAND SKETCHING   7+12

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.
Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Freehand sketching of multiple views from pictorial views of objects

UNIT II   PROJECTION OF POINTS, LINES AND PLANE SURFACE   6+12

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

UNIT III   PROJECTION OF SOLIDS   5+12

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV   PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF
                  SURFACES   5+12

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

UNIT V   ISOMETRIC AND PERSPECTIVE PROJECTIONS   6+12

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and   cylinders by visual ray method .

                                                                    TOTAL: 90 PERIODS

OUTCOMES:
On successful completion of this course, the student will be able to
- familiarize with the fundamentals and standards of Engineering graphics
- perform freehand sketching of basic geometrical constructions and multiple views of objects.
- project orthographic projections of lines and plane surfaces.
- draw projections and solids and development of surfaces.
- visualize and to project isometric and perspective sections of simple solids.

TEXT BOOKS:
1. Natrajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.
2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

REFERENCES:
1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
2. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
4. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
5. N. S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
6. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.

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

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

GE8161   **PROBLEM SOLVING AND PYTHON PROGRAMMING**   **L T P C**
                  LABORATORY   **0 0 4 2**

OBJECTIVES:
- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python.

LIST OF PROGRAMS
1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

PLATFORM NEEDED
Python 3 interpreter for Windows/Linux

COURSE OUTCOMES:
Upon completion of the course, students will be able to
- Write, test, and debug simple Python programs.
- Implement Python programs with conditionals and loops.
- Develop Python programs step-wise by defining functions and calling them.
- Use Python lists, tuples, dictionaries for representing compound data.
- Read and write data from/to files in Python.

                                                             TOTAL :60 PERIODS

BS8161   **PHYSICS AND CHEMISTRY LABORATORY**   **L   T   P   C**
(Common to all branches of B.E. / B.Tech Programmes)   **0   0   4   2**

OBJECTIVES:
- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics, properties of matter and liquids.

LIST OF EXPERIMENTS: PHYSICS LABORATORY (Any 5 Experiments)
1. Determination of rigidity modulus – Torsion pendulum
2. Determination of Young's modulus by non-uniform bending method
3. (a) Determination of wavelength, and particle size using Laser
   (b) Determination of acceptance angle in an optical fiber.
4. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
5. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer
6. Determination of wavelength of mercury spectrum – spectrometer grating
7. Determination of band gap of a semiconductor
8. Determination of thickness of a thin wire – Air wedge method

TOTAL: 30 PERIODS

OUTCOMES:
Upon completion of the course, the students will be able to
- apply principles of elasticity, optics and thermal properties for engineering applications.

CHEMISTRY LABORATORY: (Any seven experiments to be conducted)

OBJECTIVES:
- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
- To acquaint the students with the determination of molecular weight of a polymer by viscometery.

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler's method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by Iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
11. Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.
12. Pseudo first order kinetics-ester hydrolysis.
13. Corrosion experiment-weight loss method.
14. Determination of CMC.
15. Phase change in a solid.
16. Conductometric titration of strong acid vs strong base.

TOTAL: 30 PERIODS

OUTCOMES:
- The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

TEXT BOOK:
1. Vogel's Textbook of Quantitative Chemical Analysis (8TH edition, 2014)

		L	**T**	**P**	**C**
HS8251	**TECHNICAL ENGLISH**	**4**	**0**	**0**	**4**

OBJECTIVES:

The Course prepares second semester engineering and Technology students to:
- Develop strategies and skills to enhance their ability to read and comprehend engineering and technology texts.
- Foster their ability to write convincing job applications and effective reports.
- Develop their speaking skills to make technical presentations , participate in group discussions.
- Strengthen their listening skill which will help them comprehend lectures and talks in their areas of specialisation.

UNIT I   INTRODUCTION TECHNICAL ENGLISH   12

Listening- Listening to talks mostly of a scientific/technical nature and completing information-gap exercises- Speaking – Asking for and giving directions- Reading – reading short technical texts from journals- newspapers - Writing- purpose statements – extended definitions – issue- writing instructions – checklists-recommendations-Vocabulary Development- technical vocabulary Language Development –subject verb agreement - compound words.

