

**ANIL NEERUKONDA
INSTITUTE OF TECHNOLOGY AND SCIENCES
(AUTONOMOUS)
ACCREDITED BY NBA & NAAC WITH 'A' GRADE**

Affiliated to Andhra University



**Academic Regulations
Curriculum &
Syllabi (First Year I & II Sem)**

**DEPARTMENT OF
MECHANICAL ENGINEERING**

**ANIL NEERUKONDA INSTITUTE OF
TECHNOLOGY AND SCIENCES
(AUTONOMOUS)**

VISION

ANITS envisions to emerge as a world-class technical institution whose products represent a good blend of technological excellence and the best of human values.

MISSION

To train young men and women into competent and confident engineers with excellent communicational skills, to face the challenges of future technology changes, by imparting holistic technical education using the best of infrastructure, outstanding technical and teaching expertise and an exemplary work culture, besides moulding them into good citizens.

QUALITY POLICY

ANITS is engaged in imparting quality technical education. It constantly strives towards achieving high standards of teaching, training and development of human resources by encouraging its faculty and staff to work as a team and to update their knowledge and skills continually to match the needs of industry.

Foreword

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY AND SCIENCES (ANITS) was founded by Anil Neerukonda Educational Society (ANES) in the fond memory of Anil Neerukonda, son of Dr. B R Prasad Neerukonda.

Its humble journey started in 2001 with an intake of 220 students into four undergraduate B.Tech programmes. Within 14 years of its establishment, the institute registered phenomenal growth and is accredited by NAAC with ‘A’ and by NBA for the second time. It is permanently affiliated to Andhra University and has achieved autonomous status in 2015. Further, the institute has been currently ranked as 4th among the private engineering colleges in Andhra Pradesh by APSCHE. It has been recognised as “Centre for Excellence” by Infosys and is accorded by Andhra University as “Centre for Research”.

Today, the institute offers seven B.Tech. programmes and four M.Tech. programmes with an annual total intake about 1100 students. The institute offers amenities like separate hostels for boys and girls, indoor and outdoor games, transport covering all the major locations of Visakhapatnam and medical aid provided by Anil Neerukonda hospital and NRI Institute of Medical Sciences, another educational institution of ANES.

Apart from the State-of-the-Art laboratories, well established teaching methodology and implementation of the best practices, the wonderful co-ordination of the Management, Faculty and Parents has so far played a crucial role in shaping the future of the ANITIANS and has been the talisman of the Institute’s phenomenal growth.

The success stories of our champions at several qualifying exams for the higher studies like GRE, TOEFL, CAT and GATE, the impressive track record of the placements with highest known packages in MNCs like Google, Oracle, Infosys, TCS and so on are the sweetest fruits of our efforts.

PRAGNANAM BRAHMA, the motto of ANITS, is truly practiced by all the members of ANITS family, a direct effort to serve the society, nation and the mankind as well.

Hearty welcome to ANITS family.

Prof. T.V. Hanumantha Rao
PRINCIPAL

Achievements & Highlights

- Autonomous since May 2015
- NAAC with 'A' Grade
- Accredited and reaccredited by NBA, New Delhi
- UGC recognition under 2(f) and 12(B)
- Permanent affiliation to Andhra University, Visakhapatnam
- Among top 3 most preferred colleges in A.P.
- "AAA" rating accorded by "Careers Digest 360"
- Recognized as a Research Center by Andhra University
- Selected as Skill Development Center (SDC) by Govt. of A.P.
- First institute to be accorded "Center for Excellence" by Infosys
- Ranked 3rd among the Promising Private Engineering Colleges for excellence as per Competition Success Review (CSR) magazine in the year 2016
- Recognized as "Silver Partner" of Keane India (Chennai) for the year 2007-2008
- Collaborated with "Mission (R&D)" funded by Wipro
- "On Campus Training" by IBM for the students
- Collaboration with Unisys Global Solutions India (Bangalore) for internship
- Highest package offer around 2 crores including perks – highest offer in South India
- 8 lacs to 10 lacs packages –for majority ANITIANS

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Department Profile

The **Mechanical Engineering** Department of ANITS was started in the academic year 2005-06 and offers courses in B Tech programme with an in-take of 240 and M Tech (Machine Design) with an in-take of 18. At present 43 well qualified faculty blend with rich industrial and academic experience implement interactive and experimental teaching methodologies in the department. To make the teaching and learning processes effective, 1:15 faculty student ratio is maintained in the department since its inception. The department is equipped with the best infrastructure facilities in various labs like Workshop, Strength of Material Lab, Mechanical Engineering Lab, Industrial Engineering Lab, Metrology Lab, Manufacturing Technology Lab, Fluid Mechanics Lab, CAD/CAM Lab, Heat Transfer Lab, Mechatronics Lab and Experimental stress analysis Lab. To serve the student needs beyond curriculum and make them industry ready, additional experiments are being conducted in the labs and softwares were installed which are beyond the prescribed syllabus.

The department strongly believes that for disseminating knowledge to the students and to make them abreast with latest developments, good research activities are the need of the day along with regular teaching. About 60 papers were published by the faculty in various international peer reviewed journals and Conferences in the last 2 years. Due to the diligent efforts of faculty and the infrastructure available, the department attracts students of good EAMCET ranks in this region. The academic performance of the students is also a matter of prestige to the department as it stands first amongst all the affiliated colleges of Andhra University on the basis of student pass percentage. Special impetus is given to improve the managerial skills of the Students. They are motivated to organize various events in the department by themselves which includes national seminars and technical symposiums. They are also encouraged to participate in various events organized by reputed colleges and have won many prizes every year bringing laurels to the department. To make the students aware of latest technologies and also industrial needs, guest lectures by eminent persons from academics and industry, industrial visits etc., are organized regularly in the department. Apart from this, Mechanical Engineering department has started various student chapters such as ISHRAE {Indian Society for Heating, Refrigerating and Air Conditioning Engineers} Chapter, IE chapter, COMSOI chapter and Entrepreneurship Development Cell (EDC) which organize various training programs to enhance career prospects of students.

DEPARTMENT OF MECHANICAL ENGINEERING

VISION

ANITS Mechanical Engineering Department envisages to become a premier centre of learning for knowledge seekers with state-of-art laboratories, research facilities and highly competent luminaries in the faculty ranks.

MISSION

To make our students competent and build their career upon a solid foundation of knowledge.

To make our students future leaders for industry, academia and society whose ideas are based on fundamental knowledge, analytical skills, creativity and ethics.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- PEO - 1. : To enable the students to address the challenges faced in mechanical and other allied streams with a solid foundation on the principles of mechanical engineering, mathematics, sciences and with good knowledge in modern computational, analytical and simulation tools and techniques.
- PEO - 2. : To educate the students to design, construct, manage and develop mechanical engineering systems with a research orientation, in a way such that the systems are strong technically, viable economically and accepted socially to enhance quality of life.
- PEO - 3. : To enable the students to communicate effectively, excel in their profession, pursue life-long learning, good at teamwork and adhere to ethics to achieve their career and organizational goals.

PROGRAM OUTCOMES (POs)

- PO-1 Apply the knowledge of mathematics, science, engineering fundamentals to solve complex mechanical engineering problems.
- PO-2 Attain the capability to identify, formulate and analyze problems related to mechanical engineering with authentic conclusions.
- PO-3 Design mechanical system components and processes in the fields such as thermal, manufacturing, industrial and mechanical design with a contemplation on issues concern to the society such as environment, public health and safety.
- PO-4 Employ the knowledge and apply research methodology for design, analysis and experimentation to provide valid conclusions.
- PO-5 Select and apply appropriate and latest technological and software tools for problem solving in Mechanical engineering systems with an understanding of their limitations.
- PO-6 Carry out their professional practice by evaluating various societal issues with good reasoning blended with knowledge.
- PO-7 Apply the knowledge of engineering for eco-friendly and sustainable growth in the prospect of limited resources available for mankind.
- PO-8 Transform into responsible citizens by adhering to professional ethics and norms of engineering practice.
- PO-9 Function effectively in individual capacity as well as a team member in diverse and multidisciplinary streams.

- PO-10 Communicate effectively on various technological aspects with the engineering community and society at large.
- PO-11 Apply knowledge of engineering, management and financial principles to manage projects in multidisciplinary environments.
- PO-12 Realize and engage themselves in life-long learning to be abreast with technological changes and enhancing skills set

PROGRAM SPECIFIC OUTCOME (PSOs)

- PSO- I The student will be able to apply the knowledge of Mathematics, Sciences and engineering fundamentals to formulate, analyse and provide solutions the problems related to Mechanical engineering and communicate them effectively to the concerned.
- PSO- II Design mechanical systems in various fields such as machine elements, thermal, manufacturing, industrial and inter-disciplinary fields by using various engineering/technological tools to meet the mercurial needs of the industry and society at large.

ACADEMIC REGULATIONS

ACADEMIC REGULATIONS FOR B.TECH PROGRAMME UNDER AUTONOMOUS STATUS

(W.E.F. THE ADMITTED BATCH OF 2015-16)

I. Admissions:

Admissions into first year of B.Tech.Programme and admissions into second year (lateral entry) of B.Tech.Programme of the Institute will be as per the norms stipulated by Andhra University & Andhra Pradesh State Council for Higher Education (APSCHE), Govt. of Andhra Pradesh. The academic regulations of Autonomous status mentioned herewith will be applicable from 2016-17 in case of Lateral Entry admissions.

II. Programmes Offered:

The following are the B.Tech. Programmes offered by the Institute.

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

III. Structure of the B. Tech. Programme:

The programme consists of Humanities, Basic Sciences, Engineering Sciences and Technology. The complete programme is distributed over eight semesters with two semesters per academic year. Every branch of B.Tech programme will have a curriculum and syllabi for the courses recommended by the Board of Studies and approved by the Academic Council. The academic programmes of the Institute follow the credit system. The curriculum of B.Tech programme is designed to have a total of about 189 credits of which a student should acquire a minimum of 180 credits to get the degree awarded. If a student earns all the total credits, then the best 180 credits are considered to determine the final CGPA. The lateral entrants shall have a total of about 146 credits of which one should acquire a minimum of 137 credits to get the degree awarded. If a lateral student takes all the credits, then the best 137 credits are considered to determine the final CGPA.

Criteria for achieving the minimum credits:

❖ Mandatory courses

All courses mentioned in the programme excluding open electives, professional electives and MOOCS come under mandatory courses.

❖ Open Elective- A course offered by any department other than home department

The student has to choose one open elective out of the open electives offered by other departments during third year first semester or Final year first semester.

