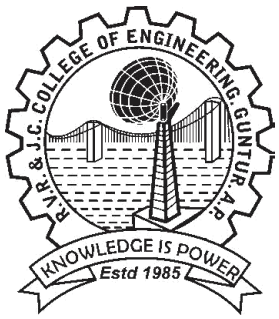

R.V.R. & J. C. COLLEGE OF ENGINEERING

(Autonomous)

Chowdavaram, GUNTUR – 522019.

Regulations (R-18),

Scheme of Instruction, Examinations and Syllabi

For Four Year B.Tech. Degree, Programme

[w.e.f. 2018-19]

MECHANICAL ENGINEERING

R.V.R. & J.C. COLLEGE OF ENGINEERING :: GUNTUR
(Autonomous)

REGULATIONS (R-18) FOR
Four Year BACHELOR OF TECHNOLOGY (B.Tech.) Degree Program

(w.e.f. the batch of candidates admitted into First Year B.Tech. from the academic year 2018-2019).

1 MINIMUM QUALIFICATIONS FOR ADMISSION

A candidate seeking admission into I Year of B.Tech. Degree Program should have passed either Intermediate examination conducted by the Board of Intermediate Education, Andhra Pradesh with Mathematics, Physics, and Chemistry as optional subjects (or any equivalent examination recognized by the Acharya Nagarjuna University) or A candidate seeking admission into II Year of B.Tech. Degree Program should have passed either Diploma in Engineering in the relevant branch conducted by the State Board of Technical Education & Training of Andhra Pradesh (or equivalent Diploma recognized by Acharya Nagarjuna University).

The selection is based on the rank secured by the candidate at the EAMCET / ECET (FDH) examination conducted by A.P. State Council of Higher Education. The candidate shall also satisfy any other eligibility requirements stipulated by the University and / or the Government of Andhra Pradesh from time to time.

2 BRANCHES OF STUDY

The B.Tech. Course is offered in the following branches of study:

1. Chemical Engineering
2. Civil Engineering
3. Computer Science & Engineering
4. Electrical & Electronics Engineering
5. Electronics & Communication Engineering
6. Information Technology
7. Mechanical Engineering

3 DURATION OF THE COURSE AND MEDIUM OF INSTRUCTION

3.1 The duration of the course is Four academic years consisting of two semesters in each academic year. The medium of instruction and examination is English.

3.2 The duration of the course for the candidates (Diploma Holders) admitted under lateral entry into II Year B.Tech. is Three academic years consisting of two semesters in each academic year. The medium of instruction and the examination is English.

4 MINIMUM INSTRUCTION DAYS

Each semester shall consist of a minimum number of 90 days of instruction excluding the days allotted for tests, examinations and preparation holidays.

5 REGISTERING THE COURSES

5.1 A candidate has to register and secure 160 credits which includes laboratory courses and project.

5.2 A candidate has to register and secure minimum pass grade in mandatory courses for which no credits are awarded.

5.3 MOOCS (Massive Open Online Courses): A student will be eligible to get Under Graduate degree with Honours or additional Minor Engineering, if he/she completes an additional 20 credits through MOOCS.

6 EVALUATION

The performance of the candidates in each semester shall be evaluated Course wise.

6.1 The distribution of marks between Sessional Examination (based on internal assessment) and Semester End Examination is as follows:

Nature of the Courses	Sessional Marks	Semester End Exam. Marks
Theory Courses / Design and / or Drawing / Practicals	40	60
Mini Project / Term paper / Mandatory Course	100	---
Project work	40	60 (Viva voce)

6.2 In each of the Semesters, there shall be two Mid Term examinations and two Assignment Tests in every theory course. The Sessional marks for the midterm examinations shall be awarded giving a weightage of 15 marks out of 18 marks (80% approx.) to that midterm examination in which the candidate scores more marks and the remaining 3 marks (20% approx.) for other midterm examination in which the candidate scores less marks. Similarly a weightage of 10 marks (80% approx.) out of 12 marks earmarked for assignment tests shall be given for the assignment in which the candidate scores more marks and remaining 2 marks (20% approx.) shall be given for the assignment test in which the candidate scores less marks.

A maximum of five marks are allotted for attendance in the respective theory courses in a graded manner as indicated in ***clause 8.2.*** The remaining 5 marks out of the 40 marks earmarked for the sessional marks are awarded (quiz / online examination) by the concerned teacher in the respective theory courses.

6.3 The evaluation for Laboratory class work consists of a weightage of 25 marks for day to day laboratory work including record work and 15 marks for internal laboratory examination including Viva-voce examination.

In case of Project work, the sessional marks shall be awarded based on the day-to-day progress, the performance in two Seminars and the Project Report submitted at the end of the semester. The allotment of sessional marks for Seminars and day-to-day work shall be 15 and 25 respectively.

NOTE : A candidate who is absent for any Assignment / Mid Term Exam, for any reason whatsoever, shall be deemed to have scored zero marks in that Test / Exam and no make-up test / Exam shall be conducted.

6.4 A candidate who could not secure a minimum of 50% aggregate sessional marks is not eligible to appear for the Semester End Examination and shall have to repeat that Semester.

7 LABORATORY / PRACTICAL COURSES

In any semester, a minimum of 10 experiments / exercises specified in the syllabus for laboratory course shall be completed by the candidate and get the record certified by the concerned faculty and Head of the Department, to be eligible to face the Semester End Examination in that Practical course.

8 ATTENDANCE REGULATIONS

8.1 Regular course of study means a minimum average attendance of 75% in all the courses computed by totalling the number of hours / periods of lectures, design and / or drawing, practical's and project work as the case may be, held in every course as the denominator and the total number of hours / periods actually attended by the candidate in all the courses, as the numerator.

8.2 A weightage in sessional marks up to a maximum of 5 marks out of 40 marks in each theory course shall be given for those candidates who put in a minimum of 75% attendance in the respective theory in a graded manner as indicated below:

Attendance of 75% and above but less than 80%	- 2 mark
Attendance of 80% and above but less than 85%	- 3 marks
Attendance of 85% and above but less than 90%	- 4 marks
Attendance of 90% and above	- 5 marks

8.3 Condonation of shortage in attendance may be recommended on genuine medical grounds, up to a maximum of 10% provided the candidate puts in at least 65% attendance as calculated in ***clause 8.1***, provided the Principal is satisfied with the genuineness of the reasons and the conduct of the candidate.

8.4 A candidate who could not satisfy the minimum attendance requirements in any semester as mentioned in ***clause 8.1***, is not eligible to appear for the Semester End Examinations and shall have to repeat the same Semester.

9 DETENTION

A candidate, who fails to satisfy either the minimum attendance requirements as stipulated in ***Clause-8***, or the requirement of minimum aggregate sessional marks as stipulated in ***Clause-6***, shall be detained. Such candidate shall have to repeat the same semester.

10 SEMESTER END EXAMINATION

10.1 For each theory course, there shall be a comprehensive Semester End Examination at the end of each Semester.

10.2 For each Practical course the Smester End Examination shall be conducted by one internal and one external examiner appointed by the Principal of the College, the duration being that approved in the detailed Schemes of Instruction & Examination.

10.3 Viva-voce Examination in Project Work shall be conducted by one internal examiner and one external examiner appointed by the Principal.

11 CONDITIONS FOR PASS

A candidate shall be declared to have passed in individual course if he / she secures a minimum of 35% marks in theory and 50% marks in Practical courses/drawing courses/Project Viva-voce in Semester End Examination and minimum of 40% marks in both Sessional & Semester End Examination put together.

