

ACADEMIC REGULATIONS

B. Tech, Four Year Degree Programme with CBCS
(For the batches admitted from the academic year 2015-16)
and
B. Tech. Lateral Entry Scheme
(For the batches admitted from the academic year 2016-17)

The following rules and regulations will be applicable for the batches of Four year B. Tech. degree admitted from the academic year 2015-16 onwards.

1. ADMISSION:

1.1 Admission into First year of Four year B. Tech. Degree programme of study in Engineering:

As per the existing stipulations of Andhra Pradesh State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made into the first year of four year B. Tech. Degree programme as per the following pattern.

- a) Category-A seats will be filled by the Convener, AP-EAMCET.
- b) Category-B seats will be filled by the Management as per the norms stipulated by Govt. of Andhra Pradesh.

1.2 Admission into the Second Year of Four year B. Tech. Degree programme (lateral entry).

As per the existing stipulations of Andhra Pradesh State Council of Higher Education (APSCHE), Government of Andhra Pradesh.

2. PROGRAMMES OF STUDY OFFERED BY AITS LEADING TO THE AWARD OF B.TECH DEGREE:

Following are the four year undergraduate Degree Programmes of study offered in various disciplines at Annamacharya Institute of Technology and Sciences, Rajampet (Autonomous) leading to the award of B. Tech. (Bachelor of Technology) Degree:

1. B. Tech. (Computer Science and Engineering)
2. B. Tech. (Electrical and Electronics Engineering)
3. B. Tech. (Electronics and Communication Engineering)
4. B. Tech. (Information Technology)
5. B. Tech. (Mechanical Engineering)
6. B. Tech. (Civil Engineering)

and any other programme as approved by the concerned authorities from time to time.

3. ACADEMIC YEAR:

The entire course of study is of four academic years and each year will have **TWO** Semesters (Total **EIGHT** Semesters). The minimum instruction days for each semester shall be 90.

4. COURSE STRUCTURE:

Each programme of study shall consist of:

4.1 General Courses comprising of the following :(5 to 10%)

- a) Language / Communication Skills
- b) Humanities and Social Sciences : Environmental Science
- c) Economics and Accounting
- d) Principles of Management

4.2 Basic Science Courses comprising of the following: (15 to 20%)

- a) Computer Literacy with Numerical Analysis
- b) Mathematics
- c) Physics
- d) Chemistry

4.3 Basic Engineering Courses comprising of the following (depending on the branch):(15 to 20%)

- a) Engineering Drawing
- b) Engineering and IT Workshop
- c) Engineering Mechanics
- d) Basic Mechanical Engineering
- e) Electrical and Electronics Engineering
- f) Basic Civil Engineering
- g) Computer Programming

4.4 Compulsory Discipline Courses :(30 to 40%)

The lists of professional subjects are chosen as per the suggestions of the experts, to impart broad based knowledge needed in the concerned branch of study.

4.5 Professional subjects - Electives: (10 to 15%)

Electives will be offered to the students to diversify the spectrum of knowledge, based on the interest of the student to broaden his individual skill and knowledge.

4.6 Open Electives-(5 to 10%)

Open subjects will be offered from other technical and / or emerging subject areas

4.7 Project work, seminar and /or internship :(10-15%)

Project work, seminar and /or internship in industry or elsewhere.

4.8 Mandatory courses:

Environmental studies, Technical English and Technical Communication & Soft Skills are included as subjects under mandatory courses but with credit weightage.

4.9 There shall be a subject like comprehensive Computer Science and Engineering with 2 hours per week introduced in final year first semester.

4.10 Every programme of study shall be designed to have 42-44 theory courses and 19-22 laboratory/seminar/comprehensive courses.

4.11 Every programme has included foundation courses to the extent of 30%, programme core and programme elective subjects to the extent of 60%,open electives and mandatory courses to the tune of 10% approximately of the total credits.

4.12 Audit Courses(to be included in III B.Tech. I Sem & II Sem)

Interested students who want to supplement their knowledge can opt for audit courses namely Professional Ethics/Stress Management & Advanced English Communication laboratory and can appear/Pass in Continuous Internal Evaluation and Semester End Examination of these courses,will be included in marks memo only when they pass.

4.13 Open Elective

IV Year I Semester student has to necessarily select a subject from the list of open electives.

4.14 Contact Hours: Depending on the complexity and volume of the course, the number of contact hours per week will be assigned.

5. CREDIT SYSTEM:

Credits are assigned based on the following norms.

	Semester Pattern	
	Period(s) / Week	Credit(s)
Theory	01	01
Practical	3	02
Comprehensive Course	02	02
Seminar	–	02
Final Year Project	12	08

6. EXAMINATION SYSTEM: All components in any programme of study will be evaluated continuously through internal evaluation and an external evaluation component conducted as semester-end examination.

6.1 Distribution of Marks:

S. No.	Description	Marks	Examination and Evaluation	Scheme of Evaluation
1.	Theory	70	Semester-End examination.	The question paper shall be of subjective type with Five questions with internal choice to be answered in 180 Minutes duration.
		30	<p>Mid-Examinations of 120 Minutes duration to be evaluated for 20marks.</p> <p>The question paper shall be of subjective type in which four questions with an internal choice are to be answered.</p> <p>Remaining 10 marks is for continuous evaluation.</p> <p>The method of allotting these marks will be decided by the teacher dealing that subject in consultation with the Head of the Department. Teacher has to announce the evaluation method in the beginning of the semester.</p>	<p>Two MID - Examinations are to be conducted for 20 marks each in a semester. 80% weightage for better performance and 20% for other shall be considered.</p> <p>MID-I: after first spell of instructions(I & II-Units).</p> <p>MID-II: after second spell of instructions (III, IV & V-Units).</p> <p>The student who has missed both the Mid examinations will be permitted to appear for a substitute examination covering the total syllabus. This substitute examination will be given a weightage of 80%. This is to be conducted before the commencement of end semester exams, can be even outside the working hours, can be even two mid exams a day also.</p>

S. No.	Description	Marks	Examination and Evaluation	Scheme of Evaluation	
2.	Laboratory Drawing or	70	Semester - End Lab Examination	For laboratory courses: 180 minutes duration – two examiners. For Drawing and /or Design: like for the theory examination.	
			30	20 Marks for Day to Day evaluation	Performance in laboratory experiments
				10 Marks for Internal evaluation	Performance of one best out of two tests to be considered.
3	Seminar	100	Internal Evaluation 20 Marks for Report 20 Marks for subject content 40 Marks for presentation 20 Marks for Question and Answers	Continuous evaluation during a semester by the Departmental Committee (DC) consisting of two/three faculty members allotted by Head of the Department.	
4	Comprehensive Course	100	The marks can be allotted based on the performance in viva-voce conducted by Head of the department and two senior faculty members in the department.		
5	Project Work	100	70 Marks for External evaluation	Semester-end Project Viva-Voce Examination by Committee as detailed under 6.2	
			30 Marks for Internal evaluation	Continuous evaluation by the DC 15 Marks by DC as detailed under 6.2.1 15 Marks by Supervisor	

6.2 Project Work Evaluation:

- 6.2.1 The Internal Evaluation shall be made by the Departmental Committee, on the basis of average of two seminars presented by each student on the topic of his project, the best one to be considered. The presentations shall be evaluated by the Departmental Committee (DC) consisting of Head of the Department, supervisor and a senior faculty member.
- 6.2.2 The Semester-End Examination (viva-voce) shall be conducted by a Committee consisting of External examiner nominated by the Chief Controller of Examinations, HOD and Supervisor. The evaluation of project work shall be conducted at the end of the IV year II Semester.

6.3 Eligibility to appear for the Semester-End examination:

- 6.3.1 A student shall be eligible to appear for end examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects in the semester.
- 6.3.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the Institute Academic Committee if the reason for shortage is convincing.
- 6.3.3 Shortage of Attendance below 65% in aggregate shall in no case be condoned.
- 6.3.4 A stipulated fee shall be payable towards condonation of shortage of attendance to the Institute as per following slab system
 - 1st Slab** : Less than 75% attendance but equal to or greater than 70% a normal condonation fee can be collected from the student.
 - 2nd Slab** : Less than 70% but equal to or greater than 65%, double the condonation fee can be collected from the student.
- 6.3.5 Students whose shortage of attendance is not condoned in any semester are not eligible to take their End examination of that class and their registration for that semester shall stand cancelled.
- 6.3.6 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the current semester, as applicable.
- 6.3.7 A student detained due to shortage of attendance, will have to repeat that semester when offered next.

6.4 Revaluation / Recounting:

Students shall be permitted to request for recounting/ revaluation of the end theory examination answer scripts within a stipulated period after payment of prescribed fee.

After recounting or revaluation, records are updated with changes if any and the student will be issued a revised memorandum of marks. If there are no changes, the student shall be intimated the same through a letter or a notice.

6.5 Improvement of marks:

Students are permitted for improvement examinations once for a maximum of four subjects after completion of the study course but before applying for provisional certificate and consolidated marks memo after payment of prescribed fee.

6.6 Supplementary Examination:

All Regular examinations are understood as Regular/Supplementary examinations. The supplementary students have to appear for the supplementary examinations along with their regular examinations conducted at the end of each semester. However, separate supplementary examinations will be conducted for the II-Semester subjects at the end of I-Semester and vice-versa.

6.7 Internship Programme:

The weightage of two credits given for an internship of three weeks duration and more, when a student undergoes internship / industrial training from the specified industries / research organizations / Universities. In such a case, the student has to submit a report on that internship which will be evaluated by a team of three faculty members (decided by the HOD) of the department for those two credits. Student is given a chance to drop one seminar in place of a successful internship / industrial training.

6.8 Massive Open Online Course (MOOC):

MOOC is one of the courses introduced in IV year II semester. The list of subjects under MOOC will be intimated before commencement of class work.

7. ACADEMIC REQUIREMENTS FOR PROMOTION/ COMPLETION OF B.TECH PROGRAMME OF STUDY:

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/ completion of B. Tech. Programme of study.

7.1 For students admitted into B. Tech. (Four Year) programme:

- 7.1.1 A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical, drawing subject if he secures not less than 35% of marks in the End examination and a minimum of 40% of marks in the sum total of the internal evaluation and End examination taken together.
- 7.1.2 For promotion from I B.Tech.to II B. Tech. a student must satisfy the attendance requirements in I year (two semesters).
- 7.1.3 A Student shall be promoted from II year to III year, if he fulfills the academic requirements of securing a minimum of **50** credits from I year I and II-Semesters, II year I and II Semesters examinations conducted till that time.
- 7.1.4 A student shall be promoted from III year to IV year if he / she fulfills the academic requirements of securing a minimum of **74** credits from I year I and II-Semesters, II year I and II-Semesters and the III year I and II- Semester examinations conducted till that time.
- 7.1.5 A student shall register for all the subjects and earn all the **195** credits. Marks obtained in all the credits shall be considered for the calculation of the class based on CCPA.
- 7.1.6 A student who fails to earn all the **195** credits as indicated in the course structure within **eight** academic years from the year of admission shall forfeit his seat in B. Tech. Programme and his admission stands cancelled.

7.2 For Lateral Entry Students (batches admitted from 2016-2017):

- 7.2.1 Academic requirements for pass in a subject are the same as in 7.1.1 and attendance requirements as in 6.3.
- 7.2.2 A student shall be promoted from II year to III year if he fulfills the academic requirements of securing a minimum of **22** credits from II year I and II-Semesters examinations conducted till that time.
- 7.2.3 A student shall be promoted from III year to IV year if he fulfills the academic requirements of securing a minimum of **46** credits from II year I and II-Semesters and the III year I and II-Semester examinations conducted till that time.
- 7.2.4 A student shall register for all the subjects and earn all **139** credits. Marks obtained in all such credits shall be considered for the calculation of the class based on CCPA.
- 7.2.5 A student who fails to earn all the **139** credits as indicated in the course structure within **six** academic years from the year of his admission shall forfeit his seat in B. Tech. Programme and his admission stands cancelled.

8. TRANSITORY REGULATIONS:

Students who got detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work for the next batch or later batches with the same (or) equivalent subjects as and when subjects are offered and they continue to be in the academic regulations of the batch he is joining later.