Professional Electives

The student has to register for at least (n-1) no. of professional electives (n = no. of professional electives offered by the department during the programme) as per his choice as provided in the curriculum. However, he can register for all the professional electives offered by the department.

❖ MOOCs- Massive Open Online Courses

The student is required to register for one MOOCs course any time during second year first semester to fourth year second semester. However, its grade will be accorded at the end of fourth year second semester along with the fourth year second semester courses of the programme.

For the award of the degree, the student has to secure a minimum pass grade or above in all the mandatory courses, registered open elective, registered professional electives. However, the degree will still be awarded even if the student fails / opts out of MOOCs.

IV. Duration of the Programme:

The duration of the programme is four academic years consisting of two semesters in each academic year. A student is permitted to complete the programme in a stipulated time frame of 8 consecutive academic years from the date of initial admission. Students joining the programme in the 2nd year through lateral entry scheme shall have to complete the programme in a stipulated time frame of 6 consecutive academic years from the date of initial admission.

V. Medium of Instruction:

The medium of instruction and examination is English.

VI. Minimum Instruction Days:

Each semester normally consists of a minimum of 16 weeks of instruction.

VII. Academic Calendar:

The dates of all important events, such as commencement of class work, examinations, vacations, etc., during the academic year will be specified in the Academic Calendar of the Institute, as approved by the Academic Council.

VIII. Examinations & Evaluation Process:

The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks each for theory and practical/drawing subjects.

(A) Theory Course:

For all lecture based theory courses, the assessment shall be for 40 marks through internal evaluation and 60 marks through external semester-end examination of three hours duration except for the subjects with 100% internal assessment in which case an internal examination will be conducted for 60 marks along with the semester-end examinations.

i) Internal evaluation:

The sessional marks shall be awarded through internal evaluation by the teachers concerned based on the continuous assessment which includes class tests, quiz, viva-voce, assignments, student regularity, two mid-examinations etc., according to a scheme notified by the department at the beginning of the semester.

Out of the 40 internal evaluation marks, 20 marks are assigned for 2 internal-mid exams, 10 marks for assignments, 5 marks for projects/ case studies /quiz/tests and 5 marks for attendance. The average of 2 internal-mid exams is considered for the 20 marks allocated.

Under any circumstances, no re-examination shall be conducted for the internal mid examinations.

ii) External evaluation:

The question paper shall be set externally and the answer scripts are valued through a double valuation system.

The average of the two valuations will be taken for the award of marks. In case, the difference of the marks obtained in the two valuations is

more than 20%, then a third examiner shall value the script. Out of the three valuations, the average of marks obtained in third valuation and the marks obtained nearer to third valuation out of first two valuations shall be considered. No revaluation for any subject/course shall be entertained as already double valuation system is in existence. However, recounting is allowed on the request of the candidate on payment of specified fee. Challenge valuation shall also be entertained on payment of specified fee.

(B) Laboratory Course:

Each student will perform about 10 to 12 experiments in each laboratory course. Laboratory course will be evaluated for 100 marks, out of which 50 marks are for external examination and 50 marks are for internal evaluation. The internal marks are awarded based on continuous assessment, record work, internal lab examination and student regularity. The external examination will be conducted by two examiners, one of them being laboratory class teacher as internal examiner (nominated by the Principal on recommendation of HOD) and an external examiner nominated by the Principal from the panel of experts recommended by the HOD.

A candidate shall be declared to have passed any theory subject/course if he secures not less than 40% in external theory examination and also a minimum of 40% of total marks of that course which assures a minimum of 'P' grade.

A candidate shall be declared to have passed any practical course if he secures not less than 50% in external laboratory examination and also a minimum of 50% of total marks of that course which assures a minimum of 'C' grade.

Only in the case of quantitative and verbal aptitude – I & II, if a candidate fails he is given an opportunity to improve to pass grade (P) irrespective of the score he gets over and above pass mark in the reexamination within one month on payment of special examination fee.

Any student appearing for the semester-end practical examination is eligible only if he submits the bonafide record certified by the laboratory class teacher and the HOD.

(C) Project Work:

The project work is evaluated for 300 marks out of which 100 through internal assessment in the IV Year I semester through continuous assessment followed by final evaluation by a committee nominated by the HOD. For the 200 marks in IV year II semester, assessment is done for 100 marks internally and for the remaining 100 marks by the committee consisting of

at least one external expert nominated by the Principal. If a student fails in the fourth year first semester project he has to appear for reassessment within one month for which he has to pay the reexamination fee.

(D) Industrial Training:

The industrial training is assessed internally for 100 marks by an internal evaluation committee constituted by the HOD.

(E) Supplementary Exam:

There will be supplementary examination for the programme such that for odd semester courses the supplementary exams will be conducted during summer vacation and for the even semester courses, the supplementary exams will be conducted during the winter vacation.

IX. Attendance Regulations:

Attendance of a student is computed by considering total number of periods conducted in all courses as the denominator and the total number of periods actually attended by the student in all courses, as the numerator. It is desirable for a student to put in 100% attendance in all the subjects. However, a candidate shall be permitted to appear for the semester end examination provided he maintains a minimum of 75% overall attendance in the semester.

The shortage of attendance on medical grounds can be condoned up to a maximum of 9% provided the student puts in at least 66% attendance and provided the Principal is satisfied with the genuineness of the reasons. The Medical Certificates are to be submitted to the Head of the Department when the candidate reports to the classes immediately after the absence. Certificates submitted afterwards shall not be entertained. Condonation fee as fixed by the college for those who put in attendance between $\geq 66\%$ and $<75\%$ shall be charged before the semester-end examinations.

In the case of students who participate in co-curricular, extra-curricular activities like student seminars, N.S.S, N.C.C, Inter-collegiate tournaments and any such other activities involving the representation of the Institute, with the prior approval of the Principal, the candidate may be deemed to have attended the classes during the actual period of such activity, solely for the purpose of attendance.

A student, who could not satisfy the minimum attendance requirement of 66% in any semester, shall be declared 'Detained'. He is not eligible to appear for the semester end examinations. He will not be promoted to the next semester and shall have to repeat that semester with the next batch(es)

of students. Such students who are detained and seek readmission, should submit an undertaking/a declaration that they will abide by the regulations existing at the time of readmission.

X. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item No. IX.

- A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory subject if only he secures not less than 40% marks in the semester-end examination and a minimum of 40% marks in the sum of the internal evaluation and semester-end examination taken together. In the labs/projects, the student should secure a minimum of 50% marks in the external examination and a minimum of 50% marks in the sum of internal evaluation and external examination evaluation taken together.
- Further, a candidate has to secure a minimum of 40 % in theory examination (excluding sessional marks) and a minimum of 50 % (excluding sessional marks) in the Practical Examination / Project / Field Work / Viva Voce / Industrial Training in Semester –End / Year – End Examination and 50% aggregate to pass.
- A student will be promoted to the next semester, if only he satisfies the minimum attendance requirement.
- A student shall be promoted from II Year to III Year only if he fulfills the academic requirement of total 50 % of all credits from regular and supplementary examinations of I Year and II Year – I Semester { i.e., total 3 semesters} examinations, irrespective of whether the candidate takes the examination in all the subjects or not.
- A student shall be promoted from III Year to IV Year only if he fulfills the academic requirements of total 50% of credits from regular and supplementary examinations of I Year, II Year and III Year- I Semester {i.e., total 5 semesters}, irrespective of whether the candidate takes the examinations in all the subjects or not.
- For lateral entry students, there is no credit based restriction for promotion from II year to III year. But a lateral entry student shall be promoted from III year to IV year only if he fulfills the academic requirements of total 50% of credits from regular and supplementary examinations of II year and III year- I Semester {i.e., total 3 semesters} irrespective of whether the candidate takes the examinations in all the subjects or not.

- Students, who fail to complete their B.Tech. Programme within eight academic years from the year of their admission or fail to acquire the credits stipulated for the programme shall forfeit their seat in B.Tech. Programme and their admission shall stand cancelled. For lateral entry students they have to complete the programme in six years from their year of admission.
- A candidate can avail the betterment chances during the validity of all courses.

XI. Award of Grades:

The absolute grading system is adopted as follows:

S.No	Range of marks %	Grade	Grade Points	
1	> 90 ≤ 100	O	10	Out Standing
2	> 80 ≤ 90	A+	9	Excellent
3	> 70 ≤ 80	A	8	Very Good
4	> 60 ≤ 70	B+	7	Good
5	> 55 ≤ 60	B	6	Above Average
6	≥ 50 ≤ 55	C	5	Average
7	≥ 40 < 50	P	4	Pass
8	< 40	F	0	Fail
9			0	Ab (Absent)

Note: Minimum grade to pass in a laboratory course is ‘C’.

The performance of a student at the end of the each semester is indicated in terms of Semester Grade Point Average (SGPA). The SGPA is calculated as below:

$$\text{SGPA} = \frac{\sum (\text{Credits of a course} \times \text{Grade points awarded for a course})}{\sum (\text{Credits of a course})}$$

SGPA is calculated for the candidates who have passed in all the courses in that semester.

Cumulative Grade Point Average (CGPA) will be calculated from II semester onwards up to the final semester and its calculation is similar to that of SGPA, considering all the courses offered from the first semester onwards.

CGPA is calculated for those who clear all the courses in all the previous semesters.

XII. Award of Class:

For award of class, a total of best 180 credits are considered in case of four year programme and best 137 credits in case of lateral entry admitted students. A candidate, who becomes eligible for the award of B.Tech.Degree, shall be placed in one of the following classes.

S.No.	Class	CGPA
1	First Class with Distinction	7.0 or more*
2	First Class	6.0 or more but less than 7.0
3	Second Class/Pass	5.0 or more but less than 6.0

***First class with Distinction will be awarded only to those students who clear all the subjects of the program in first attempt of regular examinations.**

The CGPA can be converted to aggregate percentage by multiplying CGPA with 10, in case of requirement by any other university or for any other purpose.

XIII. Eligibility for Award of B.Tech. Degree:

A student shall be eligible for the award of the B.Tech degree if he fulfills all the following conditions:

- 1) Registered and successfully completed all the components prescribed for eligibility in the Programme of study to which he/she is admitted within the stipulated period,
- 2) Obtained CGPA greater than or equal to 5.0 (Minimum requirement for Pass),
- 3) No disciplinary action is pending against him/her and
- 4) Has no dues to the Institute including hostels.

XIV. Malpractices:

The Controller of Examinations/Dean of Examinations shall refer the cases of suspected malpractices in mid examinations and semester-end examinations to Malpractice Enquiry Committee constituted by the Institute. Such committee shall follow the approved scales of punishment. The Principal shall take necessary action against the erring students based on the recommendations of the committee.