12 AWARD OF CREDITS

12.1 Credits are awarded for each Theory / Practical Courses. The total number of credits for all Four years put together shall be 160.

12.2 AWARD OF GRADES

S.No.	Range of Marks	Grade	Grade Points
1	≥ 90	O	10.0
2	80 ≥ - < 90	A^+	9.0
3	70 ≥ - < 80	A	8.0
4	60 ≥ - < 70	B^+	7.0
5	50 ≥ - < 60	B	6.0
6	40 ≥ - < 50	C	5.0
7	< 40	F	0.0
8	The grade 'W' represents withdrawal / absent	W	0.0

12.3 A candidate securing 'F' grade in any course there by securing zero grade points has to reappear and secure at least 'E' grade in the subsequent examinations for that course.

12.4 A candidate who has earned 'F' grade in any course can repeat the course by re-registering it when the course is offered next time.

12.5 After each semester, Grade sheet will be issued which will contain the following details:

- The list of courses for each semester and corresponding credits and grades obtained
- The Semester Grade Point Average (SGPA) for each semester and
- The Cumulative Grade Point Average (CGPA) of all courses put together up to that semester.

SGPA is calculated based on the following formula: $$\frac{\sum [\text{ No. of Credits X Grade Points }]}{\sum \text{ No. of Credits}}$$

CGPA will be calculated in a similar manner, considering all the courses up to that semester.

12.6 A consolidated Grade Sheet shall be issued to the candidate, after completing all , indicating the CGPA of all the Four years put together.

12.7 Conversion of CGPA into equivalent Percentage.: Percentage of Marks = 9.25 x CGPA

13 CONDITIONS FOR PROMOTION

13.1 A candidate shall be eligible for promotion to next semester, if he/she satisfies the minimum requirements of attendance and sessional marks as stipulated in ***Clauses 6 and 8***.

13.2 A candidate shall be eligible for promotion to III Year, if he / she secures 26 credits (70% approx.) of the total number of credits of I Year by the time the classwork commences for III Year, in addition to satisfying the minimum requirements of attendance and sessional marks stipulated in ***Clauses 6 and 8*** in II Year II Semester.

13.3 A candidate shall be eligible for promotion to IV Year, if he / she secures a minimum of 70% of the total number of credits of I & II Years put together, by the time the classwork commences for IV Year, in addition to satisfying the minimum requirements of attendance and sessional marks stipulated in ***Clauses 6 and 8*** in III Year II Semester.

13.4 A candidate (Diploma Holder) admitted under lateral entry into II Year, shall be eligible for promotion to IV Year, if he/she secures a minimum of 70% of the total number of credits of II Year by the time the classwork commences for IV Year, in addition to satisfying the minimum requirements of attendance and sessional marks stipulated in ***Clauses 6 and 8*** in III Year II Semester.

14 ELIGIBILITY FOR AWARD OF B.TECH. DEGREE

The B.Tech. Degree shall be conferred on a candidate who has satisfied the following requirements:

14.1 The candidate must have satisfied the conditions for pass in all the courses of all the years as stipulated in ***Clauses 11***.

14.2 **Maximum Time Limit for completion of B.Tech Degree**

A candidate, who fails to fulfil all the academic requirements for the award of the degree within eight academic years from the year of admission, shall forfeit his/her seat in B.Tech. course.

14.3 A candidate (Diploma Holder) admitted under lateral entry into II B.Tech., who fails to fulfil all the academic requirements for the award of the degree within six academic years from the year of admission, shall forfeit his/her seat in B.Tech. course.

15 AWARD OF CLASS

A candidate who becomes eligible for the award of B.Tech. Degree as stipulated in ***Clause 12*** shall be placed in one of the following Classes.

S.No.	Class	CGPA
1	First Class With Distinction	8.0 or more
2	First Class	6.5 or more but less than 8.0
3	Second Class	5.5 or more but less than 6.5
4	Third Class	5.0 or more but less than 5.5

16 IMPROVEMENT OF CLASS

A candidate, after becoming eligible for the award of the Degree, may improve the CGPA by appearing for the Semester End Examination in any of the theory course as and when conducted. But this provision shall be within a period of two academic years after becoming eligible for the award of the Degree. However, this facility cannot be availed by a candidate who has taken the Original Degree Certificate.

17 AWARD OF RANK

The rank shall be awarded based on the following:

17.1 Ranks shall be awarded in each branch of study for the top five percent of the candidates appearing for the Regular Semester End Examinations or the top ten candidates whichever is minimum.

17.2 Only such candidates who pass the Final year examination at the end of the fourth academic year after admission as regular final year candidate along with others in their batch and become eligible for the award of the degree shall be eligible for the award of rank. The Rank will be awarded only to those candidates who complete their degree within four academic years.

17.3 For the purpose of awarding rank in each branch, only such candidates who passed all courses in the first attempt only shall be considered.

18 SUPPLEMENTARY EXAMINATIONS

18.1 In addition to the Regular semester end examinations held at the end of each semester, supplementary examinations will also be conducted during the academic year. Such candidates taking the Regular / Supplementary examinations as supplementary candidates may have to take more than one examination per day.

18.2 Instant examination will be conducted immediately after the declaration of IV Year II Semester results for those candidates who cleared all courses except one course in IV Year II Semester.

19 TRANSITORY REGULATIONS

A Candidate, who is detained or discontinued in the semester, on readmission shall be required to do all the courses in the curriculum prescribed for such batch of candidates in which the candidates joins subsequently.

19.1 A candidate, studied under R-16 regulations of RVR & JCCE (Autonomous) curriculum, detained due to lack of academics/attendance at the end of the I Year II Semester or II Year I Semester, shall join in appropriate Semester of R-18 regulations. The candidate has to clear all the backlog subjects or equivalent subjects if any under R-18 curriculum by appearing the supplementary examinations, conducted by the college under R-18 curriculum. The class will be awarded based on the academic performance of the candidate as R-18 regulations.

19.2 A candidate, studied under R-16 regulations of RVR & JCCE (Autonomous) curriculum, detained due to lack of academics / attendance at the end of the II Year II Semester and also at the subsequent semesters will follow the same R-16 regulations/curriculum and he/she has to complete all the courses by appearing in the examination conducted by the college under R-16 curriculum. The class will be awarded based on the academic performance of the candidate as per R-16 regulations.

19.3 A candidate, transferred from other institutions / universities into I Year II Semester and also at the subsequent semesters of B.Tech., shall join at appropriate semester of R-18 curriculum. Such candidate shall study all the courses prescribed for that batch, in which, the candidate joins. The candidate has to clear the backlog courses, if any, in the semesters which he/she has studied in the earlier institutions / universities by appearing the supplementary examinations conducted by the college in R-16 circulum courses / equivalent courses. The equivalent courses will be decided by concerned Board of Studies.

20 CONDUCT AND DISCIPLINE

20.1 Candidates shall conduct themselves within and outside the premises of the institute in a manner befitting the candidates of our institution.

20.2 As per the order of Honourable Supreme Court of India, ragging in any form is considered as a criminal offence and is banned. Any form of ragging will be severely dealt with.

20.3 The following acts of omission and / or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures with regard to ragging.

a Lack of courtesy and decorum, indecent behaviour anywhere within or outside the campus.

b Wilful damage of college / individual property

c Possession, consumption or distribution of alcoholic drinks or any kind of narcotics or hallucinogenic drugs.

d Mutilation or unauthorized possession of library books.

e Noisy and unseemly behaviour, disturbing studies of fellow candidates.

f Hacking of computer systems (such as entering into other person's areas without prior permission, manipulation and / or damage of computer hardware and software or any other cyber-crime etc.)

g Usage of camera / cell phone in the campus

h Plagiarism of any nature

i Any other acts of gross indiscipline as decided by the academic council from time to time.