UNIT II   READING AND STUDY SKILLS   12

Listening- Listening to longer technical talks and completing exercises based on them-Speaking – describing a process-Reading – reading longer technical texts- identifying the various transitions in a text- paragraphing- Writing- interpreting charts, graphs- Vocabulary Development-vocabulary used in formal letters/emails and reports Language Development- impersonal passive voice, numerical adjectives.

UNIT III   TECHNICAL WRITING AND GRAMMAR   12

Listening- Listening to classroom lectures/ talkls on engineering/technology -Speaking – introduction to technical presentations-   Reading – longer texts both general and technical, practice in speed reading; Writing-Describing a process, use of sequence words- Vocabulary Development- sequence words- Misspelled words. Language Development- embedded sentences

UNIT IV   REPORT WRITING   12

Listening- Listening to documentaries and making notes. Speaking – mechanics of presentations- Reading – reading for detailed comprehension- Writing- email etiquette- job application – cover letter –Résumé preparation(via email and hard copy)- analytical essays and issue based essays-- Vocabulary Development- finding suitable synonyms-paraphrasing-. Language Development- clauses- if conditionals.

UNIT V   GROUP DISCUSSION AND JOB APPLICATIONS   12
Listening- TED/Ink talks; Speaking –participating in a group discussion -Reading– reading and understanding technical articles Writing– Writing reports- minutes of a meeting- accident and survey-Vocabulary Development- verbal analogies Language Development- reported speech

TOTAL :   60   PERIODS

OUTCOMES: At the end of the course learners will be able to:
- Read technical texts and write area- specific texts effortlessly.
- Listen and comprehend lectures and talks in their area of specialisation successfully.
- Speak appropriately and effectively in varied formal and informal contexts.
- Write reports and winning job applications.

TEXT BOOKS:
1.   Board of editors. Fluency in English A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016
2.   Sudharshana.N.P and Saveetha. C. English for Technical Communication. Cambridge University Press: New Delhi, 2016.

REFERENCES
1.   Raman, Meenakshi and Sharma, Sangeetha- Technical Communication Principles and Practice.Oxford University Press: New Delhi,2014.
2.   Kumar, Suresh. E. Engineering English. Orient Blackswan: Hyderabad,2015
3.   Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
4.   Grussendorf, Marion, English for Presentations, Oxford University Press, Oxford: 2007
5.   Means, L. Thomas and Elaine Langlois, English & Communication For Colleges. Cengage Learning, USA: 2007

Students can be asked to read Tagore, Chetan Bhagat and for supplementary reading.

MA8251   ENGINEERING MATHEMATICS – II   L   T   P   C
                                                                                              4   0   0   4
OBJECTIVES :
This course is designed to cover topics such as Matrix Algebra, Vector Calculus, Complex Analysis and Laplace Transform. Matrix Algebra is one of the powerful tools to handle practical problems arising in the field of engineering. Vector calculus can be widely used for modelling the various laws of physics. The various methods of complex analysis and Laplace transforms can be used for efficiently solving the problems that occur in various branches of engineering disciplines.

UNIT I   MATRICES   12
Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms.

UNIT II   VECTOR CALCULUS   12
Gradient and directional derivative – Divergence and curl - Vector identities – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III   ANALYTIC FUNCTIONS   12
Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions $w = z + c,\ cz, \dfrac{1}{z}, z^2$ - Bilinear transformation.

UNIT IV   COMPLEX INTEGRATION   12
Line integral - Cauchy's integral theorem – Cauchy's integral formula – Taylor's and Laurent's series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour.

UNIT V   LAPLACE TRANSFORMS   12
Existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function – Basic properties – Shifting theorems -Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – Transform of periodic functions – Application to solution of linear second order ordinary differential equations with constant coefficients.