XV. Amendments To Regulations:

The Institute may, from time to time, revise, amend, or change the Regulations, Schemes of Examinations, and / or Syllabi and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute.

XVI. General:

- (i) Where the words ‘he’, ‘him’, ‘his’, occur in the regulations, they include ‘she’, ‘her’, ‘hers’.**
- (ii) The academic regulation should be read as a whole for the purpose of any interpretation.**
- (iii) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.**

CURRICULUM

First Year I –Semester

CODE	Name of the subject	Instruction periods per week				MAX MARKS		CREDITS	
			Lecture	Tutorial	Practical	Total	Sessional Marks		Semester end marks
MEC111	English	HS	3	1	-	4	40	60	3
MEC112	Engineering Mathematics I	BS	3	1	-	4	40	60	3
MEC113	Engineering Physics	BS	3	1	-	4	40	60	3
MEC114	Engineering Drawing	ES	1	-	3	4	40	60	3
MEC115	Environmental Sciences	BS	3	1	-	4	40	60	3
MEC116	Engineering Physics Lab	BS	-	-	3	3	50	50	2
MEC117	Programming with C Lab	ES	2	-	3	5	50	50	3
MEC118	Work Shop	ES	-	-	3	3	50	50	2
MEC AC 1	NCC/NSS/Sports	AC	-	-	3	3	-	-	-
Total			15	4	15	34	350	450	22

First Year II –Semester

CODE	Name of the subject	Instruction periods per week				MAX MARKS		CREDITS	
			Lecture	Tutorial	Practical	Total	Sessional Marks		Semester end marks
MEC121	Engineering Mathematics II	BS	3	1	-	4	40	60	3
MEC122	Engineering Chemistry	BS	3	1	-	4	40	60	3
MEC123	Professional Ethics & Human Values	HS	2	1	-	3	100		2
MEC124	Applied Physics	BS	3	1	-	4	40	60	3
MEC125	Advanced Engineering Drawing	ES	1	-	3	4	50	50	3
MEC126	Engineering Chemistry Lab	BS	-	-	3	3	50	50	2
MEC127	Language Lab	HS	-	-	3	3	50	50	2
MEC128	Object oriented Programming with C++ Lab	ES	2	0	3	5	50	50	3
MECAC 2	NCC/NSS / Sports	AC	-	-	3	3	-	-	-
Total			14	4	15	33	420	380	21

BS : Basic Sciences; ES : Engineering Sciences; HS : Humanities and Social Sciences; PC : Professional Core; PE : Professional Elective; OE : Open Elective; PW : Project Work; IT : Industrial Training; AC : Audit Course

Second Year I –Semester

Code	Name of the subject	Periods per week				Max. marks		Credits
			Lecture	Tutorial	Practical	Sessionals	End Exams	
MEC211	Engineering Mathematics –III	BS	3	1		40	60	3
MEC212	Material Science and Metallurgy	PC	3	1		40	60	3
MEC213	Engineering Mechanics	PC	4	1		40	60	4
MEC214	Mechanics of Solids	PC	4	1		40	60	4
MEC215	Engineering Thermodynamics – I	PC	4	1		40	60	4
MEC216	Manufacturing Technology – I	PC	3	1		40	60	3
MEC217	Strength of Materials Lab	PC			3	50	50	2
MEC218	Mechanical Engineering Lab –I	PC			3	50	50	2
Total			21	6	6	340	460	25

Second Year II –Semester

Code	Name of the subject	Periods per week				Max. marks		Credits
			Lecture	Tutorial	Practical	Sessionals	End Exams	
MEC221	Engineering Mathematics –IV	BS	3	1		40	60	3
MEC222	Basic Electrical and Electronics Engineering	ES	3	1		40	60	3
MEC223	Fluid Mechanics	PC	4	1		40	60	4
MEC224	Theory of Machines-I	PC	4	1		40	60	4
MEC225	Manufacturing Technology–II	PC	3	1		40	60	3
MEC226	Machine Drawing	PC	1		3	40	60	3
MEC227	Basic Electrical and Electronics Engineering Lab	PC			3	50	50	2
MEC228	Manufacturing Technology Lab– I	PC			3	50	50	2
Total			18	5	9	340	460	24

Third Year I – Semester

Code	Name of the subject	Periods per week				Max. marks		Credits
			Lecture	Tutorial	Practical	Sessionals	End Exams	
MEC311	Open Elective-I	OE	3	1		40	60	3
MEC312	Hydraulic Machinery and Systems	PC	3	1		40	60	3
MEC313	Engineering Thermodynamics – II	PC	4	1		40	60	4
MEC314	Theory of Machines – II	PC	4	1		40	60	4
MEC315	Design of Machine Elements-I	PC	4	1		40	60	4
MEC316	FMM Lab	PC			3	50	50	2
MEC317	Manufacturing Technology Lab-II	PC			3	50	50	2
MEC318	Soft Skills lab	HS			3	100		2
MEC319	Verbal and Quantitative Aptitude –I	HS	4			100		2
Total			22	5	9	500	400	26

Third Year II – Semester

Code	Name of the subject	Periods per week				Max. marks		Credits
			Lecture	Tutorial	Practical	Sessionals	End Exams	
MEC321	Manufacturing Technology – III	PC	3	1		40	60	3
MEC322	Industrial Engineering and Management	PC	3	1		40	60	3
MEC323	Design of Machine Elements-II	PC	4	1		40	60	4
MEC324	Engineering Thermodynamics-III	PC	4	1		40	60	4
MEC325	Operations Research	PC	3	1		40	60	3
MEC326	Dept Elective-I	PE	3	1		40	60	3
MEC327	Metrology & Mechatronics Lab	PC			3	50	50	2
MEC328	Mechanical Engineering Lab – II	PC			3	50	50	2
MEC329	Verbal and Quantitative Aptitude –II	HS	4			100		2
	Industrial Training *							
Total			24	6	6	440	460	26

Fourth Year I - Semester

Code	Name of the subject	Periods per week				Max. marks		Credits
			Lecture	Tutorial	Practical	Sessionals	End Exams	
MEC411	Open elective –II	OE	3	1		40	60	3
MEC412	Managerial Economics and Financial Analysis	PC	3	1		40	60	3
MEC413	Heat and Mass Transfer	PC	4	1		40	60	4
MEC414	Computer Aided Design	PC	3	1		40	60	3
MEC415	Dept Elective –II	PE	3	1		40	60	3
MEC416	Dept Elective –III	PE	3	1		40	60	3
MEC417	Heat and Mass Transfer Lab	PC			3	50	50	2
MEC418	Computer Aided Design Lab	PC			3	50	50	2
MEC419	Industrial Training**	IT				100		2
MEC420	Project -Phase –I	PW			5	100		4
Total			19	6	11	540	460	29

Fourth Year II - Semester

Code	Name of the subject	Periods per week				Max. marks		Credits
			Lecture	Tutorial	Practical	Sessionals	End Exams	
MEC421	Instrumentation & Control systems	PC	3	1		40	60	3
MEC422	Dept Elective – IV	PE	3	1		40	60	3
MEC423	Project Phase –II	PW			12	100	100	8
MEC424	MOOCs ##	OE				100		2
Total			6	2	12	280	220	16

LIST OF DEPARTMENT ELECTIVES

ELECTIVE SUBJECTS:

	Stream - 1	Stream - 2	Stream - 3	Stream - 4	Stream - 5
Elective -I MEC 326	Power Plant Engineering	Automation in Manufacturing	Advanced Mechanics of Solids	Production Planning and Control	Rapid Prototyping
Elective -II MEC 415	Gas Turbines and Jet Propulsion	product Design and Manufacturing	Robotics	Total Quality Management	Finite Element Analysis
Elective -III MEC 416	Refrigeration and Air Conditioning	Computer Numerical Control and Computer Aided Manufacturing	Automobile Engineering	Entrepreneurship Development	Nano Technology
Elective -IV MEC 422	Non-conventional sources of energy	Condition Monitoring	Computational Fluid Dynamics	Statistical Quality Control	Mechatronics

To award degree, a student has to obtain 180 credits. For a student who has obtained all 190 credits by successfully completing required electives, the best 180 credits will be considered for calculating final CGPA. The student is also having the choice of registering for 180 credits only {However, a student cannot opt out of more than 1 open elective and 1 department elective}. In this case the CGPA is calculated for 180 credits.

* Students have to undergo Industrial Training after III Year and during summer vacation

**Viva-voce for Industrial Training will be organized in IV Year – I Sem

A student can also opt for MOOCS {Massive online open courses} at any time during the IV Year B. Tech course in any of the courses offered by Premium institutions such MIT, Stanford etc., and have to provide course completion certificate for award of credits. Compatibility to our system and corresponding marks are evaluated by a departmental committee. But marks and credits will be awarded in IV year- II Sem. only.

OPEN ELECTIVES - I

III Year I - Semester

Department	Name of the Course offered
ELECTRONICS AND COMMUNICATION ENGINEERING	ECE 311 (A) Electronic Design with Integrated Circuits ECE 311 (B) Digital Electronics ECE 311 (C) Applications of Fields and Waves ECE 311 (D) Special Topics: Electronics ECE 311 (E) Applied Electronics
ELECTRICAL AND ELECTRONICS ENGINEERING	EEE 311 Renewable Energy Technologies
MECHANICAL ENGINEERING	MEC 311 (A) Robotics MEC 311 (B) Computer Aided Design
COMPUTER SCIENCE & ENGINEERING	CSE311(A) Computer Operating systems CSE311(B) Fundamentals of Computer Networks CSE311(C) Concepts of Object Oriented Programming CSE311(D) Database Management Systems
INFORMATION TECHNOLOGY	IT 311 (A) Essentials of Information Technology IT 311 (B) Data Structures IT 311 (C) Operating Systems IT 311 (D) Database Management Systems
CHEMICAL ENGINEERING	CHE 311(A) Industrial Safety and Hazards Management CHE 311(B) Engineering Biology CHE 311(C) Fuel Cell Technology CHE 311(D) Design of Experiments
CIVIL ENGINEERING	CIV 311 (A) Basic civil engineering CIV 311 (B) Building Planning and construction CIV 311 (C) Basics of Foundation Engineering
MATHEMATICS	MAT 311 (A) Numerical Methods MAT 311 (B) Fuzzy Set Theory & Fuzzy Logic and its Applications MAT 311 (C) Probability Statistics
PHYSICS	PHY 311 Nano Technology and Engineering Applications
CHEMISTRY	CHY 311 (A) Environmental Sciences CHY 311 (B) Characterisation of Materials