20.4 Commensurate with the gravity of offense, the punishment may be reprimand, fine, expulsion from the institute / hostel, debar from examination, disallowing the use of certain facilities of the institute, rustication for a specified period or even outright expulsion from the institute or even handing over the case to appropriate law enforcement or the judiciary, as required by the circumstances.

20.5 For an offence committed in (i) a hostel (ii) a department or in a class room and (iii) elsewhere, the chief warden, the head of the department and the principal respectively, shall have the authority to reprimand or impose fine.

20.6 Cases of adoption of unfair means and / or any malpractice in an examination shall be reported to the principal for taking appropriate action.

20.7 All cases of serious offence, possibly requiring punishment other than reprimand, shall be reported to the academic council.

20.8 The institute level standing disciplinary action committee constituted by the academic council shall be the authority to investigate the details of the offence, and recommend disciplinary action based on the nature and extent of the offence committed.

20.9 The principal shall deal with any academic problem, which is not covered under these rules and regulations, in consultation with the programmes committee in an appropriate manner, and subsequently such actions shall be placed before the academic council for ratification. Any emergency modification of regulation, approved by the appropriate authority, shall be reported to the academic council for ratification.

20.10 ''Grievance and Redressal Committee'' (General) constituted by the Principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters.

21 MALPRACTICES

21.1 The Principal shall refer the cases of malpractices in internal assessment tests and semester-end examinations to a malpractice enquiry committee constituted by him / her for the purpose. Such committee shall follow the approved scales of punishment. The principal shall take necessary action, against the erring candidates basing on the recommendations of the committee.

21.2 Any action on the part of a candidate during an examination trying to get undue advantage or trying to help another, or drive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the staff, who are in-charge of conducting examinations, valuing examination papers and preparing / keeping records of

documents relating to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned in the examination shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.

22 AMENDMENTS TO REGULATIONS

The College may, from time to time, revise, amend, or change the Regulations, Schemes of Examinations, and / or Syllabus.

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B.TECH MECHANICAL ENGINEERING

(w.e.f. the batch of students admitted from the academic year 2018-19)

Three Weeks Orientation Programme is Mandatory before starting Semester I [First Year]

Semester I [First Year] COURSE STRUCTURE

SNo.	Course Details		Scheme of Instruction			Scheme of Examination			Category Code
	Code No.	Subject Name	Periods per week			Maximum Marks		Credits	
			L	T	P	SES	EXT		
1	ME/CE/EC 111	Mathematics-I	3	1	-	40	60	4	BS
2	ME/EC/EE 112	Engineering Chemistry	3	1	-	40	60	4	BS
3	ME/CE/CH/EE 113	English for Communication Skills	2	-	-	40	60	2	HS
4	ME/EC/EE 151	Chemistry Lab	-	-	3	40	60	1.5	BS
5	ME/CE/CH/EE 152	English Language Communication Skills Lab	-	-	2	40	60	1	HS
6	ME/CE/EE 153	Workshop Practice Lab	1	-	4	40	60	3	ES
7	MC 000	Three Weeks Orientation Program	-	-	-	100	-	-	-
8	MC 002	Environmental Science	2	-	-	100	-	-	-
9	MC 006	English Competency Development Programme	2	-	-	100	-	-	-
		TOTAL	13	2	9	540	360	15.5	TPW-24

Semester II [First Year] COURSE STRUCTURE

SNo.	Course Details		Scheme of Instruction			Scheme of Examination			Category Code
	Code No.	Subject Name	Periods per week			Maximum Marks		Credits	
			L	T	P	SES	EXT		
1	ME/CE/EC 121	Mathematics-II	3	1	-	40	60	4	BS
2	ME 122	Engineering Physics	3	1	-	40	60	4	BS
3	ME/CE/CH/CS/ EE/EC/IT 123	Programing for Problem Solving	3	-	-	40	60	3	ES
4	ME/CH 124	Basic Electrical Engineering	3	1	-	40	60	4	ES
5	ME 161	Physics Lab	-	-	3	40	60	1.5	BS
6	ME/CE/CH/CS/ EE/EC/IT/ 162	Programing for Problem Solving Lab	-	-	4	40	60	2	ES
7	ME/CE/EE 163	Engineering Graphics & Design Lab	1	-	4	40	60	3	ES
8	ME/CH 164	Basic Electrical Engineering Lab	-	-	2	40	60	1	ES
		TOTAL	13	3	13	320	480	22.5	TPW-29

ME/CE/EC 111	MATHEMATICS-I	L	T	P	C	Int	Ext
	(Calculus & Linear Algebra)	3	1	-	4	40	60

Semester I [First Year]

COURSE OBJECTIVES:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. evaluate certain improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
2. fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
3. understand Fourier series and deal with functions of several variables.
4. understand matrices and linear algebra in a comprehensive manner.

UNIT I [CO:1] **(15)**

Evolutes and Involutes, Evaluation of improper integrals: Integrals without infinite limits of integration, Beta function, Gamma function, Relation between beta and gamma functions (without proof), Applications of definite integrals to evaluate surface areas and volumes of revolutions.

UNIT II [CO:2] **(15)**

Rolle's theorem (without proof), Lagrange's mean value theorem (without proof), Taylor's and Maclaurin series (without proof), Sequences, Series, Series of positive terms, Convergence tests: Comparision test (limit form) D'Alembert's ratio test, Raabe's test for convergence.

UNIT III [CO:3] **(15)**

Fourier series: Half range sine and cosine series, Parseval's formula. Multivariable Calculus: Limit, continuity and partial derivatives, total derivative, Maxima, minima and saddle points of two variables, Method of Lagrange multipliers. Scalar and vector point functions , Gradient, directional derivative divergence and curl, del applied twice to point and product of point functions(without proofs).

UNIT IV [CO:4] **(15)**

Rank of a matrix, Normal form, Inverse by Gauss Jordan method, System of linear equations: non homogeneous, Homogeneous systems, Rank-nullity theorem(without proof), Eigenvalues and eigenvectors, Cayley-Hamilton Theorem, Diagonalization of matrices, reduction of quadratic form to canonical form.

LEARNING RESOURCES:

TEXT BOOK:

B.S.Grewal - Higher Engineering Mathematics, Khanna publishers, 42nd edition, 2017.

REFERENCE BOOK(s):

1. G.B. Thomas and R.L. Finney - Calculus and Analytic geometry, Pearson, 2002.
2. N.P. Bali and Manish Goyal - A text book of Engineering Mathematics, LaxmiPublications, Reprint, 2010.
3. Erwin Kreyszig - Advanced Engineering Mathematics, John Wiley & Sons, 2006.

WEB RESOURCES:

http://nptel.iitm.ac.in/courses/

ME/EC/EE 112	ENGINEERING CHEMISTRY	L	T	P	C	Int	Ext
		3	1	-	4	40	60

Semester I [First Year]

COURSE OBJECTIVES:

1. To imparts concepts involved in molecular structure and intermolecular forces.
2. To Understands the chemistry behind electrochemical energy systems.
3. To understand the chemical concepts involved in Water treatment and Corrosion.
4. To understand the about the major organic reactions and end products like conducting polymers.
5. To learn the analytical methods useful in characterization of compounds.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. Student can identify stable complexes and suitable electrochemical energy systems for end usage.
2. apply his knowledge for effective water treatment and corrosion prevention.
3. identify chemical reactions that are used in the synthesis of molecules and polymers
4. distinguish the ranges of the electromagnetic spectrum and characterize a given compound using analytical techniques..