TOTAL: 60 PERIODS
OUTCOMES :
After successfully completing the course, the student will have a good understanding of the following topics and their applications:
- Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.
- Gradient, divergence and curl of a vector point function and related identities.
- Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.
- Analytic functions, conformal mapping and complex integration.
- Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

TEXT BOOKS :
1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.
2. Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2016.

REFERENCES :
1. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
2. Jain R.K. and Iyengar S.R.K., " Advanced Engineering Mathematics ", Narosa Publications, New Delhi , 3rd Edition, 2007.
3. O'Neil, P.V. "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, New Delhi, 2007.
4. Sastry, S.S, "Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.
5. Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

MATERIALS SCIENCE

PH8251

(Common to courses offered in Faculty of Mechanical Engineering
Except B.E. Materials Science and Engineering)

L	T	P	C
3	0	0	3

OBJECTIVES:
- To introduce the essential principles of materials science for mechanical and related engineering applications.

UNIT I   PHASE DIAGRAMS   9
Solid solutions - Hume Rothery's rules – the phase rule - single component system - one-component system of iron - binary phase diagrams - isomorphous systems - the tie-line rule - the lever rule - application to isomorphous system - eutectic phase diagram - peritectic phase diagram - other invariant reactions – free energy composition curves for binary systems - microstructural change during cooling.

UNIT II   FERROUS ALLOYS   9
The iron-carbon equilibrium diagram - phases, invariant reactions - microstructure of slowly cooled steels - eutectoid steel, hypo and hypereutectoid steels - effect of alloying elements on the Fe-C system - diffusion in solids - Fick's laws - phase transformations - T-T-T-diagram for eutectoid steel – pearlitic, baintic and martensitic transformations - tempering of martensite – steels – stainless steels – cast irons.

UNIT III   MECHANICAL PROPERTIES   9
Tensile test - plastic deformation mechanisms - slip and twinning - role of dislocations in slip - strengthening methods - strain hardening - refinement of the grain size - solid solution strengthening - precipitation hardening - creep resistance - creep curves - mechanisms of creep - creep-resistant materials - fracture - the Griffith criterion - critical stress intensity factor and its determination - fatigue failure - fatigue tests - methods of increasing fatigue life - hardness - Rockwell and Brinell hardness - Knoop and Vickers microhardness.

UNIT IV   MAGNETIC, DIELECTRIC AND SUPERCONDUCTING MATERIALS   9
Ferromagnetism – domain theory – types of energy – hysteresis – hard and soft magnetic materials – ferrites - dielectric materials – types of polarization – Langevin-Debye equation – frequency effects on polarization - dielectric breakdown – insulating materials – Ferroelectric materials - superconducting materials and their properties.

UNIT V   NEW MATERIALS   9
Ceramics – types and applications – composites: classification, role of matrix and reinforcement, processing of fiber reinforced plastics – metallic glasses: types , glass forming ability of alloys, melt spinning process, applications - shape memory alloys: phases, shape memory effect, pseudoelastic effect, NiTi alloy, applications – nanomaterials: preparation (bottom up and top down approaches), properties and applications – carbon nanotubes: types.

TOTAL :   45   PERIODS

OUTCOMES:
Upon completion of this course,
- the students will have knowledge on the various phase diagrams and their applications
- the students will acquire knowledge on Fe-Fe$_3$C phase diagram, various microstructures and alloys
- the students will get knowledge on mechanical properties of materials and their measurement
- the students will gain knowledge on magnetic, dielectric and superconducting properties of materials
- the students will understand the basics of ceramics, composites and nanomaterials.

TEXT BOOKS:
1. Balasubramaniam, R. "Callister's Materials Science and Engineering". Wiley India Pvt. Ltd., 2014.
2. Raghavan, V. "Physical Metallurgy: Principles and Practice". PHI Learning, 2015.
3. Raghavan, V. "Materials Science and Engineering : A First course". PHI Learning, 2015.