OPEN ELECTIVES - II

IV Year I - Semester

Department	Name of the Course offered
ELECTRONICS AND COMMUNICATION ENGINEERING	ECE 411 (A) Introduction to Embedded System Design ECE 411 (B) Introduction to VLSI Design ECE 411 (C) Introduction to Image Processing /Computer Vision
ELECTRICAL AND ELECTRONICS ENGINEERING	EEE 411 Fundamentals of Electric Power Utilization
MECHANICAL ENGINEERING	MEC 411 (A) Finite Element Analysis MEC 411 (B) Operation research
COMPUTER SCIENCE & ENGINEERING	CSE 411(A) Introduction to soft computing CSE 411(B) Cloud computing overview CSE 411(C) Digital Image processing CSE 411(D) Embedded Systems and Applications
INFORMATION TECHNOLOGY	IT 411 (A) Software Engineering Concepts IT 411 (B) Foundations of Web Development & Design IT 411 (C) Open Source Technologies IT 411 (D) Multimedia Concepts
CHEMICAL ENGINEERING	CHE 411(A) Food Processing Technology CHE 411(B) Corrosion Engineering CHE 411(C) Computational Tools for Engineers CHE 411(D) Bioinformatics
CIVIL ENGINEERING	CIV 411 (A) Elements of Environmental Engineering CIV 411 (B) Water Resources conservation CIV 411 (C) Elements of Transportation Engineering
PHYSICS	PHY 411 Principles & Applications of NDT Methods
CHEMISTRY	CHY 411 (A) Environmental Sciences CHY 411 (B) Green Technologies

FIRST YEAR SYLLABI

I- Semester

&

II- Semester

ENGLISH

(Common for all branches)

MEC 111

Credits:3

Instruction : 3 Periods & 1 Tut/Week

Sessional Marks : 40

End Exam : 3 Hours

End Exam Marks: 60

Course Objectives:

- To improve the language proficiency of the students in English with emphasis on Reading and Writing skills.
- To enable the students to study engineering subjects with greater comprehension & cognizance.
- To strengthen the vocabulary of the students.
- To enable the students to write grammatically correct structures with logical flow.
- To equip the students with the knowledge of different formats of business communication.

Course Outcomes:

By the end of the course, the student will be able to:	
1.	Analyze the structure of the phrases, clauses and sentences
2.	Apply his enriched vocabulary to give better shape to his communication skills.
3.	Effectively use different formats of business correspondence.
4.	Use idiomatic expressions and foreign phrases in his communication.
5.	Analyse, interpret and compose meaningful texts.

SYLLABUS

UNIT I

10 Periods

Vocabulary : One Word Substitutes

Grammar : Noun : Noun Phrase, Gerunds

Writing Skills :

- 1) Formal Letter writing – format, style of letter writing and types of letters — complaint, enquiry, requesting quotations, invitation, regret and acceptance.
- 2) Story Building-Developing a story from the key words, giving a title and describing learning outcomes.

UNIT II

10 Periods

Vocabulary : Foreign phrases or expressions

Grammar : Adjectives : Quantifiers, qualifiers, determiners, nouns as adjectives, verbs as adjectives, adjective phrases

Writing Skills:

1. Technical Report writing – Formal reports and types: Informational reports, Analytical reports and Recommendation reports— Status, feasibility, progress, incident and project.
2. Essay writing.

UNIT III

10 Periods

Vocabulary : Idiomatic expressions- meaning and usage.**Grammar** : Articles (concept and function; definite, indefinite and omission of articles)**Writing Skills** :

1. Preparation of C.V. and Resume-format, style purpose and objective.
2. Précis- writing technique with suitable title.

UNIT IV

9 Periods

Vocabulary : Phrasal Verbs derived from the following dynamic verbs: Go, Get, Run, Take, Look, Put, Hold, Stand etc.**Grammar** : Prepositions or prepositional phrases**Writing Skills** :

1. Reading comprehension – questions based on facts, interpretation, logical deduction, vocabulary.
2. E-mail etiquette- format, style and language

UNIT V

9 Periods

Vocabulary : Synonyms and Antonyms (From the text book only)**Grammar** : Pronouns: Kinds of pronouns, relative pronouns – who and whom, whose, which Verbs - Aspects, moods, tenses, direct and indirect speech (active and passive voice), concord, Infinites and verb participles, verb phrase, Conditionals – probable, improbable, impossible, If-clause, Correction of sentences**TEXT BOOK:***Life through language* Pearson Publication Delhi**REFERENCE BOOKS:**

1. GJ.K. Gangal *A Practical Course for Developing Writing Skill in English* PHI
2. Mark Lester and Larry Beason *Handbook of English Grammar & Usage* Tata McGraw Hill.
3. S.M.Gupta *Current English Grammar And Usage* PHI
4. Dr. P. Prasad, Rajendra K Sharma *The Functional Aspects of Communication Skills* Katson Books
5. Abul Hashem *Common errors in English* Ramesh Publishing House
6. M. Ashraf Rizvi *Effective Technical Communication* Tata Mc-Graw Hill
7. Edgar Thorpe & Showick Thorpe *Objective English* Pearson

ENGINEERING MATHEMATICS-I

(Common for all branches)

MEC 112

Credits :3

Instruction : 3 Periods & 1 Tut/Week

Sessional Marks :40

End Exam : 3 Hours

End Exam Marks:60

Course Objectives :

- To impart knowledge in basic concepts of functions of several variables and their applications like maxima & minima.
- To enable the students to study the concepts of Fourier series.
- To enable the students to study the concepts of three dimensional figures like sphere, cone cylinder and conicoids.
- To equip the students with the knowledge of multiple integrals and their applications.
- To introduce the concepts of improper integrals like beta, gamma & error functions.

Course Outcomes:

By the end of the course, student will be able to:	
1.	Familiarize with functions of several variables
2.	Apply Fourier series in solving boundary value problems
3.	Apply the concept of three dimensional analytical geometry
4.	Use mathematical tools needed in evaluating multiple integral and their usage.
5.	Use the concepts of improper integrals, Gamma, Beta and Error functions which are needed in Engineering applications

SYLLABUS

UNIT I

12 Periods

Partial Differentiation : Function of two or more variables – Partial Derivatives – which variable is to be treated as constant – Homogeneous functions – Euler's theorem – Total Derivative - Change of Variables .Jacobians – Taylor's theorem for functions of two variables – Maxima and Minima functions of two variables.

UNIT II

12 Periods

Fourier series: Introduction – Euler's formula – conditions for a Fourier expansion – Functions having points of Discontinuity – Change of interval – Even and Odd functions – Half range series-Parseval's formula.

UNIT III

12 Periods

Three Dimensional Analytical Geometry: Equation of a sphere – Plane section of a sphere – Tangent Plane - Equation of a cone – Right circular cone – Equation of a cylinder – Right circular cylinder.

UNITIV

14 Periods

Multiple Integrals: Double integrals – Change of order of integration – Double integral in polar co-ordinates – Area enclosed by plane curves – Triple Integrals. Volume of Solids- Change of Variables-Area of curved surfaces, Calculation of mass.

UNIT V

10 Periods

Beta & Gamma functions :Beta function – Gamma function relation between Beta and Gamma functions –results and problems, error function.

TEXT BOOK:

1. Dr. B.S. Grewal, *Higher Engineering Mathematics* 43rd edition, Khanna Publishers, New Dehli.

REFERENCE BOOKS:

1. N.P. Bali, Dr . Ashok Saxena, Dr.N.Ch.S. Narayana, *A Text book on Engineering Mathematics* Laxmi pub.(p)Ltd. New Dehli
2. H.K.Dass, *Advanced Engineering Mathematics*, S.chand and company Ltd
3. Dr.M.K. Venkataraman, *Higher Engineering Mathematics* National Pub.Co.Madras.
4. Erwin kreyszig. *Advanced Engineering Mathematics* John Wiley and sons Newyork

ENGINEERING PHYSICS

(Common for all branches)

MEC 113

Credits:3

Instruction : 3 Periods & 1 Tut/Week

Sessional Marks :40

End Exam : 3 Hours

End Exam Marks:60

Course Objectives:

- To impart knowledge in basic concepts of physics relevant to engineering applications
- To introduce advances in technology for engineering applications

Course Outcomes:

By the end of the course, student will be able to:	
1	Understand the fundamental concepts of thermodynamics.
2	Familiar with the fundamentals of electromagnetic induction and Ultrasonics.
3	Aware of the basic concepts of optics like interference, diffraction, polarization and its various applications.
4	Understand the working principle and applications of lasers and fiber optics.
5	Learn fundamentals of modern physics and its importance in modern technology.

SYLLABUS

UNIT I

10 Periods

Thermodynamics: Heat and work, first law of thermodynamics and its applications, reversible and irreversible processes, heat engine, Carnot cycle and its efficiency, Carnot's theorem, second law of thermodynamics, entropy – entropy change in reversible and irreversible processes, entropy and second law, entropy and disorder, entropy and probability, third law of thermodynamics

UNIT II

10 Periods

Electromagnetism: Faraday's law of induction, Lenz's law, Integral and differential forms of Faraday's law, self-inductance, energy stored in electric and magnetic fields, Poynting vector, displacement current, Maxwell's equations in integral form (no derivation), wave equation, propagation of electromagnetic waves in free space

Ultrasonics: Properties of ultrasonic waves, production of ultrasonic waves by magnetostriction and piezoelectric methods, applications of ultrasonics

UNIT III

10 Periods

Optics

Interference: Introduction, principle of superposition, coherence, Young's double

slit experiment, conditions for interference, interference in thin films by reflection, wedge shaped film and Newton's rings

Diffraction: Introduction, Fresnel and Fraunhofer diffraction, diffraction at a single slit

Polarisation: Introduction, types of polarized light, double refraction in uniaxial crystals, Nicol's prism, quarter and half-wave plate, production and detection of plane, circular and elliptically polarized light

UNIT IV

10 Periods

Lasers: Introduction, characteristics of a laser beam, spontaneous and stimulated emission of radiation, population inversion, Ruby laser, He-Ne laser, semiconductor laser, applications of lasers

Fibre optics: Introduction to optical fibers, principle of propagation of light in optical fibers, acceptance angle and acceptance cone, numerical aperture, types of optical fibers, modes of propagation and refractive index profiles, attenuation in optical fibers, advantages of optical fibers in communications, fiber optics communication system, applications of optical fibers, fiber optic sensors

UNIT V

10 Periods

Quantum Mechanics: Planck's hypothesis, wave-particle duality, introduction to quantum theory, de-Broglie concept of matter waves, Heisenberg's uncertainty principle, Schrodinger's time independent and time dependent wave equations, physical significance and properties of the wave function ψ , application of Schrodinger wave equation for a particle in one dimensional well – eigen wavefunctions and energy eigen values of the particle

Elements of Statistical Mechanics: Elementary concepts of Maxwell-Boltzman, Bose-Einstein and Fermi-Dirac statistics (no derivation)

TEXT BOOKS:

1. S.L Gupta and SanjeevGupta*Engineering physics*DhanpatRai publications.
2. M.N. Avadhanulu&P.G.Kshirasagar*A text book of engineering physics*, S.Chand publication
3. Resnick&Halliday*Physics - Volume II*

REFERENCE BOOKS:

- 1) V. Rajendran*Engineering physics*McGrawHill Education Private Ltd
- 2) S.O.Pilai, Sivakami*Engineering Physics* New Age International Publishers
- 3) Young & Freedman *University Physics* Pearson Education
- 4) A.Marikani*Engineering Physics* PHI Learning Private Limited

ENGINEERING DRAWING

(Common for all branches)

MEC 114

Credits :3

Instruction : 1 Theory& 3 Practical Periods/week

Sessional Marks :40

End Exam : 3 Hours

End Exam Marks:60

Course Objectives:

- To increase ability to communicate with people and learn to sketch and take field dimensions.
- To make the student familiar to the drawing practices and convection
- To familiarize the student about various engineering curves used in industry
- To enable the student draft simple engineering components and analyze different views of components.
- To introduce basic Auto CAD skills.