UNIT I [CO:1] **(15)**

Molecular structure, Intermolecular forces and Energy systems:

Crystal field theory-salient features, energy level diagrams-tetrahedral and octahedral complexes, crystal field stabilization energies and magnetic properties.

Ionic, dipolar, Vander Waal's interaction and Hydrogen bonding, critical phenomena-Andrew's isotherms of CO_2, derivation of critical constants from Vander Waal's equation.

Electrode potential, electrochemical series, Nernst equation and its applications. Batteries-Primary (Dry cell) and secondary (Lead acid), Lithium battery (Li-MnO_2)- advantages, Fuel cell (H_2 - O_2 cell).

UNIT II [CO:2] **(15)**

Water Chemistry and Corrosion :

Water Chemistry - WHO standards, Municipal water treatment-Removal of suspended impurities - Sedimentation, Co-agulation and Filtration-Disinfection of water by chlorine, Break point chlorination, Dechlorination, Purification by ion-exchange method and reverse osmosis.

Corrosion-Introduction, Electrochemical theory of corrosion, galvanic corrosion, differential aeration corrosion, Factors-temperature, pH, overvoltage. Cathodic protection by sacrificial anodic method and impressed current method. Electroplating (Cu), Electrolessplating (Ni).

UNIT III [CO:3] **(15)**

Organic reactions and Polymers :

Types of organic reactions-Substitution($SN_1$and SN_2), Elimination ($E_1$and E_2), Addition-Markownikoff's rule and anti-Markownikoff's rule, Cyclisation (Diel's Alder reaction), Synthesis of aspirin.

Polymers - Functionality, Degree of Polymerization, Tacticity-Addition and condensation polymerization, Relationship between Structure and Properties of polymers (Strength, Crystallinity, Elasticity, Plastic Deformation, Glass transition temperature (T_g)), Factors affecting T_g.

Conducting polymers: Introduction, Examples, General applications, Mechanism of conduction in polyacetylene.

UNIT IV [CO:4] **(15)**

Spectroscopic techniques and its applications :

Beer-Lambert's law, limitations, colorimetric determination of Fe(III) UV-VIS spectroscopy - electronic transitions, shifts-blue and red, Block diagram - brief introduction of components, Applications - purity and differentiation of conjugated and non-conjugated dienes.

IR Spectroscopy - condition to be IR active, vibrational modes of - AB_2, Block diagram-brief introduction of components, IR spectrum of CO_2 and H_2O molecules, General applications. Fluorescence and its applications in medicine.

LEARNING RESOURCES:

TEXT BOOK(s):

1. P.C.Jain and Monica Jain- Engineering chemistry, 16th edition, Dhanpat Rai Publishing Company.
2. Wiley Engineering chemistry, 2nd edition, Wiley India Private Limited.

REFERENCE BOOK(s):

1. Bruce H. Mahan, University Chemistry, 3rd edition, Narosa Publishing House..
2. Shashi Chawla - A text book of Engineering chemistry, 3rd edition, Dhanpat Rai Publishing Company..

WEB RESOURCES:

1. Engineering Chemistry (NPTEL Web Book by B.L. Tembe, Kamaluddin & M.S. Krishnan).
2. http://www.powerstream.com/BatteryFAQ.html#lec
3. http://freevideolectures.com/Course/3029/Modern-Instrumental-Methods-ofAnalysis.

ME/CE/CH/EE 113	ENGLISH FOR COMMUNICATION SKILLS	L	T	P	C	Int	Ext
		2	-	-	2	40	60

Semester I [First Year]

COURSE OBJECTIVES:

1. To enable students improve their lexical and communicative competence and to equip students with oral and written communication skills.
2. To help students understand and learn the correct usage and application of Grammar principles.
3. To get them acquainted with the features of successful professional communication.
4. To enable students acquire various specific features of effective written communication.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. use vocabulary contextually.
2. compose effectively the various forms of professional communication.
3. apply grammar rules efficiently in spoken and written forms.

UNIT I [CO:4] **(8)**

Vocabulary Building

1.1 - Root words from foreign languages and their use in English.

1.2 - Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.

1.3 - Synonyms, antonyms, and standard abbreviations.

1.4 - One word substitutes.

UNIT II [CO:4] **(8)**

Writing Skills

2.1 - Proposal writing

2.2 - Letter-writing

2.3 - Techniques for writing precisely (precis writing)

2.4 - E-mail writing

UNIT III [CO:4] **(8)**

Identifying Common Errors in Writing

3.1 - Subject-verb agreement

3.2 - Noun-pronoun agreement

3.3 - Articles

3.4 - Prepositions

3.5 - Tenses

3.6 - Redundancies

UNIT IV [CO:4] **(8)**

Nature and Style of Sensible Writing

4.1 - Describing

4.2 - Narration

4.3 - Classifying

4.4 - Coherence and cohesion in paragraph writing

LEARNING RESOURCES:

TEXT BOOK:

Communication Skills. Sanjay Kumar and Pushpa Lata.Oxford University Press.

REFERENCE BOOK(s):

1. Remedial English Grammar. F.T. Wood. macmillan.2007
2. On Writing Well. William Zinsser. Harper ResourceBook. 2001
3. Study Writing. Liz Hamp-Lyons and Ben Heasly.Cambridge University Press.2006.
4. Practical English Usage.Michael Swan. OUP. 1995Press

ME/EC/EE 151	CHEMISTRY LAB	L	T	P	C	Int	Ext
		-	-	3	1.5	40	60

Semester I [First Year]

COURSE OBJECTIVES:

1. To learn the concepts of equivalent weight, molecular weight, normality, molarity, weight percent, volume percent.
2. To know the methods of determining hardness and chloride ion content of water sample.
3. To learn the redox methods to determine Fe2+ ions present in solution.
4. To know principles and methods involved in using instruments like conductivity bridge and potentiometer
5. To know the molecular properties like surface tension, viscosity.
6. To know synthetic methods for preparation of drugs and polymer

COURSE OUTCOMES:

After successful completion of the course, the students will be able to

1. estimate the Fe(II) content of a given solution and chloride/hardness content of water.
2. measure molecular properties such as surface tension, viscosity.
3. measure conductance of solutions, redox potentials of a cell.
4. synthesize a small drug molecule and polymer.

List of Experiments:

1. Estimation of Mohr's salt using $KMnO_4$.
2. Estimation of Mohr's salt using $K_2Cr_2O_7$.
3. Determination of chloride ion content of water.
4. Determination of Hardness of water using EDTA method.
5. Determination of Fe(II) strength using $K_2Cr_2O_7$ potentiometrically.
6. Determination on strength of NaOH using HCI conductometrically.
7. Determination of surface tension.
8. Determination of Viscosity.
9. Determination of Saponification / acid value of oil.
10. Preparation of p-bromo acetanilide.
11. Preparation of Phenol Formaldehyde resin.
12. Determination of partition co-efficient of I2 in water.
13. Determination of Rf value using TLC.
14. Verification of Freundlich isotherm using adsorption of acetic acid on activated charcoal.