9. CREDIT POINT AVERAGE (CPA) AND CUMULATIVE CREDIT POINT AVERAGE (CCPA):

9.1 For a semester:

$$\text{Credit Point Average [CPA]} = \frac{1}{10} \frac{\sum_i C_i T_i}{\sum_i C_i}$$

Where C_i = Credits earned for Course i in any semester,

T_i = Total marks obtained for course i in any semester

9.2 For the entire programme:

$$\text{Cumulative Credit Point Average [CCPA]} = \frac{1}{10} \frac{\sum_n \sum_i C_{ni} T_{ni}}{\sum_n \sum_i C_{ni}}$$

Where n = the semester in which such courses were credited

9.3 Overall Performance:

CCPA	Classification of final result
7.0 & above	First class with distinction
6.0 & above but below 7.0	First class
5.0 & above but below 6.0	Second class
4.0 & above but below 5.0	Pass

10. TRANSCRIPTS:

After successful completion of the entire programme of study, a transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued, if required, after payment of requisite fee. Partial transcript will also be issued up to any point of study to a student on request.

11. ELIGIBILITY:

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

- (i) Registered and successfully completed all the components prescribed in the programme of study to which he is admitted.
- (ii) Successfully acquired all **195/139 credits** as specified in the curriculum corresponding to the branch of study within the stipulated time.
- (iii) No disciplinary action is pending against him.

12. AWARD OF B.TECH DEGREE:

12.1 A student is permitted to select one of the extracurricular / extension activities like NSS / Sports / Games / Cultural activities. A certificate in one of these activities is a must for the student to become eligible for the award of Provisional Certificate or Degree.

12.2 The B. Tech. Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on the recommendations of the Principal of Annamacharya Institute of Technology and Sciences, Rajampet (Autonomous).

13. AMENDMENTS TO REGULATIONS:

The chairman, Academic Council of Annamacharya Institute of Technology and Sciences, Rajampet (Autonomous) reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

14. Any legal issues are to be resolved in Rajampet Jurisdiction.

15. GENERAL:

Where the words "he", "him", "his", "himself" occur in the regulations, there include "she", "her", "herself".

COURSE STRUCTURE

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES
DEPARTMENT OF CIVIL ENGINEERING**

Regulations : **R15**Programme Code: **G6****I Year B. Tech., I Semester**

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5GC11	English through Literature	2	1	0	2
5GC12	Engineering Chemistry	4	1	0	4
5GC14	Engineering Mathematics-I	3	1	0	3
5G111	Problem solving techniques and Introduction to C Programming	3	1	0	3
5G511	Engineering Mechanics - Statics	3	1	0	3
5G512	Engineering Graphics -I	2	--	6	5
5GC16	ELCS Lab-I	--	--	3	2
5GC17	Engineering Chemistry Lab	--	--	3	2
5G113	Problem Solving Through C Lab	--	--	3	2
5G514	Engineering Workshop	--	--	3	2
Total		17	5	18	28

I Year B. Tech., II Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5GC21	Technical English	2	1	0	2
5GC23	Engineering Physics	4	1	0	4
5GC24	Engineering Mathematics-II	3	1	0	3
5G121	C programming and Data Structures	3	1	0	3
5G521	Engineering Mechanics -Dynamics	3	1	0	3
5G522	Engineering Graphics -II	2	--	6	5
5GC26	ELCS Lab-II	--	--	3	2
5GC28	Engineering Physics Lab	--	--	3	2
5G123	Programming in C and Data Structures Lab	--	--	3	2
5G124	IT Workshop	--	--	3	2
Total		17	5	18	28

Note: L - Lecture; T-Tutorial; P – Practical; C – Credits

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES
DEPARTMENT OF CIVIL ENGINEERING**

Regulations : **R15**Programme Code: **G6****II Year B. Tech., I Semester**

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5GC31	Engineering Mathematics-III	3	1	-	3
5G538	Electrical and Mechanical Technology*	3	1	-	3
5G631	Strength of Materials-I	3	1	-	3
5G632	Surveying	3	1	-	3
5G633	Fluid Mechanics	3	1	-	3
5G634	Building Materials and Construction	3	1	-	3
5GC35	Aptitude & Reasoning skills	2	0	--	2
5G635	Surveying Lab-I	0	-	3	2
5G636	Strength of Materials Lab	0	-	3	2
Total		20	6	6	24

NOTE:

* In Electrical and Mechanical Technology two questions from each part should be chosen to answer five questions in the End semester examination.

II Year B. Tech., II Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5GC42	Probability and Statistics	3	1	0	3
5GC43	Environmental Science	3	1	0	3
5G641	Strength of Materials-II	3	1	0	3
5G642	Hydraulics and Hydraulic Machinery	3	1	0	3
5G643	Structural Analysis-I	3	1	0	3
5G644	Building Planning and Drawing	3	1	0	3
5G645	Fluid Mechanics and Hydraulics Hydraulic Machinery Lab	0	0	3	2
5G646	Surveying Lab II	0	0	3	2
5G647	Seminar – I	0	2	0	2
Total		18	8	6	24

Note: L - Lecture; T-Tutorial; P – Practical; C – Credits

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I Year B. Tech. I Semester

**(5GC11) ENGLISH THROUGH LITERATURE
(Common to all branches)**

Course Objectives:

- To improve the language proficiency of the students in English through literature
- To enhance the vocabulary of the students in English through the use of diverse authentic materials
- To enable the students absorb the human values expressed in literature

Unit I

DETAILED STUDY: *Cabuliwallah* by Rabindranath Tagore; *The Road not Taken* by Robert Frost

NON-DETAILED STUDY: G. D. Naidu

Unit II

DETAILED STUDY: *A Dog's Tale* by Mark Twain; *If* by Rudyard Kipling

NON-DETAILED STUDY: Sudha Murthy

Unit III

DETAILED STUDY: *The Gift of Magi* by O. Henry; *Leisure* by W. H. Davies

NON-DETAILED STUDY: Vijay Bhatkar

Unit IV

DETAILED STUDY: *An Astrologer's Day* by R. K. Narayan; *Night of the Scorpion* by Nissim Ezekiel;

NON-DETAILED STUDY: Jagadish Chandra Bose

Unit V

DETAILED STUDY: *The Proposal* by Anton Chekhov

NON-DETAILED STUDY: Homi Jehangir Baba

Text Books:

1. For Detailed study: Texts from Open Sources (Available on Web)
2. For Non-detailed study: *Trailblazers* published by Orient Black Swan
 - Texts from open sources are included in the syllabus to make the teaching-learning process more interesting and inspiring. Also, the literary texts from open sources will allow the student learn language through literature. The book for the non-detailed study allows the student to have an insight into the lives and careers of some legendary personalities.
 - The text for non-detailed study is meant for extensive reading by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements etc.

Course Outcomes:

- The student will appreciate the significance of silent reading and comprehension
- The student develops critical thinking and creative writing skills through exposure to literary texts
- The student will understand the components of different forms of writing

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I Year B. Tech. I Semester

**(5GC12) ENGINEERING CHEMISTRY
(Common to CSE, IT, ME and CE)**

Course Objectives:

- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- After completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, analytical methods, engineering materials and water chemistry.

Unit I

WATER TREATMENT: Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity and chlorides in water, Water treatment for domestic purpose Disinfection- Definition, Kinds of disinfectants (Bleaching powder, Ozone, chloramine, UV light and Chlorine), Break point chlorination.

INDUSTRIAL USE OF WATER: For steam generation, Boiler troubles: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water: Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate conditioning. External Treatment: Permutit/ Zeolite process, Ion-Exchange process, Desalination of brackish water by Reverse Osmosis.

Unit II

ELECTROCHEMISTRY: Electrochemical cells-Basic concepts, classification of electrochemical cells, numerical calculations, Batteries: classification of batteries: Primary (Leclanche battery, mercury battery) and Secondary /rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries) Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen)

ELECTROCHEMICAL SENSORS: Potentiometric Sensors and Voltammetric sensors. Examples: analysis of Glucose and urea.

CORROSION: Definition & Types (dry & wet Corrosions), Electrochemical Theory of corrosion, concentration cell corrosion, galvanic corrosion, factors affecting the corrosion, Prevention: Anodic and Cathodic protection, Electroplating (Nickel, copper and chromium) & Electrolessplating

Unit III

POLYMERS: Introduction to polymers, Polymerization process- types (without mechanism), Plastics: Thermosetting and Thermoplastics, Preparation, properties and Engineering applications of PVC, Bakelite, nylons.

NATURAL RUBBER: Processing, vulcanization and compounding of rubber. Elastomers: Preparation, properties and engineering applications of Buna-S, Buna-N and polyurethane rubbers.

CONDUCTING POLYMERS: Mechanism, synthesis and applications of polyacetylene, polyaniline. Biodegradable polymers Carbohydrates, proteins

INORGANIC POLYMERS: Basic Introduction Silicones, polyphosphazines.

Unit IV

FUEL TECHNOLOGY: Classification of Fuels – Characteristics of Fuels- Calorific Value – Units, its determination using bomb calorimeter, Numerical Problems. Solid Fuels-Coke: Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

LIQUID FUELS: Petroleum: Refining of Petroleum, Gasoline: Knocking, Octane Number, Synthetic Petrol: Bergius Processes, Fischer Tropsch's synthesis. Diesel and Cetane number. Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

GASEOUS FUELS: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus, Solving of problems on Combustion.

Unit V

CHEMISTRY OF ENGINEERING MATERIALS

CEMENT: Composition & manufacture of Portland cement, Setting and Hardening (Hydration and Hydrolysis), Refractories: Classification with suitable examples, properties and applications

LUBRICANTS: Definition and properties of lubricants, theory of lubrication, and applications of lubricants.

ROCKET PROPELLANTS: Classification, Characteristics of a good propellant

Text Books:

1. Engineering Chemistry by K.N.Jayaveera, G.V.Subba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, Fourth Edition, 2012.
2. A Text Book of Engineering Chemistry, Jain and Jain, DhanapathRai Publishing Company, New Delhi, 15th Edition, 2010.

Reference Books:

1. A Text book of Engineering Chemistry by S. S Dhara, S. S. Umare, S. Chand Publications, New Delhi, 12th Edition, 2010.
2. Engineering Chemistry by K.B.ChandraSekhar, UN.Das and Sujatha Mishra, SCITECH, Publications India Pvt Limited, Chennai, 2nd Edition, 2012.
3. Concepts of Engineering Chemistry- Ashima Srivastava and N.N. Janhavi, Acme Learning Pvt Ltd, First Edition, 2013.
4. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu, BS Publications, Hyderabad, 3rd Edition, 2008.
5. Text Book of Engineering Chemistry, Shashichawla, DhanapathRai Publications, New Delhi, 4th Edition, 2011.
6. Engineering Chemistry, K. SesaMaheswaramma and MrudulaChugh, Pearson Education, First Edition, 2013.

Course Outcomes:

The student is expected to

- Understand the functions of fuel cells, batteries and extends the knowledge to the processes of corrosion and its prevention.
- Understand industrially based polymers, various engineering materials.
- Differentiate between hard and soft water.
- Understand the disadvantages of using hard water domestically and industrially.
- Select and apply suitable water treatment methods domestically and industrially.
- Understand the manufacture of synthetic petrol.
- Differentiate between thermoplastics and thermosetting plastics.
- Understand the manufacture, setting and hardening of cement.

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I Year B. Tech. I Semester

(5GC14) ENGINEERING MATHEMATICS – I
(Common to all branches)

Course Objectives:

The course aims to provide the student with the ability

- To understand the Differential equations of first, second and higher orders with their applications.
- To understand the concept of partial differentiation and its applications.
- To understand the concept of curve tracing in various forms

Unit I

Linear and Bernoulli equations. Applications to Newton's law of cooling, law of natural growth and decay, Chemical reaction and solutions, orthogonal trajectories.

Unit II

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax} , $\sin ax/\cos ax$, polynomials in x , $e^{ax} V(x)$, $xV(x)$, method of variation of parameters. Applications to oscillatory electrical circuits.

Unit III

Rolle's Theorem – Lagrange's Mean Value Theorem (without proof). Simple examples of Taylor's and Maclaurin's Series.

Infinite series – Comparison test, Integral test, Ratio test, Cauchy's root test– Alternating series: Leibnitz rule (Without proof).