Course Outcomes:

By the end of the course, student will be able to:	
1.	Draw various engineering curves and understand the basic geometrical constructions.
2.	Prepare orthographic projections of points and lines
3.	Produce orthographic projections of plane surfaces
4.	Draw orthographic projections of solids in various orientations.
5.	Prepare isometric projections and understand basics of Computer Aided Drafting.

SYLLABUS

UNIT I

Introduction to Engineering Drawing & basics of geometrical construction. Construction of conic sections, Construction of cycloidal curves (cycloid, epicycloid, and hypocycloid), involutes (over circles and polygon) & Archimedian spiral.

UNIT II

Orthographic projections – projections of points – projections of straight lines (lines parallel to both HP&VP, lines parallel to one and inclined to other, lines inclined to both the planes)

UNIT III

Projections of planes – perpendicular planes – oblique planes

UNIT IV

Projection of solids – Prisms – Cylinder– Pyramids & Cones

UNIT V

Isometric projections – Plane solids, Combination of solids Demonstration & Practice: Computer aided drafting of lines, planes solids and Dimensioning.

TEXT BOOK:

1. N. D. Bhatt *Engineering Drawing* Charotar Publishing House Pvt. Ltd, 53rd Edition : 2014

REFERENCE BOOKS:

1. K. L. Narayana & P. Kanniah *Engineering Drawing*
2. R. B. Choudary *Engineering Graphics with Auto CAD*
3. Trymbaka Murty *Computer Aided Engineering Drawing*

ENVIRONMENTAL SCIENCES

(Common for all branches)

MEC 115

Instruction : 3 Periods & 1 Tut/Week

End Exam : 3 Hours

Credits 3

Sessional Marks :40

End Exam Marks:60

Course Objectives:

- To gain knowledge on the importance of environment and ecosystems.
- To acquire knowledge with respect to biodiversity, its threats and its conservation and appreciate the concept of interdependence.
- To acquire knowledge about environmental pollution- sources, effects and control measures of environmental pollution
- To understand the treatment of wastewater and solid waste management.
- To be aware of the national and international concern for environment for protecting the environment

Course Outcomes:

By the end of the course, student will be able to:	
1	Identify the characteristics of various natural resources and can implement the conservation practices
2	Realize the importance of Ecosystem and Biodiversity for maintaining ecological balance
3	Classify, analyze various pollutants and can develop methods for solving problems related to environment
4	Design and evaluate strategies and methods for sustainable development of environmental systems and for the remediation or restoration of degraded environments
5	Get awareness on various environmental laws and regulations applicable to global issues and play a role in solving social problems

SYLLABUS

UNIT I

10 Periods

Introduction to Environment and Natural Resources : Introduction: Definition, Multidisciplinary nature, Scope and Importance of Environmental Sciences- R & D in environment, green advocacy, green marketing, green media and environment consultancy. Need for public awareness.

Natural Resources: Forest resources-use and overexploitation, deforestation, Big Dams effects on forests and tribal people. Water resources-sources, use and over utilization of surface and ground water, conflicts over water, dams-benefits and problems. Food resources-environmental impact of modern agriculture-fertilizer and pesticides. Land resources-land degradation- landslides, soil erosion and desertification. Energy resources- renewable and non-renewable energy resources and use of alternate-energy sources.

UNIT II

10 Periods

Ecosystem & Bio Diversity : Ecosystem: Concept of an ecosystem-structure and function of an ecosystem Food chains, food webs and ecological pyramids, Energy flow in an ecosystem, Ecosystem regulation, Ecological succession. Types, characteristic features, structure and function of forest, grass land, desert and aquatic ecosystems.

Biodiversity : Definition, types, India as a Mega diversity Nation, Values of biodiversity, Hot spots of biodiversity, Threats to biodiversity-habitat loss, poaching, human-wildlife conflicts, Endangered and endemic species, Conservation of biodiversity.

UNIT III

10 Periods

Environmental Pollution and Waste Management : Sources, effects and control measures of Air pollution, Noise Pollution, Soil Pollution, Marine pollution, Thermal pollution, Radio Active Pollution. Water Pollution (Sources, Effects, Control measures, DO, BOD, COD, sewage treatment), Green house effect, Ozone depletion, Acid rain –causes and adverse effects.

Solid waste management: Sources and effects of municipal waste, bio-medical waste, Industrial waste, e-waste, Process of waste management-composting, sanitary landfills, incineration.

UNIT IV

8 Periods

Social Issues and Environment : Social Issues and the Environment: From unsustainable to sustainable development, Environmental Impact Assessment, Water conservation, Rain water harvesting, water shed management. Resettlement and rehabilitation of people, Environmental ethics.

Urbanization, Industrialization, Transportation, Human population and the environment-population growth, role of information technology in environment and human health.

UNIT V

10 Periods

Legislations, Conventions & Case Studies : Environmental protection act-Air (prevention and control of pollution) act, Water (prevention and control of pollution) act, Wildlife protection act, Forest conservation act.

International Conventions : Stockholm Conference, Brundtland Commission, Rio declaration, Vienna Convention, Kyoto protocol, Johannesburg Summit.

Case Studies: Chipko Moment, Kolleru Lake, Flourosis, Silent valley project, Narmada BachoAndolan, Ralegeon siddhi, Tehri dam, Madhura refinery and Tajmahal

TEXT BOOK:

1. AnubhaKaushik&C.P.Kaushik*Principles of Environmental Studies*New Age International Publications.

REFERENCE BOOKS:

1. B.K. Sharma *Environmental chemistry*Goel publishing house, Meerut, 2001.
2. G. S. Sodhi*Fundamental concepts of Environmental Chemistry*, Narosa publishing house, New Delhi
3. S.S.Dara*A text book of Environmental Chemistry and pollution control*S.Chand and Company Ltd, New Delhi, 2002.

ENGINEERING PHYSICS LAB

(Common for all branches)

MEC 116

Practical / week:3

End Exam : 3Hrs

Credits: 2

Sessional Marks :50

End Exam Marks : 50

Course Objectives:

- To enable the students to acquire skill, technique and utilization of the Instruments

Course Outcomes:

By the end of the course, student will be able to:	
1	Design and conduct experiments as well as to analyze and interpret data.
2	Apply experimental skills to determine the physical quantities related to Heat, Electromagnetism and Optics.

List of experiments (any eight to ten experiments are to be completed)

1. Determination of coefficient of thermal conductivity of a bad conductor- Lee's method.
2. Determination of radius of curvature of a convex lens - Newton's rings.
3. Determination of wavelengths of spectral lines in mercury spectrum-using diffraction grating in normal incidence position.
4. Determination of Cauchy's constants of the material of the prism using spectrometer.
5. Determination of thickness of a thin paper by forming parallel interference fringes-Wedge method.
6. Study of variation of magnetic field along the axis of a current carrying circular coil – Stewart and Gee's apparatus
7. Calibration of a low-range voltmeter using potentiometer.
8. Verification of laws of resistance and determination of specific resistance of wire by using Carey- Foster's bridge.
9. Determination of refractive indices o-ray and e-ray in quartz crystal (double refraction)
10. Determination of the frequency of an electrically maintained tuning fork - Melde's experiment.

11. Determination of Rydberg constant using hydrogen discharge tube.
12. Characteristics of photo cell and determination of Planck's constant – Photoelectric effect.
13. Determination of e/m of an electron by Thomson's method
14. Determination of band gap of semiconductor.

TEXT BOOK:

1. Physics Laboratory Manual prepared by Department of Physics ANITS

REFERENCE BOOKS:

1. D.P Siva Ramaiah and V. Krishna Murthy *Practical physics* Maruti book Depot
2. A.R Vegi *Comprehensive practical Physics* Vegi Publishers Pvt.Ltd.

PROGRAMMING WITH C LAB

(Common for all branches)

MEC 117

Instruction : 2 Periods/Week & 3 Practicals/Week

End Exam : 3Hrs

Credits :3

Sessional Marks :50

End Exam Marks : 50

Course Objectives :

To enable students to

- Understand the program development steps using compilers.
- Strengthen the problem solving skills using programming techniques.
- Design programs using various control structures.
- Develop programs using structures, unions and files.

Course Outcomes:

By the end of the course, student will be able to:	
1.	Gain a working knowledge on programming.
2.	Learn and use the fundamentals of a programming language (such as language-defined data types (int, float, char, double), control constructs (sequence, selection, repetition), program modules (including functions, modules, methods).
3.	Exhibit the ability to formulate a program that correctly implements the algorithm.
4.	Demonstrate the effective use the programming environment used in the course.