Note: A minimum of 10(Ten) experiments have to be performed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

ME/CE/CH/EE 152	ENGLISH LANGUAGE COMMUNICATION SKILLS LAB	L	T	P	C	Int	Ext
		-	-	2	1	40	60

Semester I [First Year]

COURSE OBJECTIVES:

1. To Identify speaker's purpose and tone; make inferences and predictions about spoken discourse, discuss and respond to content of a lecture or listening passage orally and/or in writing.
2. To acquaint the students with the Standard English pronunciation, i.e., Receive Pronunciation (RP), with the knowledge of stress and intonation.
3. To develop production and process of language useful for social and professional life.
4. To develop in them communication and social graces necessary for functioning. Improve the dynamics of professional presentations.
5. To develop critical reading and comprehension skills at different levels.

COURSE OUTCOMES:

After successful completion of the course, the students will be able to:

1. comprehend relationships between ideas and make inferences and predictions about spoken discourse.
2. speak English with a reasonable degree of accuracy in pronunciation.
3. develop appropriate speech dynamics in professional situations.
4. use effective strategies and social graces to enhance the value of communication.
5. develop effective communication and presentation skills and using language effectively to face interviews with success.

List of Exercises / Activities:

Oral Communication

(This unit involves interactive practice sessions in Language Lab).

1. Listening Comprehension.
2. Pronunciation, Intonation, Stress and Rhythm.
3. Common Everyday Situations: Conversations and Dialogues.
4. Interviews.
5. Formal Presentations.
6. Reading Comprehension.

REFERENCE BOOK(S) :

1. Communication Skills. Sanjay Kumar and Pushpa Lata. Oxford University Press.
2. Practical English Usage. Michael Swan. OUP. 1995 Press
3. Exercises in Spoken English. Parts.I- III. CIEFL, Hyderabad. Oxford University
4. Technical English .M. Sambaiah, Wiley Publications, New Delhi

ME/CE/EE 153	WORKSHOP PRACTICE LAB	L	T	P	C	Int	Ext
		1	-	4	3	40	60

Semester I [First Year]

COURSE OBJECTIVES:

Engineers, whatever be their line of activity, must be proficient with all aspects of manufacturing, however it should not be forgotten that practice without theory is blind and the theory without practice is lame.

1. Students involved in acquiring manufacturing skills must have balanced knowledge of theory as well as practice.
2. Imparts basic knowledge of various tools and their use in different sections of manufacture such as fitting, carpentry, tin smithy, moulding, casting, welding, electrical wiring, PCB work on electronic circuits and practice with machine shop tools & equipments.

COURSE OUTCOMES:

After successful completion of the course, the students will be able to

1. will gain knowledge of the different manufacturing processes which are commonly employed in the industry to fabricate components using different materials.

Lectures and Videos: [10 hours]

1. Manufacturing Methods: Introduction to various types of manufacturing methods - casting - forming - various machining operations such as turning, milling, shaping, drilling, slotting etc.,, - various joining methods such as welding, brazing, soldering etc.,- Advanced manufacturing methods (3 Lectures).
2. CNC machining and Additive manufacturing (1 Lecture).
3. Fitting operations and power tools (power hack saw, table mounted circular saw, wood turning lathe, bench grinder, concrete mixer, concrete vibrator etc.,) (1 Lecture).
4. Basic principles involved in electrical circuits and electronic PCB circuits(1 Lecture).
5. Carpentry (1 Lecture).
6. Welding(arc welding & gas welding) (1 Lecture).
7. Metal casting(1 Lecture).
8. Plastic moulding, glass cutting (1 Lecture).

Text book:

1. Hajra Choudhury S, K., Hajra Choudhury A.K and Nirjhar Roy S.K. - Elements of Workshop Technology, VolumeI and Volume II,2010, Media promoters and publishers private limited, Mumbai.

Reference books:.

1. Kalpakjian S and Steven S.Schmid. - Manufacturing Engineering and Technology, 4th edition, Pearson Education, India, 2002.
2. Rao P.N. - Manufacturing Technology, Volume I &II, Tata McGrawHill House, 2017.

Work shop Practice: (60 hours)

Objectives:

Students acquiring practical knowledge on various manufacturing techniques and will be able to fabricate components with their own hands.

Outcomes:

Up on completion of laboratory, students will be able to gain the manufacturing skills and get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.

List of Exercises - Trade wise Experiments:

1. Welding shop(both arc &gas welding)
   - Square butt joint
   - Lap joint
   - Single v butt joint
   - Gas welding & Cutting
2. Fitting Shop& Casting
   - Inclined fit
   - Half round fit
   - V fit
   - Moulding and casting of Hand wheel
3. Practice on electrical wiring and Electronic circuit boards
   - One bulb controlled by one switch &one bulb controlled by two switches
   - Two bulbs controlled by one switch (Stair case connection)
   - Tube light connection
   - Measurement of resistance, voltage and current with the help of a multi-meter & soldering on an electronic PCB circuit.
4. Machine Shop
   - Practice of machining operations on Lathe, Milling, Shaping, Drilling and Slotting Machines.
5. Carpentry
   - Lap joint
   - Cross lap joint
   - Dovetail joint
   - Turning on wood turning Lathe
6. Tin Smithy
   - Rectangular tray
   - Funnel
   - Pipe joint
   - Rectangular Scoop

Plastic moulding and glass cutting

Note: A minimum of 2 (Two) from each trade - Total 12 (Twelve) experiments - have to be Performed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

MC 000	THREE WEEKS ORIENTATION PROGRAM	L	T	P	C	Int	Ext
	[MANDATORY NON-CREDIT COURSE - ACTIVITY BASED]	-	-	-	-	100	-

Semester I [First Year]

MC 002	ENVIRONMENTAL SCIENCE	L	T	P	C	Int	Ext
	[MANDATORY NON-CREDIT COURSE - ACTIVITY BASE]	2	-	-	-	100	-

Semester I [First Year]

COURSE OBJECTIVES:

1. To enable the students to understand that humans are an integral part of environment and hence their activities reflect on the environment.
2. To enable the students to realize and appreciate the importance of ancient practices and their importance in the present times
3. To enable the students to appreciate the contribution of individuals for the upkeep of environmental standards, in turn help the humans live better.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. evaluate the implications of human activities and thereby promote ecofriendly technologies.
2. promote awareness among the members of the society for a sustainable environment.
3. include and give priority to environmental protection in all developmental projects.

A. AWARENESS ACTIVITIES - SMALL GROUP MEETINGS

I. Source of water for human consumption/activities:
- **a.** collection of information pertaining to water resources and consumption in Andhra Pradesh
- **b.** Water resource on campus: General / Laboratory use and
- **c.** Drinking water - understand the background and adopt judicious management.
- **d.** Recycled water for Gardening - Particularly Lawns.
- **e.** Cut down wastage of electricity in class rooms / labs / hostels etc. by avoiding misuse.

II. After the group meetings and exposure to the local issues and healthy practices, students motivated to make:
- **a.** Posters
- **b.** Slogans/One liners for promoting awareness

III. Lectures from Experts (at least 2 in the course duration)

IV. A walk in the neighborhood to promote a chosen theme on environmental consciousness.

B. ACTUAL ACTIVITIES

1. Plantation on Campus and on the sides of approach road.
2. Distribution of saplings to the local colony dwellers and encourage plantation.
3. Development of Kitchen garden on campus - Cultivation of atleast leafy vegetables and creepers like cucumber etc. for use in college canteen/hostels etc.
4. Adoption of "NO PLASTICS" on campus.
5. Field trip to gain knowledge of biodiversity, water shed, mining, pollution and other local issues.
6. Preparation of working models for energy generation/transformation etc.