Unit IV

Functions of several variables – Partial differentiation- Chain rule-Jacobian – Maxima and Minima of functions of two variables, Lagrangian method of Multipliers with three variables only.

Unit V

Curve tracing – Tracing of Cartesian, polar and parametric curves.

Text Book:

Higher Engineering Mathematics, B.S.Grewal, Khanna publishers-43rd Edition (2014)

References Books:

1. Higher Engineering Mathematics, by Kreyszing
2. A Text Book of Engineering Mathematics, B.V. Ramana, Tata McGraw Hill.
3. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and others, S.Chand& Company.* Tutorial

Course Outcomes:

Upon completion of the course, students should be able to

- Understand the various types of ordinary differential equations
- Have the knowledge on functions of several variables.
- Understand the concepts of curve tracing

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(AN AUTONOMOUS INSTITUTION)**

I Year B. Tech. I Semester

**(5G111) PROBLEM SOLVING TECHNIQUES AND INTRODUCTION TO C PROGRAMMING
(Common to ALL branches)**

Course Objectives:

- Introduction to computer peripherals, Software development.
- Describe when and how to use the stand C statement and to Write, Compile and Debug basic C programs using an IDE
- Write and debug programs using an IDE and the principles of designing
- Structured programs when and how to use the appropriate statements available in the C language
- Write basic C programs using , Selection statements, Repetitive statements, Functions, Pointers, Arrays and Strings
- Implementation of C applications for data structures, Sorting and Searching.

Unit I

INTRODUCTION TO COMPUTER PROBLEM SOLVING: Introduction to Computer Systems, Computer Environments, Computer Languages, Introduction to Problem Solving Aspect, Top- down Design, Implementation of Algorithms, Flow Charts, SDLC.

Unit II

INTRODUCTION TO C LANGUAGE: Structure of a C Language program, Creating and Running C programs, Keywords, Identifiers, Data Types, Type def, enumerated Types variables, constants, input/output. Operators and Expressions, precedence and associatively, Type Conversions, Bitwise Operators. Example programs for each topic.

Unit III

C Program Statements, Selection and Decision making Statements-two way selection –if...else statements, multi way selection-switch statements. Loop Control Statements-concept of a loop, Loops in C-while loop, do...while loop, for loop, Other Related Statements -break, continue, goto. Example programs for each topic.

Unit IV

ARRAYS: Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Multidimensional Arrays.

STRINGS: String Basics, String Library Functions, Array of Strings. Example programs for each topic.

Unit V

FUNCTIONS: Library Functions in C, User defined Functions,-declaration, definition, calling of function , types of User defined functions, Parameter passing methods-pass by value, pass by reference, Scope, Storage Classes - Auto, Register, Static, Extern, Scope rules, Type Qualifiers, Recursion - Recursive Functions, Preprocessor Commands. Using Array Elements as Function Arguments. Example programs for each topic.

Text Books:

1. C Programming and Data Structures.B.AForouzan,R. F.Gilberg,Cengage learning, Indian edition.
2. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
3. C and Data Structures, E.Balaguruswamy, Tata McGraw Hill.
4. How to Solve it By Computer ,R.G.Dromey,PHI.

Reference Books:

1. C and Data Structures, A snapshot oriented treatise with live engineering examples, Dr. N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand.
2. LET US C, YeswanthKanitkar, Ninth Edition, BPB Publication.

Course Outcomes:

After completion of the course student will be able to

- Understand the importance of the software development process and System development tools.
- Understand general principles of C programming language and able to write simple program in C. Able to develop programs based on arrays and functions.

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I Year B. Tech. I Semester

**(5G511) ENGINEERING MECHANICS-STATICS
(Common to ME and CE)**

Course Objective:

- This course will serve as a basic course by introducing the concepts of basic mechanics which will help as a foundation to various courses.
- Develop an understanding of the principles of statics and the ability to analyze problems in a systematic and logical manner, including the ability to draw free-body diagrams. Ability to analyze the statics of trusses, frames and machines.

Unit I

INTRODUCTION TO ENGINEERING MECHANICS: Basic concepts - System of forces– Resultant of a force system, Moment of forces and its Application & Couples, Spatial Forces- Components in space, Resultant Equilibrium of system forces, free body diagrams.

Unit II

TYPES OF SUPPORTS: Support reactions for beams with different types of loading – concentrated, uniformly distributed load, uniformly varying loading and couple.

ANALYSIS OF FRAMES (ANALYTICAL METHOD): Types of Frames – Assumptions for forces in members of a perfect frame. Method of Joints, Method of Sections, Cantilever trusses and Simply supported trusses.

Unit III

FRICITION: Types of friction– Static and Dynamic Frictions, laws of Friction–Limiting friction and impending motions–Cone of limiting friction– Motion of bodies – Wedge friction – Ladder friction.

Unit IV

CENTROID AND CENTER OF GRAVITY: Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies –Theorem of Pappu’s and Guldinus Centre of Gravity of Composite figures. (Simple problems only).

Unit V

MOMENT OF INERTIA: Area moment of Inertia - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures,

MASS MOMENT OF INERTIA: Moment of Inertia of Simple solids, Moment of Inertia of composite masses. (Simple problems only)

Text Books:

1. Engineering Mechanics-Statics and Dynamics, A.Nelson, Tata McGraw-Hill Company.
2. Engineering Mechanics, R.K Bansal - Laxmi Publications
3. Singer’s Engineering Mechanics, B. Vijay kumarreddy – B.S. Publishers.
4. Engineering Mechanics, Bhavikatti and Rajasekharappa

Reference Books:

1. Engineering Mechanics by Timoshenko & young, Tata McGraw-Hill Company
2. Engineering Mechanics – B. Bhathacharya- Oxford University Publications
3. Engineering Mechanics –Arthur P. Boreasi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning
4. Engineering Mechanics-Statics & Dynamics—Johnson & Beer

Course Outcomes:

The students are able to

- Use the concepts of force, moment and its application.
- Construct free-body diagrams and to calculate the reactions necessary to ensure static equilibrium.
- Get knowledge of internal forces and moments in members.
- Learn concept of friction and applications.
- Find centroid and centre of gravity of simple and composite bodies.
- Find moment of inertia and polar moment of inertia including transfer methods and their applications.

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I Year B. Tech. I Semester

**(5G512) ENGINEERING GRAPHICS – I
(Common to ME and CE)**

Course Objectives:

- To enable the students with various concepts like Dimensioning, Conventions and standards related to working drawing in order to become professionally efficient.
- To introduce fundamental concepts of curves used in engineering, projection of points, lines and planes.
- To impart and inculcate proper understanding of the theory of projections.
- Able to understand and visualize geometrical curves, projections of lines and planes.

Unit I

INTRODUCTION: Lettering – Geometrical constructions - Curves used in Engineering Practice: Conic Sections– General method only. Special methods: Ellipse – Oblong method, Arcs of circle method, Concentric circles methods - Rectangle method and Tangent method for Parabola - Rectangular Hyperbola.

Unit II

CYCLOIDAL CURVES: Cycloid, Epicycloid and Hypocycloid (treatment of simple problems) – Involute – Square, Pentagon, Hexagon and Circle.

Unit III

PROJECTIONS OF POINTS AND LINES: Projections of Points and Projections of Lines- Inclined to one reference plane - Inclined to both reference planes, Finding the True lengths - Traces.

Unit IV

PROJECTIONS OF PLANES: Projections of regular Plane surfaces inclined to one reference plane and both reference planes.

Unit V

AUXILIARY PLANES: Projection of lines and planes using auxiliary planes.

Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers
2. Engineering Drawing, K.L. Narayana, P. Kanniah, Scitech Pub.

Reference Books:

1. Engineering Drawing and Graphics, Venugopal/ New age.
2. Engineering Drawing, Johle, Tata McGraw-Hill
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education

Course Outcomes:

- Students will be able to know and understand the conventions and the methods of Engineering Graphics.
- Able to understand the application of industry standards and techniques applied in engineering graphics.
- Dimension and annotate two-dimensional engineering drawings.
- Students will be able to improve their visualization skills so that they can apply these skills in developing the new products.

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I Year B. Tech. I Semester

**(5GC16) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB – I
(Common to all branches)**

Course Objectives:

- To train students to use language effectively in everyday conversations
- To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
- To enable the students learn better pronunciation through emphasis on individual speech sounds

The following course content is prescribed for the **English Language Laboratory** sessions:

- 1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants**
- 2. Situational Dialogues and Role-play**
- 3. Telephone Skills**
- 4. Describing Objects / Situation / People**

Manual cum Record, prepared by the Faculty Members of English of the college will be used by Students.

Minimum Requirement:

The English Language Lab shall have two parts:

- **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
- **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V. an LCD projector, a digital stereo –audio & video system and camcorder etc.

Suggested Software:

Sky Pronunciation Suite

Connected Speech from Clarity

Clarity Pronunciation Power – Part I

Mastering English in Vocabulary, Grammar, Spellings, Composition

English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

Dorling Kindersley - Series of Grammar, Punctuation, Composition etc.

Language in Use, Foundation Books Pvt Ltd with CD

Learning to Speak English - 4 CDs

Microsoft Encarta with CD

Cambridge Advanced Learners' English Dictionary with CD.

Murphy's English Grammar, Cambridge with CD.

Course Outcomes:

- The student will be able to express himself fluently in social and professional contexts
- The student will learn how to neutralize his accent

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I Year B. Tech. I Semester

**(5GC17) ENGINEERING CHEMISTRY LAB
(Common to CSE, IT, ME and CE)**

Course Objectives:

- The student will learn practical understanding of the redox reaction.
- The student will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications.
- The student will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology.

LIST OF EXPERIMENTS

Any 10 of the following experiments has to be performed

VOLUMETRIC ANALYSIS

Redox Titrations

1. Estimation of iron (II) using Diphenylamine indicator (Dichrometry – Internal indicator method)
2. Estimation of Chloride ion using potassium Chromite indicator (Mohr's method)

Water analysis

3. Determination of total hardness of water by EDTA method
4. Estimation of Dissolved Oxygen by Winkler's method
5. Determination of acidity of Water
6. Determination of Alkalinity of Water.

Complexometry

7. Determination of Copper by EDTA method

Iodometry

8. Determination of Copper by Iodometry

INSTRUMENTATION

Colorimetry

9. Estimation of Iron in Cement by Colorimetry.

Conductometry

10. Conductometric titration of strong acid Vs strong base (Neutralization titration)

Fuel analysis

11. Determination of Calorific Value of fuel by using Bomb Calorimeter

Lubricants

12. Determination of Viscosity of oils using Redwood Viscometer I
13. Determination of Viscosity of oils using Redwood Viscometer II

PREPARATION OF POLYMERS

14. Preparation of Bakelite
15. Preparation of Thiokol rubber

Manual cum Record: Prepared by the Faculty Members of Engineering Chemistry of the college will be used by Students.

Equipment Required:

- ✓ Analytical weighing balance
- ✓ Digital Conductometer
- ✓ Photo-colorimeter
- ✓ Bomb calorimeter
- ✓ Redwood viscometers
- ✓ Deionizer plant
- ✓ Digital electronic balance

Glassware Required:

Pipettes, burettes, conical flasks, standard flasks, beakers, reagent bottles, spatulas, wash bottles, BOD Bottles, measuring cylinders, glass rods, Bunsen burners, funnels, thermometers etc.

Chemicals Required:

EDTA, Hypo, Mohr Salt Solution, HCl, Sulphuric Acid, Copper Solution, Iron Solution, Potassium Dichromate Solution, Potassium Iodide Solution, Buffer Solution, diphenyl amine, EBT indicator, NaOH solution, Benzoic acid Urea, distilled water etc.

Reference Books:

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.
2. Chemistry Practical – Lab Manual by K.B.ChandraSekhar, G.V. Subba Reddy and K.N.Jayaveera, SM Publications, Hyderabad, 3rd Edition, 2012.

Course Outcomes:

- The student would be confident in understanding of redox systems
- The student would have acquired the practical skill to handle the analytical methods with confidence.
- The student would feel comfortable to think of design materials with the requisite properties
- The student would be in a position to technically address the water related problems.

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I Year B. Tech. I Semester

**(5G113)PROBLEM SOLVING THROUGH C LAB
(Common to ECE, EEE, ME and CE)**

Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:

- Intel based desktop PC with ANSI C/ TURBO C Compiler and Supporting Editors

Exercise 1:

Minimum of 4 programs on Data types, Variables, Constants and Input and Output.