REFERENCES
1. Askeland, D. "Materials Science and Engineering". Brooks/Cole, 2010.
2. Smith, W.F., Hashemi, J. & Prakash, R. "Materials Science and Engineering". Tata McGraw Hill Education Pvt. Ltd., 2014.
3. Wahab, M.A. "Solid State Physics: Structure and Properties of Materials", Narosa Publishing House, 2009.

BE8253	BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING	L T P C
		3 0 0 3

OBJECTIVES:
To impart knowledge on
- Electric circuit laws, single and three phase circuits and wiring
- Working principles of Electrical Machines
- Working principle of Various electronic devices and measuring instruments

UNIT I   ELECTRICAL CIRCUITS   9
Basic circuit components - Ohms Law - Kirchoff's Law – Instantaneous Power – Inductors - Capacitors – Independent and Dependent Sources - steady state solution of DC circuits - Nodal analysis, Mesh analysis- Thevinin's Theorem, Norton's Theorem, Maximum Power transfer theorem- Linearity and Superposition Theorem.

UNIT II   AC CIRCUITS   9
Introduction to AC circuits – waveforms and RMS value – power and power factor, single phase and three-phase balanced circuits – Three phase loads - housing wiring, industrial wiring, materials of wiring

UNIT III   ELECTRICAL MACHINES   9
Principles of operation and characteristics of ; DC machines, Transformers (single and three phase) ,Synchronous machines , three phase and single phase induction motors.

UNIT IV   ELECTRONIC DEVICES & CIRCUITS   9
Types of Materials – Silicon & Germanium- N type and P type materials – PN Junction –Forward and Reverse Bias –Semiconductor Diodes –Bipolar Junction Transistor – Characteristics —Field Effect Transistors – Transistor Biasing –Introduction to operational Amplifier –Inverting Amplifier –Non Inverting Amplifier –DAC – ADC .

UNIT V   MEASUREMENTS & INSTRUMENTATION   9
Introduction to transducers - Classification of Transducers: Resistive, Inductive, Capacitive, Thermoelectric, piezoelectric, photoelectric, Hall effect and Mechanical - ,Classification of instruments - Types of indicating Instruments - multimeters –Oscilloscopes- – three-phase power measurements– instrument transformers (CT and PT)

TOTAL : 45 PERIODS

OUTCOMES:
Ability to
- Understand electric circuits and working principles of electrical machines
- Understand the concepts of various electronic devices
- Choose appropriate instruments for electrical measurement for a specific application

TEXT BOOKS
1. Leonard S Bobrow, " Foundations of Electrical Engineering", Oxford University Press, 2013
2. D P Kothari and I.J Nagarath, "Electrical Machines "Basic Electrical and Electronics Engineering", McGraw Hill Education(India) Private Limited, Third Reprint ,2016
3. Thereja .B.L., "Fundamentals of Electrical Engineering and Electronics", S. Chand & Co. Ltd., 2008

REFERENCES
1. Del Toro, "Electrical Engineering Fundamentals", Pearson Education, New Delhi, 2007
2. John Bird, "Electrical Circuit Theory and Technology", Elsevier, First Indian Edition, 2006
3. Allan S Moris, "Measurement and Instrumentation Principles", Elseveir, First Indian Edition, 2006
4. Rajendra Prasad, "Fundamentals of Electrical Engineering", Prentice Hall of India, 2006
5. A.E.Fitzgerald, David E Higginbotham and Arvin Grabel, "Basic Electrical Engineering", McGraw Hill Education(India) Private Limited, 2009
6. N K De, Dipu Sarkar, "Basic Electrical Engineering",Universities Press (India)Private Limited 2016

GE8291   ENVIRONMENTAL SCIENCE AND ENGINEERING   L T P C
3 0 0 3
OBJECTIVES:
- To study the nature and facts about environment.
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth"s interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I   ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY   14
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II   ENVIRONMENTAL POLLUTION   8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III   NATURAL RESOURCES   10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV   SOCIAL ISSUES AND THE ENVIRONMENT   7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V   HUMAN POPULATION AND THE ENVIRONMENT   6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

OUTCOMES:
- Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
- Public awareness of environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. of living has lead to serious environmental disasters

TEXT BOOKS:
1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

REFERENCES :
1. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD,New Delhi, 2007.
2. Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) PVT, LTD, Hydrabad, 2015.
3. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.
4. G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.