C. THEORY SYLLABUS FOR ASSESSMENT

Part-I

1. Introduction to Environmental Studies Scope and Importance.
2. Natural resources Renewable and Non-Renewable: Definition and importance of the following resources in detail: a. Forest b. Water c. Land d. Energy
3. Sustainable development - Concept and Measures.
4. Biodiversity - Definition, Types of Biodiversity, Values and threats to Biodiversity, Conservation of biodiversity, IUCN classification: Endangered, Threatened, Vulnerable, Rare species; Endemic and Exotic species.
5. Climate change - Global warming, Ozone depletion and Acid rain.

Part-II

6. Water shed, water shed management in detail.
7. Solid wastes and Solid waste management.
8. Environmental Legislation, Environmental acts - Wild life conservation act, water act, Forest act, Air act and Environmental protection act.
9. Case studies: Chernobyl nuclear disaster, Bhopal gas tragedy, Narmada bachao andolan, Silent valley, Story of Tuvalu, Ganga Story.
10. Earth summit and Kyoto protocol: Measures at individual level for conservation of natural resources and sustainable development.

Text Books

1. Anubha Kaushik and C.P.Kaushik - Environmental Studies, 3rd Edition, New Age InternationalPublishers, New Delhi., 2012.
2. R. Rajagopalan - Environmental studies from crisis to cure, 3rd Edition, Oxford University press, 2012.

ASSESSMENT

1. Two assessments each of 40 marks will be done in the semester. The split up of each assessment is as follows:
   a. Two internal theory examinations will be conducted for 18 marks each.
   b. Evaluation of the prepared activity sheets and working models will be done for 12M (continual evaluation) twice in the semester in line with the theory examination.
   c. 5 Marks for attendance and 5 marks for oral test.

Note: Weightages for a, b & c will be taken as per the assessment guidelines of the R-18 curriculum and projected to 100 marks.

MC 006	ENGLISH COMPETENCY DEVELOPMENT PROGRAMME	L	T	P	C	Int	Ext
	[MANDATORY NON-CREDIT COURSE - ACTIVITY BASED]	2	-	-	-	100	-

Semester I [First Year]

LECTURE PLAN

Session	Topic
1.	Self Introduction
2.	Self Introduction
3.	Introducing Others
4.	Mind Mapping -Small Talk
5.	Random Operation
6.	JAM & Extempores
7.	Starting a Conversation-Rapid Fire
8.	Story Telling
9.	Narrating Life Stories
10.	Tense Buster
11.	Describing people
12.	Picture Perception & Description
13.	Movie Reviews
14.	News Articles-Open Discussion & Debate
15.	Everyday Life-Communicative Activities
16.	Role Plays
17.	Short Versions
18.	Contemporary Novels-Critical Appreciation Round

References :

* Contemporary Novels-Critical Appreciation Round
* eslflow.com/Personality Vocabulary Survey
* eslflow.com/Celebrity Interview
* eslflow.com/Telling stories
* eslflow.com/ First Impressions/speaking activity
* Speaking work sheets/Out & About 1 - PHOTOCOPIABLE, Cambridge University Press 2015
* Speaking Unplugged: 30 activities for one-to-one classes by online TEFL training
* Think Teen work book
* The guardian weekly/News based English language activities
* Walkietalkie https://www.teacherspayteachers.com/Store/Walkietalkie
* Alen Maley's Conversation/Rob Nolasco & Lois Arthur/Oxford University Press
* Alen Maley's Project Work/Diana L.Fried-Booth/Oxford University Press
* Cambridge English/Objective PET/Louise Hashemi & Barbara Thomas
* Cambridge English Business Benchmark/Guy Brook-Hart
* British Council / Learn English Select Face-to-Face Course / APSCHE Communication Skills Project
* Self- Designed Handouts

ME/CE/EC 121	MATHEMATICS-II	L	T	P	C	Int	Ext
	(Calculus, Ordinary Differential Equations and Complex Variable)	3	1	-	4	40	60

Semester II [First Year]

COURSE OBJECTIVES:

The objective of this course is to familiarize the prospective engineers with techniques in Multivariate integration, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. use effective mathematical tools for the solutions of differential equations that model Physical processes.
2. use mathematical tools needed in evaluating multiple integrals and their usage.
3. apply integration of vector functions.
4. use tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

UNIT I [CO:1] **(15)**

Differentials equations of first order-Linear equations, Bernoulli's equation, exact equations, equations reducible to exact equations.

Differentials equations of higher order - Second order linear differential equations with constant coefficients - Method of variation of parameters, Cauchy's homogeneous linear equation and Legendre's linear equation.

UNIT II [CO:2] **(15)**

Multiple Integrals - Double integrals (Cartesian and polar), Change of order of integration, Change of variables Cartesian to polar coordinates.

Area by double integrals, Triple integrals (Cartesian), Volume by triple integrals.

UNIT III [CO:3] **(15)**

Integration of vectors - Line integrals, surface integrals, Green's theorem in the plane (without proof), Stoke's theorem (without proof), Volume integrals, Gauss divergence theorem (without proof).

Complex variables - Differentiation, Cauchy Riemann equations (Cartesian and polar-without proof), analytic functions.

UNIT IV [CO:4] **(15)**

Harmonic functions, finding harmonic conjugate - Milne Thomson method.

Complex integration - Cauchy Integral Theorem (without proof), Cauchy Integral Formula (without proof).

LEARNING RESOURCES:

TEXT BOOK:

B.S.Grewal - Higher Engineering Mathematics, Khanna publishers, 42nd edition, 2017.

REFERENCE BOOK(s):

1. Erwin Kreyszig - Advanced Engineering Mathematics, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal - A text book of Engineering Mathematics, LaxmiPublications, Reprint, 2010.

WEB RESOURCES:

http://nptel.iitm.ac.in/courses/

ME 122	ENGINEERING PHYSICS	L	T	P	C	Int	Ext
	(Waves and Optics)	3	1	-	4	40	60

Semester II [First Year]

COURSE OBJECTIVES:

1. To impart knowledge and understanding the basic principles of oscillators.
2. To understand about basic phenomena of mechanical waves in the medium.
3. To understand the basic phenomena of light waves and interference.
4. To understand about diffraction phenomena and basic principles of lasers.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. Identify and illustrate physical concepts and terminology used in oscillations.
2. Identify the basic phenomena of mechanical waves in medium.
3. Identify the propagation of light and interference phenomena.
4. Identify the basic concepts of diffraction phenomena and lasers.

UNIT I [CO:4] **(15)**

Simple harmonic motion, damped and forced simple harmonic oscillator:

Mechanical and electrical simple harmonic oscillators, complex number notation and phasor representation of simple harmonic motion, damped harmonic oscillator - heavy, critical and light damping, energy decay in a damped harmonic oscillator, quality factor, forced mechanical and electrical oscillators, electrical and mechanical impedance.

UNIT II [CO:4] **(15)**

Non-dispersive transverse and longitudinal waves in one dimension and introduction to dispersion :

Transverse wave on a string, the wave equation on a string, Harmonic waves, reflection and transmission of waves at a boundary, impedance matching standing waves and their Eigen frequencies, longitudinal waves and the wave equation for them, acoustics waves and speed of sound, standing sound waves.

UNIT III [CO:4] **(15)**

The propagation of light :

Fermat's principle of stationary time and its applications e.g. in explaining mirage effect, laws of reflection and refraction, Light as an electromagnetic wave and Brewster's angle, total internal reflection.