Exercise 2:

Minimum of 4 programs on Operator, Expressions and Type Conversions.

Exercise 3:

Minimum of 4 programs on Conditional Statements [two way and multipath].

Exercise4:

Minimum of 4 programs on Loop Control Statements [for, while and do-While]

Exercise 5:

Minimum of 4 programs on Unconditioned JUMP Statements- break, continue, Goto.

Exercise 6:

Minimum of 4 programs on Declaring Arrays, Referencing Arrays, Array Subscripts. Using for loop for sequential Access.

Exercise 7:

Minimum of 4 programs on Multidimensional Arrays.

Exercise 8:

Minimum of 4 programs on String Basics, String Library Functions and Array of Strings.

Exercise 9:

Minimum of 4 programs on simple user defined functions, Parameter passing methods- pass by value, pass by reference.

Exercise 10:

Minimum of 4 programs on Storage classes- Auto, Register, Static and Extern

Exercise11:

Minimum of 4 programs on Recursive Functions, Preprocessor commands.

Exercise 12:

Minimum of 4 programs on using Array Elements as Function Arguments.

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I Year B. Tech. I Semester

**(5G514) ENGINEERING WORKSHOP
(Common to ME and CE)**

Course Objective:

The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially, know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

1. TRADES FOR EXERCISES:

- A. **CARPENTRY SHOP**– Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 50 x 50 mm soft wood stock
- B. **FITTING SHOP**– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock.
- C. **SHEET METAL SHOP**– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 gauge G.I. sheet.
- D. **HOUSE-WIRING**– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
- E. **FOUNDRY**– Preparation of two moulds (exercises): for a single pattern and a double pattern.
- F. **WELDING** – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint

2. TRADES FOR DEMONSTRATION:

- A. **PLUMBING**
- B. **MACHINE SHOP**
- C. **METAL CUTTING**

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

Reference Books:

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009.
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapooan, Saravana Pandian, 4/e Vikas.
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

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I Year B. Tech. II Semester

**(5GC21) TECHNICAL ENGLISH
(Common to all branches)**

Course Objectives:

- To improve the language proficiency of the students in English with an emphasis on LSRW skills
- To equip the students with comprehension skills to study academic subjects with greater facility.
- To develop English communication skills of the students in formal and informal situations

Unit I

Sure Outcomes: Technology with a Human Face

Grammar: Kinds of Verbs and their Use; Writing: Official Letters; Vocabulary: Synonyms and Antonyms, Prefixes and Suffixes, Idioms and Phrases

Unit II

Sure Outcomes: Climatic Change and Human Strategy

Grammar: Tenses; Writing: Letters of Application; Vocabulary: One-word Substitutes

Unit III

Sure Outcomes: Emerging Technologies: Solar Energy in Spain

Grammar: Types of Sentences: Simple, Compound and Complex; Declarative, Interrogative, Imperative and Exclamatory; Writing: E-mails; Vocabulary: Commonly Confused Words

Unit IV

Sure Outcomes: Water: The Elixir of Life

Grammar: Subject-Verb Agreement; Writing: Official Reports, Technical Reports; Vocabulary: English Spelling, Commonly misspelt words

Unit V

Sure Outcomes: The Secret of Work

Grammar: Active and Passive Voice; Writing: Note-making; Vocabulary: Connotations

Text Book:

Sure Outcomes published by Orient Black Swan (with CD)

- The book prescribed serves as students' handbook. The reader comprises essays which are particularly relevant to engineering students.
- The teacher should focus on developing LSRW skills of students while using the prescribed text and exercises. The classes should be interactive. The students should be encouraged to participate in the classroom proceedings and also to write short paragraphs and essays. The main aim is to encourage two-way communication in place of one-sided lecture.

Reference Books:

1. Essential Grammar in Use, (with CD), Raymond Murphy, 3/e, Cambridge University Press, 2009
2. Basic Communication Skills for Technology, Andrea J Ruthurford, Pearson Education, Asia.
3. English for Technical Communication, AyshaViswamohan, Tata Mc-Graw Hill
4. English Grammar and Composition, David Grene, Mc Millan India Ltd.
5. Murphy's English Grammar, Raymond Murphy, CAMBRIDGE
6. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
7. Communication Skills for Technical Students, Farhathullah, T.M., Orient Blackswan, 2008

8. Developing Communication Skills, 2/e. by Krishna Mohan & Meera Banerji, Macmillan, 2009
9. English for Technical Communication, Vol. 1 & 2, by K. R. Lakshmi Narayanan, Sci tech. Publications.
10. Longman Dictionary of Contemporary English with DVD, Pearson Longman

Course Outcomes:

- The student will demonstrate the ability to guess the contextual meaning of the words and grasp the overall message of the text to draw inferences
- The student will understand the components of different forms of writing
- The student will exhibit effective writing skills through his understanding of English Grammar

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I Year B. Tech. II Semester

**(5GC23) ENGINEERING PHYSICS
(Common to CSE, IT, ME and CE)**

Course Objectives:

- The mission of the Engineering Physics course is to prepare students for careers in engineering where physics principles can be applied to the advancement of technology.
- The Engineering Physics course educates the principles of optical science and engineering necessary to understand optical systems.
- The Crystallography, X-ray diffraction of crystals and crystal defects explains how basic structure modulates properties of materials.
- The principles of quantum mechanics and electron theory of metals gives an idea on basic development of energy in metals.
- The main objective of this course is to provide basic understanding of different engineering materials (semiconductors, magnetic, superconducting and nano materials).

Unit I

PHYSICAL OPTICS, LASERS AND FIBRE OPTICS:

Physical Optics: Introduction - Interference in thin films by reflection – Newton’s Rings – Fraunhofer diffraction due to single slit, double slit and diffraction grating.

Lasers: Introduction - Characteristics of laser – Spontaneous and stimulated emission of radiation - Einstein’s coefficients - Population inversion – Ruby laser - He-Ne laser - Semiconductor laser - Applications of lasers. Holography: Construction and Re-Construction of hologram - Applications

Fiber optics: Introduction– Construction and working principle of optical fiber – Numerical Aperture and acceptance angle – Types of optical fibers – Optical fiber communication system – Applications of optical fibers in communications, sensors and medicine.

Unit II

CRYSTALLOGRAPHY AND ULTRASONICS:

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters – Bravais lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Directions and planes in crystals – Miller indices – Inter planar spacing in cubic crystals – X-ray diffraction - Bragg’s law – Powder method– Defects in solids: point defects and types.

Ultrasonics: Introduction – Properties – Production of ultrasonics by piezoelectric method and detection – Applications in non-destructive testing.

Unit III

QUANTUM MECHANICS AND FREE ELECTRON THEORY:

Quantum Mechanics: Introduction to matter waves – de-Broglie’s hypothesis - Heisenberg’s uncertainty principle - Schrodinger’s time independent wave equation – Significance of wave function - Particle in a one dimensional infinite potential well.

Free electron theory: Classical free electron theory – Sources of electrical resistance – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution – Kronig - Penny model (qualitative) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

Unit IV

SEMICONDUCTORS AND MAGNETIC MATERIALS:

Semiconductors: Introduction – Intrinsic and extrinsic semiconductors – Drift & diffusion currents and Einstein’s equation – Hall Effect - Direct and indirect band gap semiconductors – Working principle of p-n junction diode, LED and photodiode.

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magneton – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials – Hysteresis - Soft and hard magnetic materials and applications.

Unit V

SUPERCONDUCTIVITY AND NANOMATERIALS:

Superconductivity: Introduction –Properties of superconductors - Meissner effect – Type I and type II superconductors – Flux quantization – London penetration depth – BCS theory (qualitative) –ac and dc Josephson effects- Applications of superconductors.

Nanomaterials: Introduction - Significance of nanoscale –Basic principles of nano materials (Surface area and quantum confinement) – Physical properties: optical, thermal, mechanical and magnetic properties –Synthesis of nanomaterials: ball mill, chemical vapor deposition, sol-gel, plasma arcing methods – Carbon nanotubes (CNT) and properties – Applications of nanomaterials.

Text Books:

1. Engineering physics –K.Thyagarajan, MacGraw Hill Publishers,2013.
2. Engineering Physics – S. ManiNaidu, Pearson Education, I Edition, 2012.
3. Engineering physics –P.K.palanisamy,scietech publisher,Edition,2013.

Reference Books:

1. Engineering Physics – RV.S.S.N. Ravi Kumar and N.V. Siva Krishna, Maruthi Publications , 2013
2. Engineering Physics – D.K.Battacharya and A.Bhaskaran,OxfordHeigher Education I Edi 2010.
3. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning, I Edition, 2012.
4. Engineering Physics – D.K.Bhattacharya and A.Bhaskaran, Oxford University press.
5. Engineering Physics – M. Arumugam, Anuradha Publications II Edition, 1997.
6. Engineering physics – M.N. Avadhanulu and P.G. KrshiSagar, Chand and Co, Revised Edi 2013.
7. Solid State Physics – A.J. Dekkar, McMillan Publishers, Latest edition, 2012.
8. Engineering Physics – Gaur and Gupta Dhanapati, RaiPublishers , 7th Edition, 1992.
9. Text book of Nanoscience and Nanotechnology: B S Murthy, P.Shankar, Baldev Raj B B Rath, James Murday, University Press, I Edition, 2012.

Course Outcomes:

The student is able to

- Understand basic principles of optics, optical engineering materials and incorporation of optics in engineering field.
- Identify different types of crystal structures in materials and x-ray diffraction through crystals.
- Know about importance of ultrasonic's in engineering field.
- Analysis of basic concepts of quantum mechanics and electron theory and consequences.
- Explain about basic mechanism of different types of advanced materials used in engineering field.
- Get brief idea about synthesis, properties and applications of nano materials.

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I Year B. Tech. II Semester

**(5GC24) ENGINEERING MATHEMATICS – II
(Common to all branches)**

Course Objectives:

The course aims to provide the student with the ability

- To apply this knowledge to evaluate the multiple integrals in real life situations.
- To apply the knowledge of Laplace transforms and vector calculus for engineering problems

Unit I

Multiple integral: –Double integral – Evaluation - Change of Variables - Change of order of integration- Area and volumes using double integral. Triple integral - Evaluation.

Unit II

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Second shifting theorem– Laplace transform of Periodic functions – Inverse Laplace transform – Convolution theorem.

Unit III

Application of Laplace transforms to ordinary differential equations of first and second order.

Unit IV

Vector Calculus: Scalar and vector point functions, Gradient and its geometrical interpretation, Divergence –physical interpretation of divergence, Curl -physical interpretation of curl, Del applied twice to point functions, Line integral - Area, Surface and volume integrals.

Unit V

Vector Integral Theorems: Green's theorem – Stoke's theorem and Gauss's Divergence Theorem (without proofs) and their applications.

Text Book:

Higher Engineering Mathematics, B. S. Grewal, Khanna publishers- 43rd Edition (2014)

Reference Books:

1. Higher Engineering Mathematics, by Kreyszing
2. A Text Book of Engineering Mathematics, B.V. Ramana, Tata McGraw Hill.
3. A Text Book of Engineering Mathematics, Vol – 1, T.K.V. Iyengar, B. Krishna Gandhi and others, S. Chand & Company.

Course Outcomes:

Upon completion of the course, students should be able to

- Understand the concepts of applications of integration.
- Have the knowledge of Laplace transforms and their applications.
- Master vector integral theorems.

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I Year B. Tech. II Semester

**(5G121) C PROGRAMMING AND DATA STRUCTURES
(Common to ALL branches)**

Course Objectives:

- Structured programs when and how to use the appropriate statements available in the C language
- Write basic C programs using , Selection statements, Repetitive statements, Functions, Pointers, Arrays and Strings
- Implementation of C applications for data structures, sorting and searching.

Unit I

Pointers - Introduction, Features of Pointers, Pointer Declaration and Definition, Void Pointers, pointers for inter function communication, Pointers to Pointers, Pointer Applications: arrays and pointers, pointer arithmetic, Dynamic Memory Allocation, Pointers to Functions, pointer to void and command line arguments.