SYLLABUS

1. Overview
2. Introduction to Unix
3. Data Types, Constants
4. Operators, Expressions
5. Control Structures
6. Arrays & Strings
7. Pointers
8. Functions.
9. Structures & Unions
10. Files

REFERENCE BOOKS:

1. YashwantKanetkar*Let Us C* 5th Edition.
2. V.Rajaraman*Fundamentals of Computers* 4th Edition, PHI 2005.
3. Programming Techniques through C, M.G. V. Murthy, Pearson Education, 2002

4. KRVenugopal, SR Prasad *Mastering C* Tata McGraw Hill.
5. B.W. Kernighan, Dennis M. Ritchie *The C – Programming Language* PHI

LIST OF SAMPLE PROGRAMS

1. Write a C program for any three of the following
 - i) To accept the distance between two cities and convert the distance in meters, feet, inches and centimeters. (Note: Input distance in Kilometers).
 - ii) To accept the marks obtained by a student in five different subjects, calculate the total marks and percentage obtained by the student (The maximum marks for each subject is 100).
 - iii) To accept a 3-digit number and calculate the sum of its digits.
 - iv) To accept quantity, product code, unit price of five products and calculate the total price for each product and the SUBTOTAL, TAX, TOTAL and print the details in the following format

Qty	Product code	Unit price	Total price
xx	1	400.00	xxxx.xx
xx	2	20.00	xxxx.xx
xx	3	200.00	xxxx.xx
xx	4	100.00	xxxx.xx
xx	5	200.00	xxxx.xx
		SUB TOTAL	xxxxx.xx
		TAX	xxxx.xx
		TOTAL	xxxxx.xx

- v) To evaluate the following expression
 - a) $(ax + by) / (ax - by)$
 - b) $a^2 + b^2 + \text{squareroot}(2ab)$
2. Write a C program for any three of the following
 - i) To find the maximum and minimum of three numbers.
 - ii) For the above experiment in 1-ii) find and display the grade of the student as prescribed below:

Percentage	Grade
>90	A
>80 and <=90	B
>70 and <=80	C
>60 and <=70	D
>=50 and <=60	E
< 50	F

- iii) To find the roots of a quadratic equation.
 - iv) To find the area of a triangle when
 - a) Sides are given
 - b) Base and height are given
 - c) Co-ordinates are given
 - v) To accept an alphabet and convert into its opposite case.
(Do not use library functions)
3. Write a C program for any four of the following
- i) To print prime numbers between the specified range (eg. 100 to 200)
 - ii) To generate Pascal triangle format
 - iii) To compute cosine series: $\cos(x) = 1 - x^2/2! + x^4/4! - x^6/6! + \dots$
 - iv) To check whether number is palindrome or not.
 - v) To print set of Armstrong numbers in a specified range. (eg. 100 to 200)
 - vi) To convert the numbers from the following
 - a) Binary to decimal
 - b) Decimal to binary
4. Write a C program to perform the following operations in a given array of 'n' numbers
- i) Sum of all the numbers
 - ii) Minimum and maximum in the array
 - iii) Searching an element
 - iv) To generate random real numbers in the range of 10 to 20 and sort them.
5. Write a C Program to perform the following on the matrices
- i) Transpose of a matrix and check the symmetry
 - ii) Trace and norm of a matrix
 - iii) Addition of matrices
 - iv) Multiplication of two matrices
6. Write a C program to perform any two of the following operations on strings (not using library functions)
- i) To check whether the given string is palindrome or not.
 - ii) To find the length of the string
 - iii) To concatenate two strings.
 - iv) To check whether the given substring exists in a text and display the frequency.
- 7.
- i) Write a C program to create a structure for a student with the details name, roll no five subject marks, total marks, percentage and sort the records according to the percentage.
 - ii) Write a C program to add two complex numbers using structures.
 - iii) Write a C program to illustrate difference between union and structure.

- 8.
- i) Write a program to calculate the sum of an array using pointers.
 - ii) Write a program to search a name in a given list of names using pointers
9. Write a C program using functions
- i) To illustrate call by value and call by reference
 - ii) To accept a string and character and pass them as parameters to a function, the function shall replace the character in the string with any other specific character and return the modified string.
 - iii) To pass the employee record as a structure to the function. The function shall compute the gross salary (include DA and HRA Calculation), take the savings as input and compute the tax payable as per the prescribed table.

Gross Salary	Tax (%)
Less than 2 Lakhs	NIL
2 Lakhs to 5 Lakhs	10
5 Lakh to 10 Lakh	20
10 Lakhs to 50 Lakhs	30
Above 50 lakhs	50

Note: The employee record shall contain employee name, employee id, hire date, basic salary, DA, HRA.

10. Write a C program for any one program for the following to illustrate recursion
- i) Factorial of a number
 - ii) GCD and LCM of two numbers
 - iii) Fibonacci series
11. Write a C program to perform any three of the following on files
- i) To count the number of alphabets, numbers, words, lines in a given file.
 - ii) To merge two files into third auxiliary file and display the content.
 - iii) To print every even position character in a given file.
 - iv) To separate alphabets and integers into two files from the given source file.
12. Write a C program to update the record of a person in a file by accepting person ID.

Hint:

1. Create the file with few records.
2. The fields in a record
 - a. Name of the person
 - b. Identity(ID) of the person
 - c. Age
 - d. Gender
 - e. Occupation
 - f. Salary

WORKSHOP

(Common for all branches)

MEC118

Credits: 2

Practical / week :3

Sessional Marks :50

End Exam : 3Hrs

End Exam Marks : 50

Course Objectives :

- To provide training and hands on experience to the students on basic Engineering related skills like carpentry, fitting, house wiring and tin smithy.

Course Outcomes:

By the end of the course, student will be able to:	
1.	Make different carpentry joints.
2.	Make simple fitting jobs.
3.	Make simple jobs like funnel, elbow etc. using sheet metal.
4.	Understand and build circuits for different types of applications like stair case wiring, series and parallel connections.

LIST OF EXPERIMENTS

Minimum of three exercises has to be conducted from each trade.

Trade:

Carpentry

1. Cross Lap Joint
2. Dovetail Joint
3. Mortise and Tennon Joint
4. Bridle Joint

Fitting

1. V Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

House Wiring

1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy

1. Taper Tray
2. Square Box without lid
3. Elbow
4. Funnel

ENGINEERING MATHEMATICS-II

(Common for all branches)

MEC 121

Credits :3

Instruction : 3 Periods & 1 Tut/Week

Sessional Marks :40

End Exam : 3 Hours

End Exam Marks:60

Course Objectives:

- To impart knowledge in basic concepts of solving linear system of equations.
- To enable the students to study the Eigen values and Eigen vectors of matrix.
- To introduce the concepts of ordinary differential equations and their applications to engineers.
- To enable the students to solve any higher order differential equations and to solve differential equations related to simple electric circuits, Newton's law of cooling.
- To introduce the students to Laplace Transforms and their applications.

Course Outcomes:

By the end of the course, student will be able to:	
1.	Solve linear system equations using of matrix algebra techniques
2.	Determine the Eigen values and vectors of a matrix
3.	Apply different techniques in solving differential equations that model engineering problem
4.	Use the application of Differential equations like simple electric circuits, Newton's law of cooling and to solve any higher order linear ordinary differential equation with constant coefficients
5.	Solve linear differential equations and Network analysis using Laplace transforms.

SYLLABUS

UNIT I

11 Periods

Linear Algebra: Rank of matrix-Elementary Transformation of a matrix- Gauss Jordan Method of finding the inverse – Normal form of the matrix- PAQ form – Consistency of linear system of equations – System of homogeneous and non-homogeneous equations .

UNIT II

12 Periods

Linear transformations – Orthogonal transformations-Vectors (Linearly Independent & Dependent) ,Eigen values , Eigen Vectors, Properties of Eigen values – Cayley Hamilton theorem (without proof).Reduction to diagonal form – Reduction of Quadratic form to canonical form – Nature of quadratic form,.

UNIT III

10 Periods

Differential Equations of first order : First order Linear differential equations , Bernoulli's equations , Exact Differential Equations –Equations reducible to exact Equations - Orthogonal trajectories – Simple Electric circuits-Newton law of cooling.

UNIT IV

10 Periods

Higher order Linear Differential Equations : Definitions – Rules for finding the complementary function, rules for finding the particular integral, method of variation of parameters, equations reducible to linear equations with constant coefficient - Cauchy's homogeneous linear equation, Legendre's linear equation.

UNIT V

17 Periods

Laplace Transforms: Introduction – definitions- Transforms of elementary functions - Properties of Laplace transforms- Transforms of Periodic functions – Transforms of Derivatives – Transforms of Integrals- Multiplication by - division by t -Evaluation of integrals by Laplace transforms.

Inverse Laplace transforms – Other methods of finding inverse transforms (Excluding Residue method) Convolution theorem – Application's to Differential Equations – Unit Step function- Unit Impulsive functions.

TEXT BOOK:

1. Dr. B.S. Grewal *Higher Engineering Mathematics* 43rd edition, Khanna Publishers, New Dehli.

REFERENCE BOOKS:

1. N.P. Bali, Dr . Ashok Saxena, Dr.N.Ch.S. Narayana, *A Text book on Engineering Mathematics* Laxmi pub.(p)Ltd. New Dehli.
2. H.K.Dass, *Advanced Engineering Mathematics*, S.chand and company ltd
3. Dr.M.K. Venkataraman, *Higher Engineering Mathematics* National Pub.Co.Madras.
4. Erwin kreyszig. *Advanced Engineering Mathematics* John Wiley and sons, Newyork.

ENGINEERING CHEMISTRY

(Common for all branches)

MEC 122

Instruction : 3 Periods & 1 Tut/Week

End Exam : 3 Hours

Credits :3

Sessional Marks :40

End Exam Marks:60

Course Objectives:

- To provide knowledge on problems associated with impure water and various water treatment technologies
- To enable the students to know the importance of semiconducting materials and preparation techniques
- To provide basic knowledge on conventional energy resources, developments in batteries and fuel cells
- To understand the corrosion of metals, various methods to prevent and control of corrosion
- To create awareness on advanced concepts like nano materials, green chemistry and eco-friendly technologies for future development

Course Outcomes:

By end of the course, student will be able to:	
1	Identify the problems associated with raw water in various applications and can adopt suitable technologies for domestic and industrial feed waters.
2	Identify & generalize the properties of semiconducting materials and can select suitable semiconducting & various ceramic materials for specific applications.
3	Classify and analyze the conventional energy sources and design of suitable batteries/cells for different engineering applications.
4	Select and design of suitable materials to prevent corrosion and protect various parts from corrosion.
5	Implement the green chemistry principles, concept of tribology, unique properties of nano & composite materials in designing of suitable methods and materials to meet the technological challenges.
6	Solve scientific problems related to various engineering fields.

SYLLABUS

UNIT I

10 Periods

Water Chemistry: Impurities in water, Hardness of water - units and calcium carbonate equivalents, -estimation of hardness (EDTA method) - disadvantages of hard water, boiler troubles- Scale & Sludge formation - prevention- Internal treatment - (Phosphate, Carbonate and Calgon conditioning) -Caustic embrittlement

Water treatment techniques: Softening of water -lime-soda process -numerical problems on LS process -Zeolite, -ion exchange methods, Desalination of water – Reverse osmosis and Eelectrodialysis, Municipal water treatment - Screening, sedimentation, coagulation, Sterilization- Chlorination-Break Point chlorination.