		L T P C
GE8292	**ENGINEERING MECHANICS**	**3 2 0 4**

OBJECTIVES:
To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

UNIT I   STATICS OF PARTICLES   9+6
Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces – Vectorial representation of forces – Vector operations of forces -additions, subtraction, dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility .

UNIT II   EQUILIBRIUM OF RIGID BODIES   9+6
Free body diagram – Types of supports –Action and reaction forces –stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Single equivalent force - Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions

UNIT III   PROPERTIES OF SURFACES AND SOLIDS   9+6
Centroids and centre of mass – Centroids of lines and areas - Rectangular, circular, triangular areas by integration – T section, I section, - Angle section, Hollow section by using standard formula – Theorems of Pappus - Area moments of inertia of plane areas – Rectangular, circular, triangular areas by integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Principal moments of inertia of plane areas – Principal axes of inertia-Mass moment of inertia –mass moment of inertia for prismatic, cylindrical and spherical solids from first principle – Relation to area moments of inertia.

UNIT IV   DYNAMICS OF PARTICLES   9+6
Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion - Newton's laws of motion – Work Energy Equation– Impulse and Momentum – Impact of elastic bodies.

UNIT V   FRICTION AND RIGID BODY DYNAMICS   9+6
Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction – wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

TOTAL : 45+30=75 PERIODS

OUTCOMES:
On successful completion of this course, the student will be able to
- illustrate the vectorial and scalar representation of forces and moments
- analyse the rigid body in equilibrium
- evaluate the properties of surfaces and solids
- calculate dynamic forces exerted in rigid body
- determine the friction and the effects by the laws of friction

TEXT BOOKS:
1. Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).
2. Vela Murali, "Engineering Mechanics", Oxford University Press (2010)

REFERENCES:
1. Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Limited Publishers, 1998.
2. Hibbeller, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education 2010.
3. Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics", 4th Edition, Pearson Education 2006.
4. Meriam J.L. and Kraige L.G., " Engineering Mechanics- Statics - Volume 1, Dynamics- Volume 2", Third Edition, John Wiley & Sons,1993.
5. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.

GE8261	**ENGINEERING PRACTICES LABORATORY**	**L T P C**
		0 0 4 2

OBJECTIVES:
To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

GROUP A (CIVIL & MECHANICAL)

I   CIVIL ENGINEERING PRACTICE   13
Buildings:
(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:
(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.
(b) Study of pipe connections requirements for pumps and turbines.
(c) Preparation of plumbing line sketches for water supply and sewage works.
(d) Hands-on-exercise:
  Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
  (e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:
   (a) Study of the joints in roofs, doors, windows and furniture.
   (b) Hands-on-exercise:
      Wood work, joints by sawing, planing and cutting.

II   MECHANICAL ENGINEERING PRACTICE   18
Welding:
   (a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding.
                     (b) Gas welding practice
Basic Machining:
      (a) Simple Turning and Taper turning
      (b) Drilling Practice

Sheet Metal Work:
      (a) Forming & Bending:
      (b) Model making – Trays and funnels.
      (c) Different type of joints.

Machine assembly practice:
         (a) Study of centrifugal pump
         (b) Study of air conditioner

 Demonstration on:
      (a) Smithy operations, upsetting, swaging, setting down and bending. Example –
           Exercise – Production of hexagonal headed bolt.
      (b) Foundry operations like mould preparation for gear and step cone pulley.
      (c) Fitting – Exercises – Preparation of square fitting and V – fitting models.