Unit II

Structures – Definition, initialization, accessing structures, nested structures, array of structures, structures and functions. Pointers and Structures. Unions. Sample programs

Files: Introduction to Streams and Files, Standard library input / output functions, formatted input / output functions, character input/output functions; Text verses binary Streams, Standard library functions for files. File examples.

Searching and Sorting - Exchange (Bubble) Sort, Selection Sort, Quick Sort, Insertion Sort, Merge Sort, Searching- Linear and Binary Search Methods.

Unit III

Data Structures: Overview of Data Structure. **Stack:** Representation of a Stack, Operation on a Stack, Implementation of a Stack using Arrays and Pointers, Representation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Recursion.

Queues: Representation of Queue, Insertion, Deletion, Searching Operations, Circular Queues.

Unit IV

Linked List: Singly Linked List, Linked List with and without header, Insertion, Deletion and Searching Operations.

Doubly Linked List: Insertion, Deletion and Searching Operations.

Circular Linked List: Insertion, Deletion and Searching Operations.

Unit V

Trees: Introduction to Trees, Binary Trees, creation of binary tree, Operations on Binary Tree. Introduction to Binary Search Tree, Operations on Binary Search Trees.

Graphs: Defining graph, basic terminology, graph representation.

Text Books:

1. C Programming and Data Structures. B.A Forouzan, R. F. Gilberg, Cengage learning, Indian edition.
2. Programming in C and Data Structures, J.R. Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
3. Data Structures and Algorithms: Concepts, Techniques and Applications G.A.V. Pai [UNIT-V]

Reference Books:

1. C and Data Structures, A snapshot oriented treatise with live engineering examples, Dr. N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand.
2. LET US C, YeswanthKanitkar, Ninth Edition, BPB Publication.

Course Outcomes:

- Understand the purpose of pointers for parameter passing, referencing and dereferencing and understands the concepts of structures, unions and File management.
- Understand what and how to design data structure programs using C programming language.
- Understand how to solve applications like searching and sorting using C Programming language.

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I Year B. Tech. I Semester

**(5G521) ENGINEERING MECHANICS-DYNAMICS
(Common to ME and CE)**

Course Objective:

- This course will serve as a basic course by introducing the concepts of Basic mechanics which will help as a foundation to various courses.
- To teach the basic principles of particle and rigid body kinematics and kinetics. Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.

Unit I

KINEMATICS OF PARTICLES: Introduction, motion of particle, displacement, velocity and acceleration, Rectilinear motion, Rectilinear motion Along X-axis, Uniformly Accelerated motion, motion curves, rectilinear motion along vertical Y-axis

CURVILINEAR MOTION: introduction, rectangular coordinates, projectile motion, tangential and normal components of acceleration, radial and transverse components of acceleration.

Unit II

KINEMATICS OF RIGID BODIES: Introduction, rotational motion about a fixed axis, rotational motion with constant angular acceleration, rotational motion with constant angular velocity, relationship between angular and linear motions, general plane motion.

Unit III

KINETICS OF PARTICLES: Introduction, laws of motion, mass of bodies in rectangular coordinates, motion of connected bodies, D’alembert’s principle, variable acceleration, tangential and normal components of acceleration, Virtual work method.

Unit IV

WORK AND ENERGY: Introduction, work done by a force, work done by a variable force, work done in stretching a spring, power, energy, work done by internal forces, potential energy.

IMPULSE AND MOMENTUM: Introduction, impulsive force, impulse and momentum, non-impulsive force, impact of jet on plates or vanes.

Unit V

KINETICS OF RIGID BODIES: Introduction, system of particles, translational motion of a system of particles, rotational motion of system of particles, kinetic equations of motion for a rigid body, work energy method.

Text Books:

1. Engineering Mechanics-Statics and Dynamics, A.Nelson, Tata McGraw-Hill Company.
2. Engineering Mechanics, R.K Bansal - Laxmi Publications
3. Singer’s Engineering Mechanics, B. Vijay kumarreddy – B.S. Publishers.
4. Engineering Mechanics, Bhavikatti and Rajasekharappa

Reference Books:

1. Engineering Mechanics by Timoshenko & young, Tata McGraw-Hill Company
2. Engineering Mechanics – B. Bhathacharya- Oxford University Publications
3. Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning
4. Engineering Mechanics-Statics & Dynamics—Johnson & Beer

Course Outcomes:

The students are able to

- Understand basic kinematics concepts – displacement, velocity and acceleration (and their angular counterparts).
- Understand basic dynamics concepts – force, momentum, work and energy
- Understand and be able to apply Newton’s laws of motion.
- Understand and be able to apply other basic dynamics concepts - D’alembert’s principle, the Work-Energy principle, Impulse-Momentum principle and the coefficient of restitution.

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I Year B. Tech. I Semester

**(5G522) ENGINEERING GRAPHICS – II
(Common to ME and CE)**

Course Objectives:

- To impart and inculcate proper understanding of the theory of projections of solids and simple machine components.
- Able to visualize projections of solids with sectioning, isometric views and orthographic views.
- To prepare the student for future engineering positions.

Unit I

PROJECTIONS OF SOLIDS: Projections of Regular Solids – Cylinder, Cone, Prism and Pyramid - inclined to one reference plane & both reference planes – Auxiliary Views.

Unit II

SECTIONS OF SOLIDS: Section Planes and Sectional views of Right Regular Solids–Prism, Cylinder, Pyramid and Cone. True shapes of the sections.

Unit III

DEVELOPMENT OF SURFACES: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid, Cone and their Sectioned parts.

INTERPENETRATION OF RIGHT REGULAR SOLIDS: Projections of curves of Intersection of Cylinder Vs Cylinder - Cylinder Vs square prism – Cylinder Vs Cone and Square prism Vs Square prism (Axis bisecting problems only).

Unit IV

ISOMETRIC PROJECTIONS / VIEWS: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids.

Unit V

CONVERSION OF VIEWS: Conversion of Isometric views to Orthographic Views and Conversion of Orthographic views to Isometric views.

Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers
2. Engineering Drawing, K.L. Narayana, P. Kanniah, Scitech Pub.

Reference Books:

1. Engineering Drawing and Graphics, Venugopal/ New age.
2. Engineering Drawing, Johle, Tata McGraw-Hill
3. Engineering Drawing, Shah and Rana, 2/e, Pearson Education

Course Outcomes:

- Comprehend general projection theory, with an emphasis on the use of orthographic projection to represent three-dimensional objects in two-dimensional views.
- Able to apply auxiliary or sectional views to most practically represent engineered parts.
- Can employ freehand 3D pictorial sketching to aid in the visualization process and to efficiently communicate ideas graphically.
- Analyze a drawing and bring out any inconsistencies to put forth inferences graphically.

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I Year B. Tech. II Semester

**(5GC26) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB - II
(Common to all branches)**

Course Objectives:

- To enable a learner sharpen his public speaking skills
- To expose the students to a varied blend of self-instructional, learner-friendly modes of language learning
- To enable the student learn better pronunciation through emphasis on word accent, intonation, and rhythm

The following course content is prescribed for the **English Language Laboratory** sessions:

1. Introduction to Stress and Intonation
2. 'Just A Minute' (JAM)
3. Oral Presentations
4. Information Transfer

Manual cum Record, prepared by the Faculty Members of English of the college will be used by Students.

Minimum Requirements:

The English Language Lab shall have two parts:

- **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
- **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V. an LCD projector, a digital stereo –audio & video system and camcorder etc.

Suggested Software:

- Sky Pronunciation Suite
- Connected Speech from Clarity
- Clarity Pronunciation Power – Part I
- Language in Use, Foundation Books Pvt Ltd with CD
- Learning to Speak English - 4 CDs
- Cambridge Advanced Learners' English Dictionary with CD.
- Murphy's English Grammar, Cambridge with CD

Course Outcomes

- The student will enhance his skills to make a presentation confidently
- The student will learn how to neutralize his accent
- The student will be able to decipher information from graphics and describe it professionally

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I Year B. Tech. II Semester.

**(5GC28) ENGINEERING PHYSICS LAB
(Common to CSE, IT, ME and CE)**

Course Objectives:

- The student will be able to handle and understand different apparatus to perform experiments.
- The student will learn practical measurement of different physical quantities.
- The student will be able to characterize the materials and their properties.
- The student will be allowed to learn practical experience of theory conceptual values.

LIST OF EXPERIMENTS

Any 10 of the following experiments has to be performed

1. Determination of wavelengths of various colors of mercury spectrum using diffraction grating in normal incidence method
2. Determination of dispersive power of the prism
3. Determination of thickness of thin object by wedge method
4. Determination of radius of curvature of lens by Newton's Rings
5. Laser : Diffraction due to single slit
6. Laser : Diffraction due to double slit
7. Laser: Determination of wavelength using diffraction grating
8. Determination of Numerical aperture of an optical fiber
9. Meldi's experiment: Determination of the frequency of tuning fork
10. Determination of particle size by using laser.
11. Energy gap of a material using p-n junction diode
12. Hall effect : Determination of mobility of charge carriers in Semiconductor
13. B-H curve
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
15. Determination of rigidity modulus –Torsional pendulum

Manual cum Record:

Prepared by Engineering Physics Faculty Members of Annamacharya Institute of Technology and Sciences.

Reference Books:

1. Engineering Physics Practicals – Dr. B. Srinivasa Rao V.K.V. Krishna K.S Rudramamba
2. Engineering Practical Physics – S.L Kakani& Shubra Kakani

Equipment Required:

- Spectrometers
- Microscopes
- Meldi's apparatus
- Stewart-Gee's apparatus
- Torsional pendulum
- Light sources
- Optical fiber cables

Course Outcomes:

- The student would be confident in handling apparatus to perform experiments.
- The student would have developed practical skill.
- The student would have knowledge in practical values and applications

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I Year B. Tech. II Semester

(5G123) PROGRAMMING IN C AND DATA STRUCTURES LAB

(Common to ECE, EEE, ME and CE)

Course Objectives:

- To make the student learn a programming language.
- To teach the student to write programs in C to solve the problems.
- To introduce the student to simple linear data structures such as lists, stacks, queues.

Recommended Systems/Software Requirements:

Intel based desktop PC with ANSI C/ TURBO C Compiler and Supporting Editors

Exercise 1

Minimum of 4 Programs on pointer basics [declaration, A, Pointers, pointers for inter function communication.

Exercise 2.

Minimum of 4 Programs on Pointers applications.

Exercise 3

Minimum of 4 programs on structures and unions

Exercise 4

Minimum of 4 programs on basic File operations.

Exercise 5

Minimum of 4 programs on searching and sorting techniques .

Exercise 6

Implementation of Stack and perform all Stack operations using
i) Arrays ii) Pointers

Exercise 7

Implementation of Queue and perform all Queue operations using
i) Arrays ii) Pointers

Exercise 8

Implement Circular Queue (its operations) using
i) Arrays ii) Pointers

Exercise 9

Implementation of Single Linked List and its operations using
i) Arrays ii) Pointers

Exercise 10

Implementation of Double Linked List and its operations using
i) Arrays ii) Pointers

Exercise 11

Implementation of Circular Linked List and its operations using
i) Arrays ii) Pointers

Exercise 12

C program that uses Stack operations to perform the following:
i. Write Converting infix expression into postfix expression
ii. Evaluating the postfix expression

Exercise 13

Implement Binary Tree using Double Linked List and its operations.

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I Year B. Tech. II Semester

**(5G124) I.T. WORKSHOP
(Common to ME and CE)**

Course Objectives:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching.

Preparing your Computer

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating System: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: Operating System Features: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimping activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell

checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper linking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Optional Tasks:

Task 11: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

Task 12: Software: Students may submit a report on specifications of various software that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. The software may be proprietary software or Free and Open source software. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop operating system
- Server operating system
- Antivirus software
- MATLAB
- CAD/CAM software
- AUTOCAD

Reference Books:

1. Introduction to Computers, Peter Norton, Mc Graw Hill
2. MOS study guide for word, Excel, Powerpoint & Outlook Exams”, Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, maintaining & Repairing PCs”, Bigelows, TMH

Course Outcomes:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer.