Wave optics : Interference introduction, Stoke`s principle, interference in thin films by reflected light(cosine law),theory of air wedge , Newton's rings, Michelson interferometer and its applications.

UNIT IV [CO:4] **(15)**

Diffraction and Lasers :

Farunhofer diffraction from a single slit, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas laser (He-Ne), solid-state lasers(Neodymium), Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, applications of lasers in science, engineering and medicine.

LEARNING RESOURCES:

TEXT BOOK:

M.N. Avadhanulu, P.G. Kshirasagar - A Text book of Engineering Physics, S. Chand & Company Ltd., 2018.

REFERENCE BOOK(s):

1. Ian G. Main, Oscillations and waves inphysics.
2. H.J. Pain, The physics of vibrations and waves .
3. E. Hecht,Optics.
4. A. Ghatak,Optics.
5. O. Svelto, Principles ofLasers.

WEB RESOURCES:

Online course:

ME/CE/CH/CS/ EE/EC/IT 123	**PROGRAMING FOR PROBLEM SOLVING**	**L**	**T**	**P**	**C**	**Int**	**Ext**
		3	**-**	**-**	**3**	**40**	**60**

Semester II [First Year]

COURSE OBJECTIVES:

1. To understand the basic problem solving process using Flow Charts and algorithms.
2. To understand the basic concepts of control structures in C.
3. To learn concepts of arrays, functions, pointers and Dynamic memory allocation in C.
4. To use the concepts of structures, unions, files and command line arguments in C.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. develop algorithms and flow charts for simple problems.
2. use suitable control structures for developing code in C.
3. design modular programs using the concepts of functions and recursion.
4. Develop code for complex applications using structures, pointers and file handling features.

UNIT I [CO:1] **(12)**

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, Arithmetic expressions and precedence.

UNIT II [CO:2] **(11)**

Conditional Branching and Loops : Writing and evaluation of conditionals and consequent branching, Iteration and loops.

Arrays : Arrays (1-D, 2-D), Character arrays and Strings Basic Algorithms:Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations.

UNIT III [CO:3] **(11)**

Function : Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions : idea of call by reference

Recursion : Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series.

UNIT IV [CO:4] **(11)**

Structures: Structures, Defining structures and Array of Structures.

Pointers : Idea of pointers, Defining pointers, Use of Pointers in self referential structures.

File handling : Defining and opening a file, closing a file, input/output operations on files using file handling functions, random access to files.

LEARNING RESOURCES:

TEXT BOOK:

Byron Gottfried - Programming with C (Schaum's Outlines), Third Edition, Tata McGraw-Hill.

REFERENCE BOOK(s):

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. Programming in C by Stephen G. Kochan, Fourth Edition, Pearson
3. C Complete Reference, Herbert Sheildt, TMH., 2000.
4. Programming with C by K R Venugopal & Sudeep R Prasad, TMH., 1997.

WEB RESOURCES:

1. http://cprogramminglanguage.net/
2. http://lectures-c.blogspot.com/
3. http://www.coronadoenterprises.com/tutorials/c/c_intro.htm
4. http://vfu.bg/en/e-Learning/Computer-Basics--computer_basics2.pdf

ME/CH 124	BASIC ELECTRICAL ENGINEERING	L	T	P	C	Int	Ext
		3	1	-	4	40	60

Semester II [First Year]

COURSE OBJECTIVES:

1. To introduce fundamental laws, basic electrical elements, sources and their characteristics.
2. To develop the ability to apply circuit analysis to AC circuits.
3. To provide students with fundamental concepts on the construction and operation of transformers and electrical machines.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. understand the basic electrical circuits and batteries.
2. gain the knowledge on the concept of AC circuits.
3. get the knowledge on the principle and operation of single phase transformer
4. understand the operation of electrical machines.

UNIT I [CO:1] **(15)**

Batteries : Lead-acid, Nickel-iron, Nickel-Cadmium batteries (Operation only). Elementary calculations for energy consumption.

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 [CO:2] **(15)**

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, RL, RC, RLC combinations (series and parallel), Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT III [CO:3] **(15)**

Transformers : Magnetic materials, BH characteristics, working principle of single phase transformer, ideal and practical transformer, equivalent circuit form O.C and S.C tests. Losses in transformers, regulation and efficiency. Auto-transformer - Working principle, comparison with two winding transformer.

UNIT IV [CO:4] **(15)**

Electrical Machines: Construction, working principle of DC generator and motor (Elementary treatment only), torque-speed characteristic of separately excited dc motor. Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency. Construction and working of synchronous generators.

LEARNING RESOURCES:

TEXT BOOK(s):

1. T.K.Nagasarkar and M.S.Sukhija - Principles of Basic Electrical Engineering, Oxford University Press, 2018.
2. D. P. Kothari and I. J. Nagrath - Basic Electrical Engineering, Tata McGraw Hill, 2010.

REFERENCE BOOK(s):

1. D. C. Kulshreshtha - Basic Electrical Engineering, McGraw Hill, 2009.
2. L. S. Bobrow - Fundamentals of Electrical Engineering, Oxford University Press, 2011.
3. E. Hughes - Electrical and Electronics Technology, Pearson, 2010.
4. V. D. Toro - Electrical Engineering Fundamentals, Prentice Hall India, 1989.
5. J.B Gupta - Basic Electrical Engineering, S.K.Kataria & Sons, 6th Edition 2015.

WEB RESOURCES:

1. http://www.egate.ws/
2. http://cosmolearning.org/courses/circuit-theory/
3. http://www.nptelvideos.in/2012/11/circuit-theory.html
4. http://elearning.vtu.ac.in/P9/notes/06ES34/Unit1-KCV.pdf
5. http://pbtstudies.blogspot.in/

ME 161	PHYSICS LAB	L	T	P	C	Int	Ext
		-	-	3	1.5	40	60

Semester II [First Year]

COURSE OBJECTIVES:

1. To give background in experimental techniques and to reinforce instructionin physical principles.
2. To find measurement, data, error, or graphical analysis in addition to illustrating a physical principle
3. To give skills that can transfer critical thinking into problem solving methods, how to identify what data is important, how to collect that data and then draw conclusions from it.

COURSE OUTCOMES:

After successful completion of the course, the students will be able to

1. use CRO, Function generator, Spectrometer for making measurements
2. test the optical instruments using principles of interference and diffraction
3. the concepts learned in the physics labtrained in carrying out precise measurements and handling sensitive equipment.
4. draw conclusions from data and develop skills in experimental design.

List of Experiments:

1. Some basic measuring instruments: Screw gauge, Vernier Callipers, Spherometer, Travelling Microscope etc., & General instructions.
2. To determine the acceleration due to gravity and radius of gyration using compound pendulum.
3. To determine the rigidity modulus of the given wire material using Torsional pendulum.
4. To determine the young modulus of the given material by non uniform bending.
5. To study the characteristic curves of a given Photocell and determine the Planck's constant.
6. To determine the radius of curvature of a given Plano-convex lens by Newton's Rings experiment.
7. To calculate the frequency & amplitude of sinusoidal waves and calibration of a given audio oscillator - Lissajous' Figures.
8. To determine the magnetic field along the axis of circular current carrying coil.
9. To measure the a.c. supply frequency using A.C. sonometer.
10. To determine the quality factor of a given series resonance LCR circuit.
11. To determine Fill factor of a given photovoltaic cell.
12. To determine the wavelengths of spectral lines of mercury light using diffraction grating.
13. To determine the wavelength of laser using diffraction grating.
14. To find the dispersive power and resolving power of a grating.
15. To determine the magnetic field in Helmoltz coil.
16. To determine the refractive index of the material of a prism.