GROUP B (ELECTRICAL & ELECTRONICS)

III   ELECTRICAL ENGINEERING PRACTICE   13
   1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
   2. Fluorescent lamp wiring.
   3. Stair case wiring
        4. Measurement of electrical quantities – voltage, current, power & power factor in RLC
           circuit.
   5. Measurement of energy using single phase energy meter.
   6. Measurement of resistance to earth of an electrical equipment.

 IV   ELECTRONICS ENGINEERING PRACTICE   16
   1. Study of Electronic components and equipments – Resistor, colour coding   measurement
   of AC signal parameter (peak-peak, rms period, frequency) using CR.
   2. Study of logic gates AND, OR, EX-OR and NOT.
   3. Generation of Clock Signal.
   4. Soldering practice – Components Devices and Circuits – Using general purpose
      PCB.
   5. Measurement of ripple factor of HWR and FWR.

                                    TOTAL: 60 PERIODS

OUTCOMES:
On successful completion of this course, the student will be able to
- fabricate carpentry components and pipe connections including plumbing works.
- use welding equipments to join the structures.
- Carry out the basic machining operations
- Make the models using sheet metal works
- Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings
- Carry out basic home electrical works and appliances
- Measure the electrical quantities
- Elaborate on the components, gates, soldering practices.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CIVIL

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.	15 Sets.
2. Carpentry vice (fitted to work bench)	15 Nos.
3. Standard woodworking tools	15 Sets.
4. Models of industrial trusses, door joints, furniture joints	5 each
5. Power Tools: (a) Rotary Hammer	2 Nos
(b) Demolition Hammer	2 Nos
(c) Circular Saw	2 Nos
(d) Planer	2 Nos
(e) Hand Drilling Machine	2 Nos
(f) Jigsaw	2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders	5 Nos.
2. Welding booth with exhaust facility	5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc.	5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.	2 Nos.
5. Centre lathe	2 Nos.
6. Hearth furnace, anvil and smithy tools	2 Sets.
7. Moulding table, foundry tools	2 Sets.
8. Power Tool: Angle Grinder	2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner	One each.

ELECTRICAL

1. Assorted electrical components for house wiring	15 Sets
2. Electrical measuring instruments	10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp	1 each
4. Megger (250V/500V)	1 No.
5. Power Tools: (a) Range Finder	2 Nos
(b) Digital Live-wire detector	2 Nos

ELECTRONICS

1. Soldering guns	10 Nos.
2. Assorted electronic components for making circuits	50 Nos.
3. Small PCBs	10 Nos.
4. Multimeters	10 Nos.
5. Study purpose items: Telephone, FM radio, low-voltage power supply	

BE8261   **BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION**   **L T P C**
ENGINEERING LABORATORY   **0 0 4 2**

OBJECTIVE:
- To train the students in performing various tests on electrical drives, sensors and circuits.

LIST OF EXPERIMENTS:
1. *Load test on separately excited DC generator*
2. Load test on Single phase Transformer
3. Load test on Induction motor
4. Verification of Circuit Laws
5. Verification of Circuit Theorems
6. Measurement of three phase power
7. Load test on DC shunt motor.
8. Diode based application circuits
9. Transistor based application circuits
10. Study of CRO and measurement of AC signals
11. Characteristics of LVDT
12. Calibration of Rotometer
13. RTD and Thermistor

Minimum of 10 Experiments to be carried out :-

TOTAL: 60 PERIODS

OUTCOMES:
- Ability to determine the speed characteristic of different electrical machines
- Ability to design simple circuits involving diodes and transistors
- Ability to use operational amplifiers

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S.No.	NAME OF THE EQUIPMENT	Qty.
1	D. C. Motor Generator Set	2
2	D.C. Shunt Motor	2
3	Single Phase Transformer	2
4	Single Phase Induction Motor	2
5	Ammeter A.C and D.C	20
6	Voltmeters A.C and D.C	20
7.	Watt meters LPF and UPF	4
8.	Resistors & Breadboards	-
9.	Cathode Ray Oscilloscopes	4
10.	Dual Regulated power supplies	6
11.	A.C. Signal Generators	4
12.	Transistors (BJT, JFET)	-