UNIT II

10 Periods

Solid State Chemistry: Classification of Solids, Band theory of solids. Chemistry of Semiconductors – Intrinsic, extrinsic, compound and defect semiconductors, Organic semiconductors, Purification and preparation of Semiconductor by zone refining – Single crystal growth(Czochralski method) – epitaxial growth. Liquid crystals, LCD, LED and OLED.

Ceramic Materials: Cement-Manufacture of Portland cement - Setting and hardening of cement -Cement concrete - RCC, Refractories - Classification - properties, Ceramics and its Engineering applications.

UNIT III

10 Periods

Thermal Energy: Fuel –types of fuels -Calorific value and its determination (Bomb calorimeter method) Coal- Ranking of coal - analysis (proximate and ultimate) – COKE – Manufacture (Otto Hoffmann’s process). Petroleum – refining of Crude oil; Synthetic petrol – Fisher - Tropsch and Bergius methods, Knocking in Petrol and Diesel engine – Octane number - Cetane number, LPG and CNG.

Chemical Energy: Electrode potential, electro chemical series – Reference electrodes – SHE, Calomel electrode – Galvanic cells – primary cells (Dry cell) secondary cells (Lead acid, Ni-Cd, Li ion batteries) H₂-O₂fuel cells.

Solar Energy: Construction and Working of Photovoltaic cell

UNIT IV

08 Periods

Corrosion Chemistry: Origin and theories of corrosion – Types of corrosion - Galvanic corrosion, concentration cell corrosion, pitting corrosion, stress corrosion, inter granular corrosion; Factors affecting corrosion – Corrosion

Prevention & Control of Corrosion:Cathodic protection; Corrosion inhibitors; Protective coatings –Galvanization & Tinning –Anodized coatings - paints & special paints

Nanochemistry: Introduction, growth of nanoparticles (Sol-gel process), Fullerenes and Carbon nanotubes

Green chemistry: Principles of Green chemistry, Alternative Solvents used in green synthesis.

Lubricants: Concept of Tribology -Mechanism of lubrication- Blended oils - properties of lubricating oils -Viscosity Index -Fire & Flash Point -Cloud & Pour Point -Aniline point.

High Polymers & Composites- Basic concepts of Polymers, Effect of polymer structure on properties. Plastics-Thermoplastic and Thermosetting resins, Composites -types- Fiber Reinforced Plastics -Particulate composites -Layer composites, engineering applications of composites.

TEXT BOOK:

1. P.C. Jain and M. Jain *Engineering Chemistry* 16th edition - Dhanapathi Rai & Sons, Delhi

REFERENCE BOOKS:

1. S.S. Dara *A text book of Engineering Chemistry* 15th edition, S. Chand & Co. New Delhi
2. O.G. Palanna *Engineering Chemistry* Tata Mcgraw Hill Education pvt ltd, New Delhi.
3. B.K. Sharma *Engineering Chemistry* - Krishna Prakashan Meerut
4. A.K. Bandopadhyay *Nanomaterials* new age international publishers.
5. V.K. Ahluvalia *Green solvents for organic synthesis* Narosa publications.

PROFESSIONAL ETHICS AND HUMAN VALUES

(Common for All Branches)

MEC 123

Instruction : 2 Periods & 1 Tut/Week

Credits :2

Sessional Marks : 100

Course Objectives :

- To understand moral values and their significance.
- To draw inspiration for imbibing moral values
- To understand professional ethics and obligations
- To know the code of ethics of relevant Professional societies

Course Outcomes:

By end of the course, student will be able to:	
1.	Understand the right code of conduct.
2.	Assess his/her roles as a proactive member of the society
3.	Solve moral dilemmas and issues
4.	Implement Code of ethics of relevant Professional societies

SYLLABUS

UNIT I: Introduction

Philosophical basis for human values- Human values as enshrined in the Gita, Bible and khoran; Religion- Values propounded in various religions- Need for Religious harmony

UNIT II: Human Values: Inspiration

Inspiration for human values- Mahatma Gandhi, Dr.SarvepalliRadha Krishnan, Swami Vivekananda, Rabindranath Tagore, Mother Theresa- Benefits of Human values- Harmony between Self-interest and human values

UNIT III: Basics of Professional Ethics

Ethical Human Conduct – based on acceptance of basic human values; Humanistic Constitution and Endersal human order – skills, sincerity and fidelity; Scope and characteristics of people-frily and eco-frily production system, Technologies and management systems.

UNIT IV: Professional Ethics in practice

Profession and Professionalism – Professional Accountability, Roles of a professional, Ethics and image of profession; Engineering Profession and Ethics - Technology and society, Ethical obligations of Engineering professionals, Roles

of Engineers in industry, society, nation and the world; Professional Responsibilities – Collegiality, Loyalty, Confidentiality, Conflict of Interest, Whistle Blowing

UNIT V: Indian Constitution, Code of Ethics and Global Issues

Indian Constitution: Fundamental Rights and duties, Freedom, Equality, Fraternity, Justice, Directive principles of state policy. Sample code of Ethics by Professional Societies such as ASME, ASCE, IMEC, IETE, Institution of Engineers (India), Indian Institute of Materials Management etc.

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership.

TEXT BOOKS:

1. K.R. Govindan and S.SenthilKumar *Professional Ethics & Human Values* Anuradha Publications.
2. Mike Martin and Roland Schinzinger *Ethics in Engineering* 3rd edition, McGraw Hill. New York (2012).

REFERENCE BOOKS:

1. R. Subramanian *Professional Ethics* Oxford Endersity Press.
2. A.N. Tripathy *Human values* 2003, New Age International Publishers
3. S.B. Srivasthva *Professional Ethics & Human Values* SciTech Publications (India) Pvt. Ltd. New Delhi.
4. Prof. D.R. Kiran *Professional Ethics & Human Values* TATA McGraw Hill Education.
5. M. Govindrajran, S Natrajan & V.S. Senth Kumar *Engineering Ethics (including human Values)* Eastern Economy Edition, Prentice hall of India Ltd

APPLIED PHYSICS
(forEEE,ECE&Mech)

MEC 124

Instruction : 3 Periods & 1 Tut/Week

End Exam : 3 Hours

Credits:3

Sessional Marks :40

End Exam Marks:60

Course Objectives:

- To enhance student's knowledge of theoretical and modern technological aspects in physics and to introduce fundamentals of physics relevant to engineering applications
- To introduce advances in technology for engineering applications

Course Outcomes:

By end of the course, student will be able to:	
1	Understand the properties of magnetic materials and superconductivity.
2	Understand the dielectric nature of materials, properties and its applications.
3	Aware about nano material properties, synthesis and characterization tools.
4	Familiar with fundamentals of crystal structures.
5	Learn the basic phenomenon involved in semiconductors and semiconductor devices.

SYLLABUS

UNIT I

12 Periods

Magnetic materials: Definition of magnetic permeability, magnetization and magnetic susceptibility, origin of magnetic moment, classification of magnetic materials, properties of diamagnetic and paramagnetic materials, ferromagnetic materials - hysteresis curve, domain theory of ferromagnetism, soft and hard ferromagnetic materials, anti-ferromagnetic and ferrimagnetic materials, ferrites and its applications

Superconductivity: Introduction, properties of superconductors, effect of temperature and magnetic field, Meissner effect, flux quantization, type – I and type – II superconductors high temperature superconductors, applications of superconductors, BCS theory (qualitative)

UNIT II

10 Periods

Dielectric materials: Definition of electric dipole moment, dielectric polarization and dielectric constant, types of polarization – electronic, ionic and oriental polarization, expression for polarisability, internal fields in solids, Clausius – Mossotti

equation, frequency dependence of electronic polarization ,properties of ferroelectric materials and their applications

UNIT III

10 Periods

Nanophase materials: Introduction to nanophase materials, properties of nanophase materials, synthesis of nanophase materials – chemical vapour deposition, sol-gel method, MECHANICAL attrition method, applications of nanophase materials. Principles of X-Ray fluorescence X-Ray Diffraction- Electron Microscopy (SEM and TEM)

UNITIV

10 Periods

Crystal structure: Introduction, fundamental terms of crystallography – space lattice, , crystal lattice, unit cell, planes, seven crystal systems – Bravais lattices, cubic lattices, crystal directions and planes, Miller indices, interplanar spacing and interatomic distance , some simple crystal structures, body-centered cubic crystals, face-centered cubic crystals

UNIT V

12 Periods

Semiconductor Physics: Intrinsic and extrinsic semiconductors, Fermi level, carrier concentration in intrinsic semiconductor, continuity equation, direct and indirect band gap semiconductors. Lorentz force, Hall effect and its applications. Physics of semiconductor devices: open circuited p-n junction diode, energy diagram of p-n diode, working of a diode, volt-ampere characteristics of p-n junction, diode as a rectifier, light emitting diode (LED) , liquid crystal display (LCD), photodiode

TEXTBOOKS:

1. S.L Gupta and SanjeevGupta*Engineering physics*DhanpatRai publications.
2. M.N. Avadhanulu&P.G.Kshirasagar*A text book of engineering physics*, S.Chand publication

REFERENCE BOOKS:

- 1) V.Rajendran*Engineering physics* Tata McGraw Hill Education Private Limited
- 2) DattuRamanlal Joshi *Engineering Physics* Tata McGraw Hill Education Private Limited
- 3) A.Marikani*Engineering Physics* PHI Learning Private Limited

ADVANCED ENGINEERING DRAWING

MEC 125

Instruction : 3Periods& 1Tut/Week
End Exam : 3 Hours

Credits : 3

Sessional Marks : 50
End Exam Marks : 50

Course Objectives:

- To make the student familiar to the drawing practices and convection
- To familiarize the student about various engineering curves and various layouts used in industry
- To enable the student draft simple engineering components and analyze basing on different views of components.

Course Outcomes:

By end of the course, student will be able to:	
1.	Draw orthographic projections for sections of solids.
2.	Draw the development of surface for solids.
3.	Prepare orthographic projections for intersections of solids.
4.	Convert isometric projections into orthographic projections and vice-versa.
5.	Develop 2-D and 3-D models using Auto-CAD.