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II Year B. Tech. I Semester

**(5GC31) ENGINEERING MATHEMATICS – III
(Common to CIVIL & ME)**

Course Objective:

- This course aims at providing the student with the concepts of Matrices, Numerical differentiation and Numerical integration, Numerical solution of ordinary differential equations, Fourier series, partial differential equations, complex variables and complex integrations which find the applications in engineering.
- Our emphasis will be more on the logical and problem solving development in the Numerical methods and its applications.

Unit I

Rank – Echelon form Solution of Linear System of Homogenous and Non Homogeneous equations- Eigen values-Eigen vectors-properties, Cayley -Hamilton theorem-inverse and powers of a matrix by Cayley Hamilton theorem.

Unit II

Solution of algebraic and transcendental equations-Bisection method-Method of false position-Newton- Raphson method-Interpolation-Forward differences-Backward differences-Newton's forward and backward difference formulae – Lagrange's interpolation formula.

Numerical Differentiation-Numerical integration-Trapezoidal Rule-Simpson's one third Rule-Simpson's $3/8^{\text{th}}$ Rule (without proofs).

Unit III

Numerical solutions of ordinary differential equations-Taylor's series-Euler's method-Picard's method- Runge-kutta fourth order method-Milne's predictor-corrector method (Without proofs).

Unit IV

Fourier series-Determination of Fourier coefficients-Fourier series-Even and Odd functions-Fourier series in an arbitrary interval-even and odd periodic continuation- Half –range Fourier sine and cosine expansions.

Partial differential equations: Formation of partial differential equations by eliminating arbitrary constants and functions--Method of separation of variables

Unit V

Functions of complex variable –continuity-differentiability-Analyticity-Properties-Cauchy Riemann equations in Cartesian and polar co-ordinates(without proofs).Harmonic and conjugate harmonic functions-Milne-Thomson's method.

Complex integration: Cauchy's integral theorem-Cauchy's integral formula-Generalized integral formula (without proofs).

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal, 40th Edition, Khanna Publishers, New Delhi.
2. A text book of Mathematical Methods, E. Keshava Reddy, and G. Sankara Rao, I. K. International.

Reference Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 8th Edition, New Age International (Pvt) Limited.
2. A text book of Engineering Mathematics, B. V. Ramana, Tata McGraw Hill.
3. Mathematics - II, T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
4. Mathematics - III, E. Keshav Reddy and Rukmangadachari, Pearson Education.

Course Outcomes:

- The student becomes familiar with the application of Mathematical techniques like Fourier series.
- The student gains the knowledge to tackle the engineering problems using the concepts of Fourier series, Partial differential equations and Numerical Methods.

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II Year B. Tech. I Semester

(5G538) ELECTRICAL & MECHANICAL TECHNOLOGY

Course Objectives:

- In this course the different types of DC generators and motors, Transformers, 3 Phase AC
- Machines which are widely used in industry are covered and their performance aspects will be studied.

In end examination minimum of two questions from each **Part-A & Part-B** should be chosen for answering **FIVE** questions. All questions carry equal marks.

Use separate booklets for Part-A & Part-B

**PART –A
ELECTRICAL TECHNOLOGY**

Unit I

ELECTRICAL CIRCUITS & DC MACHINES: Electric current, Potential Difference, Power, Energy, Ohm's law, Kirchoff's laws, RLC elements, Principle of Operation of DC Generator & Motor, Construction, Types-Applications.

Unit II

AC MACHINES: Principle of operation of 1- ϕ Transformers, Losses, Efficiency, Regulation, Principle of operation of 3- ϕ Induction motor Expression for Torque, Torque- slips Characteristics, Operation of Alternators, Applications.

**PART –B
MECHANICAL TECHNOLOGY**

Unit III

WELDING PROCESSES: Introduction to welding - classification of welding processes - Arc welding and gas welding – Equipment, welding fluxes and filler rods – Submerged arc welding, TIG and MIG processes.

Unit IV

INTERNAL COMBUSTION ENGINES : Introduction, Classification and Main components of IC Engines – Working principle of petrol and diesel engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Lubrication and fuel systems of petrol and diesel engines.

AIR COMPRESSORS AND EARTH MOVING MACHINERY: Working principles of air compressors – Reciprocating air compressor: single and multi stage compression.

Unit V

REFRIGERATION AND AIR CONDITIONING: Terminology of refrigeration and air conditioning – Refrigerants and their desirable properties – Methods of refrigeration: Vapour compression and vapour absorption systems - Basic principles of air conditioning – Room air conditioning systems - Comfort air conditioning systems.

Text Books:

1. Electrical Technology by B.L.Thareja, S.Chand Publishers.
2. Introduction to Electrical Engineering - M.S Naidu and S. Kamakshaiah, Tata McGraw-Hill Publications Ltd., New Delhi, 2009.
3. Mechanical Technology by R.S. Khurmi.
4. Mechanical Technology by Kodandaraman C.P.
5. Construction Planning; Equipment and Methods – Peurifoy.

Course Outcomes:

After the completion of the course, the student should be able

- To predict the behaviour of electrical circuits.
- To identify the type of electrical machine used for that particular application.
- To identify various electronic devices and CRO parts.

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II Year B. Tech. I Semester

(5G631) STRENGTH OF MATERIALS – I

Course Objective:

- The subject provides the knowledge of simple stress strains flexural stresses in members, shear stresses and deflection in beams so that the concepts can be applied to the Engineering problems.

Unit I

SIMPLE STRESSES AND STRAINS:-Elasticity and plasticity –Types of stresses and strains – Hooke’s law–stress –strain diagram for mild steel– Working stress –Factor of safety –Lateral strain, Poisson’s ratio and volumetric strain –Elastic moduli and the relationship between them– Bars of varying section –composite bars– Temperature stresses.

Strain energy –Resilience –Gradual, sudden, impact and shock loadings –simple applications.

Unit II

SHEAR FORCE AND BENDING MOMENT: Definition of beam–Types of beams– Concept of shear force and bending moment– S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads and combination of these loads– Point of contra flexure –Relation between S.F, B.M and rate of loading at a section of a beam.

Unit III

FLEXURAL STRESSES: Theory of simple bending –Assumptions –Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis–Determination of bending stresses– section modulus of rectangular and circular sections(Solid and Hollow), I, T,L Angle and Channel sections –Design of simple beam sections.

SHEAR STRESSES: Derivation of formula– Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T., L angle sections.

Unit IV

DEFLECTION OF BEAMS 1: Bending into a circular arc– slope, deflection and radius of curvature –Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods.

DEFLECTION OF BEAMS 2: Determination of slope and deflection for cantilever and simply supported beams subjected to point loads,-U.D.L. Uniformly varying load.-Mohr’s theorems – Moment area method– application to simple cases including overhanging beams – deflections of propped cantilevers for simple loading cases .

Unit V

PRINCIPAL STRESSES AND STRAINS: Introduction– Stresses on an inclined section of a bar under axial loading– compound stresses– Normal and tangential stresses on an inclined plane for biaxial stresses– Two perpendicular normal stresses accompanied by a state of simple shear– Mohr’s circle of stresses– Principal stresses and strains –Analytical and graphical solutions.

THEORIES OF FAILURES: Introduction– Various Theories of failures like Maximum Principal stress theory– Maximum Principal strain theory–Maximum shear stress theory– Maximum strain energy theory –Maximum shear strain energy theory.

Text Books:

1. Mechanics of Materials – Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi publications
2. Strength of Materials by R. Subramanian, Oxford University Press.
3. Strength of materials by Dr, R. K.Bansal – Laxmi publications.

Reference Books:

1. Mechanics of Solids, by Ferdinand Beer and others– Tata Mc. Grawhill Publications 2000.
2. Strength of Materials by Schaum's outline series –Mc.Grawhill International Editions.
3. Strength of Materials by S. Ramakrishna and R. Narayan– Dhanpat Rai Publications.
4. Strength of materials by R. K. Rajput, S. Chand & Co, New Delhi.
5. Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Delhi.
6. Strength of Materials by Bhavi Katti.

Course Outcomes:

- The students would be able to understand the behavior of materials under different stress and strain conditions.
- The students would be able to draw bending moment, shear force diagram, bending stress and shear stress distribution for beams under the different conditions of loading.
- The student would be able to apply knowledge to analyse concept of deflection, bending moment and shear force diagram in beams, frames, trusses and columns under various loading conditions using different analysis methods.
- The student would be able to apply knowledge to determine forces in determinate and indeterminate structures by the force and matrix method.
- The students would be able to perform ILD analysis of determinate beams and trusses.

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II Year B. Tech. I Semester

(5G632) SURVEYING

Course Objectives:

- To ensure that the student develops knowledge of the basic and conventional surveying instruments, principles behind them, working of the instruments, plotting of the area from the field measurements, determination of the area and the theory behind curves.
- To ensure that the student develops knowledge in the working of advanced instruments, setting out of curves from the field measurements and basic knowledge on remote sensing.

Unit I

LINEAR MEASUREMENTS AND CHAIN SURVEYING: Principle – Classification - Accuracy and errors - Linear measurements – Direct measurements - Instruments for chaining – Ranging out survey lines – Errors in chaining – Tape corrections - Chain triangulation -Field book - Instruments for setting right angles - Basic problems in chaining - Obstacles for chaining.

COMPASS: Compass Survey: Types of compass – Bearings - Included angles– Declination - Dip and local attraction.

Unit II

LEVELING AND CONTOURING: Types of levels - Dumpy level and tilting level - Temporary and permanent adjustments - Height of instrument and rise and fall methods - Effect of curvature and refraction - Characteristics of contours - Direct and indirect methods of contouring and plotting of contours - Uses of contour maps.

COMPUTATION OF AREAS AND VOLUMES: Areas: Areas dividing into number of triangles - By offsets to a base line - By latitudes and departures (D.M.D. and D.P.D) – By coordinates - Areas from maps. Volumes : Volume from cross-section - Embankments and cutting for a level section and two level sections with and without transverse slopes .

Unit III

THEODOLITE: Description and uses of vernier micrometer – Micro-optic theodolites – Temporary and permanent adjustments of vernier transit – Measurement of horizontal and vertical angles – Heights and distances – Traversing – Closing error and distribution – Gale's traverse table – Omitted measurements.

Unit IV

PLANE TABLE SURVEYING: Plane Table Survey: Components – Setting – Methods – Radiation– Traversing - Intersection and Resection

TACHEOMETRIC SURVEYING: Principle of stadia method – Distance and elevation formulae for staff held vertical –Instrumental constants – Anallactic lens – Tangential method – Use of subtense bar –Tachometric contouring.

Unit V

CURVES: Types of curves - Linear and angular methods of setting out of simple curves – By offsets from long chord – By offsets from tangents - By successive bisection of arcs of chords – By offsets from chords produced – Two Theodolite methods, Introduction to EDM , basic concepts & total station .

Text Books:

1. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Surveying - Vol. I, II and III, 15th Edition, Laxmi Publications (P) Ltd., New Delhi, 2010.
2. S. K. Duggal, Surveying - Vol. I and II, 3rd Edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2010.

Reference Books:

1. R. Subramanian, Surveying and Leveling, 1st Edition, Oxford University Press, New Delhi, 2010.
2. Arthur R. Benton and Philip J. Taety, Elements of Plane Surveying, 3rd Edition, McGraw Hill, 2010.
3. Arora, K. R., Surveying - Vol. I, II and III, 10th Edition, Standard Book House, Delhi, 2011.
4. Chandra, A.M, Plane Surveying, 2nd Edition, New Age International Publishers, New Delhi, 2010.

Course Outcomes

- The students would be able to do temporary and permanent adjustments.
- The students would be able to measure distances and angles.
- The students would be able to orient and draw the various maps.
- The students would be able to calculate areas and volumes of the earth work.
- The student would be able to undertake various civil engineering surveys and convert the data into usable forms.

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II Year B. Tech. I Semester**(5G633) FLUID MECHANICS****Course Objective:**

- This subject introduces the basic concepts of fluids, their behavioural properties, analyzing the fluid flows using primary equations. This subject further deals with various flow measuring devices and concepts of boundary layer flows.

Unit I

PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENTS: Dimensions and units – Physical properties of fluids – Mass density-specific weight- specific volume- specific gravity - ideal and real fluids-Newtonian and non-Newtonian fluids – Viscosity - Surface tension -Vapour pressure and their influences on fluid motion - Pressure at a point - Pascal’s law - Hydrostatic law - Atmospheric, gauge and absolute pressures - Measurement of pressure - Pressure gauges – Manometers - Differential and micro manometers.