REFERENCE BOOKS :

1. Students reference manual : Department of physics, RVR & JC College of Engg.

2. Engineering Physics Lab Manual; Dr. C.V.Madhusudhana Rao, V. Vasanth Kumar, 3rd edition, Scitech publications(India) Pvt. Ltd. Chennai.

3. Engineering Physics Practicals: Dr.B. Srinivasa Rao, V.K.V.Krishna, K.S.Rudramamba University Science Press, Daryaganj, NewDelhi.

Note: A minimum of 10(Ten) experiments have to be performed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

ME/CE/CH/CS/ EE/EC/IT/ 162	PROGRAMING FOR PROBLEM SOLVING LAB	L	T	P	C	Int	Ext
		-	-	4	2	40	60

Semester II [First Year]

COURSE OBJECTIVES:

1. To understand the basic problem solving process using Flow Charts and algorithms.
2. To understand the basic concepts of control structures in C.
3. To learn concepts of arrays, functions, pointers and Dynamic memory allocation in C.
4. To use the concepts of structures, unions, files and command line arguments in C.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. develop algorithms and flow charts for simple problems.
2. use suitable control structures for developing code in C.
3. design modular programs using the concepts of functions and recursion.
4. Develop code for complex applications using structures, pointers and file handling features.

List of Exercises / Activities:

[The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.]

Tutorial 1 : Problem solving using computers:

Lab1: Familiarization with programming environment.

Tutorial 2: Variable types and type conversions:

Lab 2: Simple computational problems using arithmetic expressions.

Tutorial 3: Branching and logical expressions:

Lab 3: Problems involving if-then-else structures.

Tutorial 4: Loops, while and for loops:

Lab 4: Iterative problems e.g., sum of series.

Tutorial 5: 1D Arrays: searching, sorting:

Lab 5: 1D Array manipulation.

Tutorial 6: 2D arrays and Strings:

Lab 6: Matrix problems, String operations.

Tutorial 7: Functions, call by value:

Lab 7: Simple functions.

Tutorial 8 & 9: Numerical methods (Root finding, numerical differentiation, numerical integration):

Lab 8 and 9: Programming for solving Numerical methods problems.

Tutorial 10: Recursion, structure of recursive calls:

Lab 10: Recursive functions.

Tutorial 11: Pointers, structures and dynamic memory allocation:

Lab 11: Pointers and structures.

Tutorial 12: File handling:

Lab 12: File operations.

Note: A minimum of 10(Ten) experiments have to be Performed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

ME/CE/EE 163	ENGINEERING GRAPHICS & DESIGN LAB	L	T	P	C	Int	Ext
		1	-	4	3	40	60

Semester II [First Year]

COURSE OBJECTIVES:

1. Expose the students to standards and conventions followed in preparation of engineering drawings.
2. Make them understand the concepts of orthographic and isometric projections.
3. Develop the ability of conveying the engineering information through drawings.
4. Make them understand the relevance of engineering drawing to different engineering domains.
5. Develop the ability of producing engineering drawings using drawing instruments.
6. Enable them to use computer aided drafting packages for the generation of drawings.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. Prepare engineering drawings as per BIS conventions mentioned in the relevant codes.
2. Produce computer generated drawings using CAD software..
3. Use the knowledge of orthographic projections to represent engineering information / concepts and present the same in the form of drawings.
4. Develop isometric drawings of simple objects reading the orthographic projections of those objects.
5. Convert pictorial and isometric views of simple objects to orthographic views.

(Units I to IV shall be taught in conventional drawing method and Unit V shall be taught with the aid of computer)

UNIT I

General : Principles of Engineering Graphics and their significance, usage of drawing instruments, lettering.

Conic sections : Construction of Ellipse, Parabola, Hyperbola and Rectangular Hyperbola. (General method only)

Curves : Cycloid, Epicycloid, Hypocycloid and Involute and Scales

UNIT II

Method of Projections : Principles of projection - First angle and third angle projection of points, Projection of straight lines inclined to both planes. Traces of lines.

Projections of planes : Projections of planes inclined to both the planes, projections on auxiliary planes.

UNIT III

Projections of Regular Solids : Projections of solids (Prism, Pyramid, Cylinder and Cone) with varying positions.

Sections of Solids : Sections of Prisms, Pyramids, cylinders and Cones. True shapes of sections. (Limited to the cutting plane perpendicular to one of the principal plane).

Development of surfaces : Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT IV

Isometric Projections: Principles of Isometric projection-Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids

Orthographic Projections : Conversion of pictorial views into Orthographic views and Vice-versa. (Treatment is limited to simple castings).

Perspective Projections : Introduction to Perspective Projection

UNIT V

Over view of Computer Aided drafting (AutoCAD) : Introduction, starting and customizing AutoCAD screen, usage of different menus, toolbars(drawing, editing, dimension, text, object properties..etc), tabs (Object, snap, grid, polar, ortho, otrack..etc) and command prompt. Setting units, limits, layers and viewports (Isometric, Top, Front, back..etc). 2D drawings of various mechanical and structural components, electrical and electronic circuits. Orthographic and Isometric views of mechanical castings and simple structures.

LEARNING RESOURCES:

TEXT BOOK:

Bhatt N.D., Panchal V.M. & Ingle P.R. - Engineering Drawing, Charotar Publishing House, 2014.

REFERENCE BOOK(s):

1. Shah, M.B. & Rana B.C. - Engineering Drawing and Computer Graphics, Pearson Education, 2008.
2. Agrawal B. & Agrawal C. M. - Engineering Graphics, TMH Publication, 2012.
3. Narayana, K.L. & P Kannaiah - Text book on Engineering Drawing, Scitech Publishers, 2008.
4. (Corresponding set of) CAD Software Theory and User Manuals

ME/CH 164	BASIC ELECTRICAL ENGINEERING LAB	L	T	P	C	Int	Ext
		-	-	2	1	40	60

Semester II [First Year]

COURSE OBJECTIVES:

1. To conduct experiments on electrical circuits.
2. To design experimental setups for theorems.
3. To know the response of electrical circuits for different excitations.

COURSE OUTCOMES:

After successful completion of the course, the students will be able to:

1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of resonance.
5. Verify the network theorems.

List of Exercises / Activities:

1. Familiarisation of Electrical Installations and Electrical Testing Equipment: Miniature circuit breakers (MCBs), Moulded Case Circuit Breakers (MCCBs), Earth-leakage circuit breakers (ELCBs), Fuses, Types of Wires, Wire Gauges, continuity test, megger, Cables and Earthing.
2. Basic safety precautions. Introduction and use of measuring instruments â€“ voltmeter,ammeter, wattmeter, multi-meter, oscilloscope, measurement of basic parameters.
3. Verification of KVL& KCL.
4. Verification of Superposition Theorem.
5. Verification of Thevenin's Theorem.
6. Verification of Norton's Theorem.
7. Transformers: Observation of the no-load current waveform on an oscilloscope (non sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics).
8. OC & SC tests on single phase transformer.
9. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
10. 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.
11. Swinburne's test on dc motor.
12. Speed control of dc motor.
13. Experiments on three-phase induction motors. Direction reversal by change of phase-sequence connections, Torque-Slip Characteristics of an induction motor.
14. Synchronous Machine operating as a generator: stand-alone operation with a load, control of voltage through field excitation.
15. Determination of choke coil parameters.

Note: A minimum of 10(Ten) experiments have to be Performed and recorded by the candidate to attain eligibility for Semester End Practical Examination.