LIST OF EXERCISES:

1. Sections of solids – Sectional views of prism, cylinder, pyramid and cone in simple positions
2. Sectional views of prism, cylinder pyramid and cone inclined to both the planes
3. Development of surfaces of prisms. Cylinder
4. Development of surfaces of pyramid, cone
5. Intersection of prism & prism, cylinder to cylinder, cylinder to cone, when two axes are perpendicular to each other
6. Intersection of cylinder to cylinder when axes are in inclined position
7. Conversion of orthographic views to isometric views (simple cases)
8. Conversion of isometric views to orthographic views.
9. 3D – Modeling using Auto CAD
 - a. Prisms and Cylinders
 - b. Pyramids and Cones
 - c. Combination of Solids

TEXT BOOK:

1. N. D. Bhatt *Engineering Drawing* Charotar Publishing House Pvt. Ltd, 53rd Edition : 2014

REFERENCE BOOKS:

1. K. L. Narayana& P. Kanniah *Engineering Drawing*
2. R. B. Choudary *Engineering Graphics with Auto CAD*
3. TrymbakaMurty *Computer Aided Engineering Drawing*

ENGINEERING CHEMISTRY LAB

(Common for all branches)

MEC 126

Practical / week : 3

End Exam : 3Hrs

Credits: 2

Sessional Marks :50

End Exam Marks : 50

Course Objectives:

- To provide clear idea over quantitative chemical analysis.
- To improve skills in analyzing samples through titration procedures.
- To familiarize with Instrumental methods of analysis for more accuracy.
- To introduce various methods of analyzing the ore samples.

Course Outcomes:

By end of the course, student will be able to:	
1	Apply experimental skills in quantitative chemical analysis of water quality parameters, substances and ores.
2	Select and use a suitable instrumental technique for the quantitative estimation and analyse the data obtained.

List of Experiments (any 10 experiments are to be completed):

1. Preparation of standard solution
2. Estimation of sodium carbonate present in soda ash.
3. Estimation of amount of calcium present in the Portland cement by titrimetrically.
4. Estimation of amount of Copper present in the Copper ore by Iodometrically.
5. Determination of total Hardness present in the given water sample.
6. Estimation of amount of Zinc by titrating with EDTA.
7. Determine the strength of acid by titrating with strong base using **pH meter**.
8. Estimate the individual strength of acids present in the acid mixture by titrating with strong base using **conductivity meter**.

9. Estimate the amount of Mohr's salt present in the given solution by titrating with potassium dichromate using potentiometer.
10. Determination of viscosity of the given liquid by Ostwald viscometer.
11. Determination of rate constant of acid catalyzed hydrolysis of ester.
12. Determination of partition coefficient of iodine distributed between Water and Carbon tetra chloride.

Demonstration

13. Estimation of amount of dissolved oxygen (D.O) present in the given water sample.
14. Synthesize the Phenol-Formaldehyde resin.

TEXT BOOK:

1. S.K. Bhasin and SudhaRani *Laboratory manual on Engineering chemistry*, third edition DhanpatRai Publishing Company.

REFERENCE BOOK:

1. S.S. Dara *Experiments and calculations in Engineering chemistry* 9th edition S. Chand & Company Ltd.

LANGUAGE LAB
(Common for all branches)

MEC 127

Practical / week : 3

End Exam : 3Hrs

Credits: 2

Sessional Marks :50

End Exam Marks : 50

Course Objectives:

- To expose the students to a variety of self-instructional, learner-friendly modes of language learning.
- To facilitate computer-aided multi-media instruction enabling individualized and independent language learning.
- To improve the fluency in spoken English and neutralize mother tongue influence
- To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking.
- To initiate them into greater use of the computer in resume preparation, report writing, format-making etc.
- To help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer-based competitive exams such as GRE, TOEFL, GMAT etc.

Course Outcomes:

By the end of the course, student will be able to:	
1.	Handle CBT (Computer Based Tests) of the qualifying examinations.
2.	Receive, interpret, remember and evaluate information by practicing effective listening skills.
3.	Speak English with neutralized accent.
4.	Narrate, describe and report incidents and situations using appropriate terminology.

SYLLABUS

I CALL (Computer Aided Language Learning)

1. Introduction to the Sounds of English-Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Short and long Reading comprehension exercises (listening skills)
4. Telephoning Skills.

II CSL (Communication Skills Lab)

5. 'Just A Minute' Sessions (JAM).
6. Describing Objects / Situations / People.
- 7 Video talks
8. Situational Dialogues / Role Play.
9. Oral Presentations- Prepared and Extempore.

Suggested Software

- Cambridge Advanced Learners' English Dictionary with CD.
- English Phonetics and Phonology – 2 CDs set
- English Mastery – Alania ABC
- Telephoning English
- Cambridge Grammar of English (Ronald Carter and Michael McCarthy) CD
- English Grammar in Use -Cambridge University Press
- Communication Skills – Oxford U P (Sanjay Kumar and PushpaLatha)

REFERENCE BOOKS:

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems)

1. *Spoken English (CIEFL)* in 3 volumes with 6 cassettes, OUP.
2. Daniel Jones *English Pronouncing Dictionary* Current Edition with CD.
3. R. K. Bansaland J. B. Harrison, *Spoken English-Orient* Longman 2006 Ed.
4. Dr A Ramakrishna Rao, Dr G Natanam& Prof SA Sankaranarayanan*English Language Communication : A Reader cum Lab Manual*Anuradha Publications, Chennai
5. Krishna Mohan & NP Singh *Speaking English Effectively* (Macmillan)
6. J. Sethi, KamleshSadanand& D.V. Jindal*A Practical Course in English Pronunciation, (with two Audio cassettes)* Prentice-Hall of India Pvt. Ltd., New Delhi.
7. T. Balasubramanian*A text book of English Phonetics for Indian Students* (Macmillan).
8. *English Skills for Technical Students*, WBSCTE with British Council, OL
9. J.K. Gangal *A Practical Course in Effective English Speaking Skills* PHI.

OBJECT ORIENTED PROGRAMMING WITH C++LAB

(Common for all branches, except for Civil & Chemical branches)

MEC 128

Credits :3

Instruction : 2 Periods/Week Practicals : 3 Periods/week

Sessional Marks :50

End Exam : 3Hrs

End Exam Marks : 50

Course Objectives:

- To introduce Object Oriented Programming (OOP) using the C++ Language.
- To provide the basic concepts and techniques which form the Object Oriented Programming paradigm.

Course Outcomes:

By the end of the course, student will be able to:	
1.	Understand how to use the programming constructs of CPP.
2.	Use Object Oriented Programming concepts to develop object oriented programs.
3.	Apply various object oriented features to solve real world computing problems using C++ language.

SYLLABUS

List of the experiments to be done on the following topics

1. Overview (Transition from C)
2. OOP Concepts and Characteristics
3. Preprocessor, Command line arguments
4. Classes & Data Abstraction
5. Objects
6. Operator Overloading
7. Inheritance
8. Virtual Functions & Polymorphism
9. I/O Streams
10. Templates
11. File Processing
12. Exception Handling Concepts

REFERENCE BOOKS:

1. Mahesh Bhawe, Sunil patekar *Object Oriented Programming in C++* Second edition, Pearson
2. R Rajaram, *Object Oriented Programming in C++* 2nd Edition New Age International Publishers

3. Herbert Schildt *C++ the Complete Reference* III edition, TMH 1999
4. E Balaguruswamy *Object Oriented Programming with C++* 3rd Edition, McGraw Hill

LIST OF SAMPLE PROGRAMS

1. Write a C++ program that uses a recursive function for solving Towers of Hanoi problem.
2. Write a C++ program to find both the largest and smallest number in a list of integers.
3. Write a C++ program that uses function templates to solve problems 1 and 2 experiments
4. Write a C++ program to implement the matrix ADT using a class. Use operator overloading for implementation
5. Write the definition for a class called **Rectangle** that has floating point data members length and width. The class has the following member functions: **void setlength(float)** to set the length data member **void setwidth(float)** to set the width data member **float perimeter()** to calculate and return the perimeter of the rectangle **float area()** to calculate and return the area of the rectangle **void show()** to display the length and width of the rectangle **int sameArea(Rectangle)** that has one parameter of type Rectangle. sameArea returns 1 if the two Rectangles have the same area, and returns 0 if they don't.
 - i. Write the definitions for each of the above member functions.
 - ii. Write main function to create two rectangle objects. Set the length and width of the first rectangle to 5 and 2.5. Set the length and width of the second rectangle to 5 and 18.9. Display each rectangle and its area and perimeter.
 - iii. Check whether the two Rectangles have the same area and print a message indicating the result. Set the length and width of the first rectangle to 15 and 6.3. Display each Rectangle and its area and perimeter again. Again, check whether the two Rectangles have the same area and print a message indicating the result
6. Create a class called MusicIns to contain three methods string(),wind() and perc(). Each of these methods should initialize string array to contain the following
 - i. Veena, guitear, sitar, sarod and mandolin under string
 - ii. Flute, clarinet, saxophone, nadaswaram and piccolo under wind
 - iii. Table, mridangam, bangos, drums and tambour under perc

It should also display the contents of the arrays initialized , create a sub class call TypeIns to contain a method called get() and show(). The get() methods must display a menu as follows

- String instruments
- Wind instruments
- Percussion instruments

The show method should display the relevant details according to user choice the base class variable must be accessible only to its derived classes.

7. Create a base class called shape. It should contain two methods getCoord(), showCoord() to accept x and y co ordinates and to display the same respectively . Create a sub class called Rect. It should contain method to display length and breadth of the rectangle called showCoord() . In main method, execute the showCoord() of Rect class by applying the dynamic method dispatch concept
8. Create a class called car. Initialize the color and body attributes to “blue” and “wagon”. there should be two constructors one is a default the creates blue wagon the other constructor should take two argcolor, body and initialize. write method toString() that returns the color and body. Create a sub class funcar. In sub class there are two constructors to invoke super class constructors resp. Write a method playCD in sub class that displays the message “Beautiful music fills the passenger compartment” execute the methods to show the messages
 - i. Mycar is a blue wagon
 - ii. My father’s car is red convertible.
9. Create the ZooAnimal constructor function. The function has 4 parameters — a character string followed by three integer parameters. In the constructor function dynamically allocate the name field (20 characters), copy the character string parameter into the name field, and then assign the three integer parameters to cageNumber, weightDate, and weight respectively.
10. Write a C++ program to perform operations on complex numbers using operator overloading
11. Write a C++ program to write number 1 to 100 in a data file NOTES.TXT
12. Write a function in C++ to count and display the number of lines not starting with alphabet ‘A’ present in a text file “STORY.TXT”.
Example:
If the file “STORY.TXT” contains the following lines,
The rose is red.
A girl is playing there.
There is a playground.
An aeroplane is in the sky.
Numbers are not allowed in the password.
The function should display the output as 3