HYDROSTATIC FORCES: Hydrostatic forces on submerged plane surfaces – Total pressure and centre of pressure on plane and curved surfaces – Calculation of total pressure from pressure diagrams.

Unit II

FLUID KINEMATICS : Description of fluid flow - Stream line – Path line and streak lines - Stream tube - Classification of flows - Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one dimensional flows – stream and velocity potential functions - Flow net and its uses.

FLUID DYNAMICS: Surface and body forces – Euler’s and Bernoulli’s equations for flow along a stream line – Momentum equation and its application – Momentum and kinetic Energy correction factors – Forces on pipe bend.

Unit III

CLOSED CONDUIT FLOW: Major loss- Darcy Weisbach equation - Minor losses – Pipes in series – Pipes in parallel – Total energy line and hydraulic gradient line - Pipe network problems - Variation of friction factor with Reynolds’s number – Moody’s chart.

MEASUREMENT OF FLOW: Pitot tube - Venturimeter and orifice meter – Orifices and mouthpieces - Rectangular, triangular and trapezoidal notches – Broad crested weirs.

Unit IV

LAMINAR AND TURBULENT FLOW: Reynold’s experiment -Characteristics of laminar and turbulent flows – Laminar flow through circular pipes - Flow between parallel plates – Hydro dynamically smooth and rough boundaries.

Unit V

HYDRAULIC SIMILITUDE: Dimensional analysis - Rayleigh’s method and Buckingham’s pi theorem - Model studies – Geometric, kinematic and dynamic similarities - Dimensionless numbers – Model laws – Scale effects.

Text Books:

1. P.N. Modi and S.M. Seth, Hydraulics and Fluid Mechanics, 18th Edition, Standard Book House, Delhi, 2011.
2. R.K. Bansal, Fluid Mechanics and Hydraulic Machines, 9th Edition, Laxmi Publishers, New Delhi, 2011.

Reference Books:

1. R.K. Rajput, Fluid Mechanics and Hydraulic Machinery, 4th Edition, S. Chand Publishers, New Delhi, 2010.
2. J.F. Douglas, J.M. Gaserek and J.A. Swaffirld, Fluid Mechanics, 5th Edition, Longman, 2010.

3. A.K. Mohanty, Fluid Mechanics, 2ndEdition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
4. S.K. Som and G. Biswas, Introduction to Fluid Machines, 2ndEdition, Tata McGraw-Hill Publishers Pvt. Ltd, 2010.

Course Outcomes:

- The students should be able to operate the equipment according to its working principles.
- The students should be able to take the observations for evaluating equipment performance.
- The students should be able to find out the hydraulic coefficients of equipment's.
- The students should be able to select the equipments as per requirements to solve practical problems.
- The students should be able to analyse the experimental and theoretical performance of equipments.

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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II Year B. Tech. I Semester

(5G634) BUILDING MATERIALS AND CONSTRUCTION

Course Objective:

- To give the students a basic idea about the construction materials, building components and to introduce component methodologies.

Unit I

STONES AND BRICKS: Properties of building stones – relation to their structural requirements. Classification of stones – Stone quarrying – precautions in blasting, Dressing of stone, Composition of good brick earth, various methods of manufacture of bricks. Comparison between clam burning and kiln burning.

Unit II

ROOFING MATERIALS Characteristics of good tile – manufacturing methods, Types of tiles. Use of Materials like aluminium, gypsum, glass and bituminous materials – their quality.

LIME & CEMENT : Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime, various ingredients of cement ,types of cement .

Unit III

WOOD: Structure – properties – Seasoning of timber. Classification of various types of woods used in buildings – Defects in timber. Alternative materials for wood, Galvanized Iron, Fiber-reinforced plastics, steel, Alluminium

Unit IV

MASONARY : Types of masonry, English and Flemish bonds , Rubble and Ashlar masonry, cavity and partition walls.

FOUNDATIONS: Shallow foundations – Spread, combined strap and mat footings.

Unit V

BUILDING COMPONENTS: Lintels, Arches, stair cases – Types. Different types of floors- Concrete, Mosaic, Terrazo floors, Pitched, flat and curved Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs- King and Queen Post Trusses. RCC Roofs.

FINISHINGS: Damp proofing- materials used. Plastering, pointing, white washing and distempering – Painting – Constituents of a paint – Types of paints – Painting of new / old Wood – Varnish – Form work and scaffolding.

Text Books:

1. Building material by S K Duggal – New Age International Publishers; Second Edition.
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
3. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
4. Building materials by R.S.Rangwala,Charotar publications

Reference Books:

1. R.Chudly “Construction Technology “– Volumes I and II” 2nd Edition, Longman, UK, 1987.
2. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.

Course Outcomes

- Student would have a basic knowledge about the planning of the residential as well as public building.
- Student would have knowledge of preparation of the working drawing.
- Student will be able to prepare of submission drawing according to the local bylaws.

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II Year B. Tech. I Semester

**(5GC35) APTITUDE AND REASONING SKILLS
(Common to CE, ME and CSE)**

Quantitative Aptitude:

- Number Systems, Averages, Problems on ages, Allegations, Percentages, Profit and Loss, Simple interest and Compound Interest, Ratio and Proportions and Variation, Time and Work, Time and Distance, Mensuration, Functions, Set Theory, Permutation and Combinations, Probability, Progressions, Inequalities, Coordinate Geometry, Quadratic Equations, Logarithms.
- HCF and LCM, Decimal Fractions, Simplification, Square Roots and Cube Roots, Surds and Indices, Pipes and cisterns, Area, Volume and Surface Areas, Races and Games, Calendar, Clocks, Stocks and Shares, True Discount, Banker's Discounts.
- Data Interpretation, Tabulation, Bar Graphs, Pie Charts, Line Graphs.

Reasoning:

Directions, Blood Relations, Problems on cubes, Series and sequences, odd man out, Coding and decoding, Data Sufficiency, logical deductions, Arrangements and Combinations, Groups and Teams, General Mental Ability, Puzzles to puzzle you, More Puzzles, Brain Teasers, Puzzles and Teasers.

Reference Books:

1. Arun Sharma, *How to Prepare for Quantitative Aptitude*, TMH Publishers, New Delhi, 2003.
2. R.S. Agarwal, *Quantitative Aptitude*, S.Chand Publishers, New Delhi, 2005.
3. Sharon Weiner-Green, Ira K. Wolf, *Barron's GRE*, Galgotia Publications, New Delhi, 2006.
4. R.S Agarwal, *Verbal and Non-Verbal Reasoning*, S. Chand Publishers, New Delhi, 1998.
5. Shakuntala Devi, *Puzzles to Puzzle You*, Orient Paper Backs Publishers (OPB), New Delhi, 2005.
6. Shakuntala Devi, *More Puzzles*, OPB, New Delhi, 2006.
7. Ravi Narula, *Brain Teasers*, Jaico Publishing House, New Delhi, 2005.

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II Year B. Tech. I Semester

(5G635) SURVEYING LAB – I

Course Objectives:

- To impart the practical knowledge in the field, it is essential to introduce in curriculum.
- Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.

LIST OF EXERCISES:

1. Survey of an area by chain survey (closed traverse) & Plotting
2. Chaining across obstacles
3. Determination of distance between two inaccessible points with compass.
4. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
5. Radiation method, intersection methods by plane Table survey
6. Two point and three point problems in plane table survey
7. Traversing by plane table survey
8. Fly leveling (differential leveling)
9. An exercise of L.S and C.S and plotting
10. Two exercises on contouring.
11. Study of Theodolite in detail - practice for measurement of horizontal and vertical angles.
12. Measurement of horizontal angles by method of repetition and reiteration.

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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II Year B. Tech. I Semester

(5G636) STRENGTH OF MATERIALS LAB

Course Objectives:

- The objective of the course is to make the student to understand the behaviour of materials under different types of loading for different types structures.

LIST OF EXPERIMENTS

1. Tension test on mild steel / HYSD bar
2. Compression test on wood
3. Compression test on coiled spring
4. Tension test on coiled spring
5. Bending test on carriage spring
6. Brinell and Rockwell hardness tests
7. Charpy and Izod impact tests
8. Shear test on mild steel
9. Bending test on simply supported beam
10. Bending test on cantilever beam
11. Bending test on fixed beam
12. Bending test on continuous beam
13. Verification of Maxwell's reciprocal theorem
14. Torsion test on mild steel.

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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II Year B. Tech. II Semester

**(5GC42) PROBABILITY AND STATISTICS
(Common to CE and ME)**

Course Objective:

- To help the students in getting a thorough understanding of the fundamentals of probability and usage of statistical techniques like testing of hypothesis, ANOVA, Statistical Quality Control and Queuing theory

Unit I

PROBABILITY MATHEMATICAL EXPECTATIONS: Introduction to Probability : Definition of random experiment, events and sample space – Definition of probability – Addition and multiplication theorems - Conditional probability – Baye’s theorem – Simple problems on Baye’s theorem.

RANDOM VARIABLE: Discrete and continuous random variables -Distribution function of random variable – Properties – Probability mass function - Probability density function – Mathematical expectation – Properties of mathematical expectations – Mean and variance.

Unit II

PROBABILITY DISTRIBUTIONS : Discrete Distributions : Binomial distribution – Mean and standard deviations of Binomial distribution – Poisson distribution – Mean and standard deviations of Poisson distribution – Applications. Continuous Probability Distributions: Uniform distribution – Exponential distribution – Normal distribution – Properties of normal distribution – Importance of normal distribution – Area properties of normal curve.

CORRELATION AND REGRESSION:

Correlation: Definition - Measures of correlation – Correlation for bivariate distribution – Rank correlation coefficients. Regression: Simple linear regression – Regression lines and properties.

Unit III

SAMPLING DISTRIBUTIONS : Population and sample – Parameter and Statistic – Sampling distribution of statistic – Standard error of statistic – Null and alternative hypotheses – Type I and II errors – Level of significance – Critical region –Degrees of freedom.

LARGE SAMPLES TEST OF SIGNIFICANCE: Test of significance for single proportion – Test of significance for difference of proportions- Test of significance for a single mean - Test of significance for difference of means – Test of significance for difference of standard deviations.

UNIT IV

SMALL SAMPLES TEST OF SIGNIFICANCE: Student’s t-test – F-test for equality of population variance – Chi-square test of goodness of test – Contingency table – Chi-square test for independence of attributes.

Unit V

STATISTICAL QUALITY CONTROL: Introduction – Advantages and limitations of statistical quality control – Control charts – Specification limits - , R, np and c charts.

QUEUING THEORY: Queuing theory – Pure birth and death process – M/M/1 Model – Problems.

Text Books:

1. T.K.V. Iyengar, B. Krishna Gandhi and Others, Probability and Statistics, 3rd Edition, S. Chand Group, New Delhi, 2011.
2. Shahnaz Bathul, A Text Book of Probability and Statistics, 2nd Edition, Ridge Publications, Hyderabad.
3. Kandaswamy and Tilagavathy, Probability Statistics and Queuing Theory, 1st Edition, S. Chand Group, New Delhi, 2004.

Reference Books:

1. Miller and John E. Freund, Probability and Statistics for Engineers, 7th Edition, Pearson Higher Education, 2010.
2. Ronald E. Walpole, Probability and Statistics for Engineers and Scientists, 8th Edition, Pearson Education India, New Delhi, 2007.
3. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical

Course Outcome:

- The student will be able to analyze the problems of engineering & industry using the techniques of testing of hypothesis, ANOVA, Statistical Quality Control and Queuing theory and draw appropriate inferences

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
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II Year B. Tech. CE – II Semester

**(5GC43) ENVIRONMENTAL SCIENCE
(Common to CE, ME and CSE)**

Course Objective:

- To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

Unit I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: Scope & Importance of environmental studies - Need for public awareness - Global environmental crisis (over-exploitation of natural resources, decline of ecosystems, loss to biodiversity, environmental pollution, and population growth) – People in environment – Institutions in environment

Unit II

RENEWABLE & NON-RENEWABLE NATURAL RESOURCES: Forest resources: Use – deforestation, case studies - dams & their effects on forest & tribal people Water resources: Use - floods, drought- conflicts over water. Mineral resources: Use - environmental effects of extracting mineral resources, case studies. Food resources: Impacts of over grazing, traditional agriculture and modern agriculture, Energy resources: Renewable and non – renewable energy resources - use of alternate energy resources. Land resources: Land as a resource, land degradation, soil erosion. Role of an individual in the conservation of natural resources.

Unit III

ECOSYSTEMS: Producers, consumers & decomposers - Food chains, food webs & ecological pyramids - Energy flow in the ecosystem- Cycling of nutrients (Bio geo chemical cycles-water, oxygen, carbon, nitrogen & energy cycles) – Types and characteristic features of the following ecosystems :(a)Forest ecosystems (b) Grass land ecosystems (c) Desert ecosystems (d) Aquatic ecosystems (lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION: Definition - Values of biodiversity: consumptive value, productive value, social value, ethical value, aesthetic value & option values - Hot spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wild life - Conservation of biodiversity: In –situ & Ex-situ conservation

Unit IV

ENVIRONMENTAL POLLUTION: Definition, causes, effects & control measures of: Air pollution, Water pollution, Soil pollution, Noise pollution, Thermal pollution, Marine pollution, Nuclear hazards - Solid waste management: Causes, effects and control measures of urban wastes.

Unit V

SOCIAL ISSUES AND THE ENVIRONMENT: Rain water harvesting - Environmental ethics: Issues & possible solutions - Global warming - Acid rain - Ozone layer depletion – Wasteland reclamation - Environment protection Act.-Air (Prevention & Control of Pollution) Act.-Water (Prevention & Control of Pollution) Act.-Wildlife Protection Act-Forest Conservation Act.

HUMAN POPULATION & ENVIRONMENT: Population explosion – Family Welfare Program -Environment & human health - Human Rights (in relation to environment) - Value Education (environmental values) - HIV/AIDS.

Text Books:

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, University press.
2. Environmental Studies by R. Rajagopalan Oxford University Press.

3. Perspectives In Environmental Studies by Anubha Kaushik and C.P.kaushik, New Age International Publishers.

REFERENCE BOOKS:

1. Comprehensive Environmental Studies by J.P.Sharma, Laxmi Publications.
2. Environmental Studies by Anindita Basak – Pearson education.
3. Environmental Studies by Benny Joseph, Mc.GrawHill Publications.

Course Outcomes:

- The students would have knowledge of characteristics of water, drinking water standards and necessity of treatment.
- The students would be able to understand the various unit operations and unit processes in water treatment and flow sheet of conventional municipal water treatment plant.
- The students would be able to design various units of municipal conventional water treatment plant.

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II Year B. Tech. II Semester

(5G641) STRENGTH OF MATERIALS – II

Course Objective:

- Study of the subject provides the understanding of principal stress, strains, springs, columns and structures.

Unit I

THIN CYLINDERS: Thin seamless cylindrical shells –Derivation of formula for longitudinal and circumferential stresses– hoop, longitudinal and Volumetric strains– changes in diameter, and volume of thin cylinders –Thin spherical shells.

THICK CYLINDERS: Introduction Lamé’s theory for thick cylinders – Derivation of Lamé’s formulae– distribution of hoop and radial stresses across thickness– design of thick cylinders – compound cylinders–Necessary difference of radii for shrinkage– Thick spherical shells.

Unit II

TORSION OF CIRCULAR SHAFTS: Theory of pure torsion– Derivation of Torsion equations: $T/J = q/r = N\theta/L$ – Assumptions made in the theory of pure torsion –Torsional moment of resistance–Polar section modulus– Power transmitted by shafts –Combined bending and torsion and end thrust–Design of shafts according to theories of failure.

SPRINGS: Introduction– Types of springs–deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel– Carriage or leaf springs.

Unit III

COLUMNS AND STRUTS: Introduction– Types of columns –Short, medium and long columns– Axially loaded compression members– Crushing load –Euler’s theorem for long columns–assumptions- derivation of Euler’s critical load formulae for various end conditions–Equivalent length of a column –slenderness ratio–Euler’s critical stress –Limitations of Euler’s theory– Rankine (Gordon) formula –Long columns subjected to eccentric loading –Secant formula– Empirical formulae –Straight line formula –Prof. Perry’s formula.

Unit IV

DIRECT AND BENDING STRESSES: Stresses under the combined action of direct loading and B.M., core of a section –determination of stresses in the case of chimneys, retaining walls and dams –conditions for stability – stresses due to direct loading and B.M. about both axis.

Unit V

UNSYMMETRICAL BENDING: Introduction– Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes– Stresses in beams subjected to unsymmetrical bending –Principal axes– Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis - Deflection of beams under unsymmetrical bending, concept shear center for high channel.

Text Books:

1. A Textbook of Strength of materials by R. K. Bansal –Laxmi Publications (P) ltd., New Delhi.
2. Strength of Materials by S.S. Bhavikatti – Vikas Publishers
3. Strength of Materials by B.C.Punmia

Reference Books:

1. Mechanics of Solids, by Ferdinand p Beer and others– Tata Mc.Grawhill Publications2000.
2. Strength of Materials by Schaum’s outline series –Mc.Grawhill International Editions.
3. Strength of Materials by S.Ramakrishnaand R.Narayan– Dhanpat Rai publications.
4. Strength of materials by R.K.Rajput, S.Chand & Co, NewDelhi.

5. Strength of Materials by A.R.Basu, Dhanpat Rai & Co, Nai Sarah, New Delhi..
6. Mechanics of Structures, by S.B.Junnarkar, Charotar Publishing House, Anand, Gujarat.

Course Outcomes:

- The students would be able to draw bending moment, shear force diagram, bending stress and shear stress distribution for beams under the different conditions of loading.
- The student would be able to apply knowledge to analyse concept of deflection, bending moment and shear force diagram in beams, frames, trusses and columns under various loading conditions using different analysis methods.
- The student would be able to apply knowledge to determine forces in determinate and indeterminate structures by the force and matrix method.

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II Year B. Tech. II Semester

(5G642) HYDRAULICS AND HYDRAULIC MACHINERY

Course Objective:

- The main objective of this course is to deal with the concepts of flow through open channels and their applications and the principles of hydraulic machines and hydraulic models.

Unit I

BOUNDARY LAYER THEORY: Boundary layer concepts – Thickness of boundary layer - Characteristics of boundary layer along a thin flat plate - Vonkarmen momentum integral equation - Laminar and turbulent boundary layers (no derivation) - Laminar sub-layer separation of boundary layer - Control of boundary layer- Flow around submerged objects – Drag and lift - Magnus effect.

Unit II

OPEN CHANNEL FLOW - I: Types of flows – Types of channels – Velocity distribution – Chezy's, Manning's and Bazin's formulae for uniform flow – Most Economical sections - Critical flow – Specific Energy - Critical depth – Computation of critical depth – Critical, sub-critical and super critical flows – Velocity measuring instruments.

OPEN CHANNEL FLOW - II: Non uniform flow - Dynamic equation for gradually varied flow - Mild, critical, steep, horizontal and adverse slopes - Surface profiles - Direct step method – Rapidly varied flow - Hydraulic jump and its applications - Energy dissipation.

Unit III

IMPACT OF JETS: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - Series of vanes - Jet striking centrally and at tip - Velocity triangles at inlet and outlet – Expressions for work done and efficiency - Applications to radial flow turbines.

Unit IV

HYDRAULIC TURBINES – I: Layout of a typical hydropower installation – Heads and efficiencies -classification of turbines -Pelton wheel - Francis turbine - Kaplan turbine - Working, working proportions - Velocity diagrams -Work done and efficiency – Hydraulic design – Runaway speed - Draft tube theory, function and efficiency.

HYDRAULIC TURBINES – II: Governing of turbines - Surge tanks - Unit quantities and specific speed – Performance characteristics -Geometric similarity - Cavitation, causes, effects.

Unit V

CENTRIFUGAL PUMPS: Pump installation details – Classification -Heads – Losses and efficiencies - Limitation of suction lift – Work done - Minimum starting speed - Specific speed - Multistage pumps -Pumps in parallel - Performance of pumps - Characteristic curves -Net positive suction head – Priming devices.

HYDROPOWER ENGINEERING: Classification of hydropower plants – Load factor - Utilization factor - Capacity factor – Estimation of hydropower potential.

Text Books:

1. P.N. Modi and S.M. Seth, Hydraulics and Fluid Mechanics, 18th Edition, Standard Book House, Delhi, 2011.
2. K, Subramanya, Flow in Open Channels, 3rd Edition, Tata McGraw-Hill Publishers, New Delhi, 2010.
3. D.S. Kumar, Fluid Mechanics and Fluid Power Engineering, 7th Edition, Kataria and Sons, Delhi, 2009.
4. R.K. Bansal, Fluid Mechanics and Hydraulic Machines, 9th Edition, Laxmi Publishers, NewDelhi, 2011.

Reference Books:

1. Ranga Raju, Flow Through Open Channels, 7th Edition, Tata McGraw-Hill Publications, New Delhi, 2009.
2. R.K. Rajput, Fluid Mechanics and Hydraulic Machinery, 4th Edition, S. Chand Publishers, New Delhi, 2010.
3. V.T .Chow, Open Channel Flow, McGraw-Hill Publishers, New Delhi, 1996.
4. Banga and Sharma, Hydraulic Machines, 7th Edition, Khanna Publishers, New Delhi, 2007.
5. M.M. Dandekar and K.N. Sharma, Water Power Engineering, 1st Edition, Vikas Publishing House, New Delhi, 2009.

Course Outcomes

- The students should be able to understand and apply the basic concept of laminar flow of fluid, boundary layer and its types in solving the practical problems.
- The students should be able to understand the hydraulics of flow in smooth and rough pipe, concept of frictional resistance to flow, series, parallel & branched pipes flow looped network analysis using Hardy-Cross and water hammer pressure due to sudden closure of valve.
- The students should be able to apply the basic to analyze and apply of geometrical properties, critical flow, uniform flow, specific energy in open channel flow.
- The students should be able to understand and apply the gradually varied flow in open channel flow.
- The students should be able to understand and apply the rapidly varied flow in open channel flow.
- The students should be able to understand and apply concept of hydraulic jump in open channel flow.
- The students should be able to know the constructional details, heads and working principles of pumps
- The students should be able to know the constructional details, heads and working principles of turbines.

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II Year B. Tech. II Semester

(5G643) STRUCTURAL ANALYSIS - I

Course Objectives:

- To make the students to understand the principles of analysis of structures of static and moving loads by various methods.

Unit I

FIXED BEAMS – Introduction to statically indeterminate beams with U.D.L, central point load, eccentric point load. Number of point loads and uniformly varying loads shear force and bending moment diagrams-Deflection of fixed beams effect of sinking of support.

Unit II

CONTINUOUS BEAMS: Introduction-Clapeyron's theorem of three moments-Analyses of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

Unit III

SLOPE-DEFLECTION METHOD: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

MOMENT DISTRIBUTION METHOD: Introduction, application to continuous beams with and without sinking of supports.

Unit IV

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, Bending moment and shear forces- Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

MOVING LOADS: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single Concentrated load U.D.L longer than the span, U.D.L shorter than the span, two point loads with fixed distance between them and several point loads.

Unit V

INFLUENCE LINES: Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section single point load, U.D.L longer than the span, U.D.L shorter than the span.

INDETERMINATE STRUCTURAL ANALYSIS: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies–Solution of trusses with up to two degrees of internal and external indeterminacies–Castigliano's theorem.

Text Books:

1. Analysis of Structures-Vol I & Vol II by V.N.Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
2. Structural Analysis by V.D.Prasad Galgotia publications, 2nd Editions.
3. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi
4. Comprehensive Structural Analysis-Vol. I & 2 by Dr. R. Vaidyanathan & Dr.P.Perumal- Laxmi publications pvt.Ltd., New Delhi
5. Basic structural Analysis by C.S.Reddy, Tata Mcgrawhill, New Delhi

Reference Books:

1. Mechanics of Structures by S.B.Junnarkar, Charotar Publishing House, Anand, Gujrat
2. Theory of Structures by Gupta, Pandit & Gupta; Tat Mc.Graw– Hill Publishing Co. Ltd., New Delhi.
3. Theory of Structures by R.S. Khurmi, S. Chand Publishers

4. Strength of Materials and Mechanics of Structures- by B.C.Punmia, Khanna Publications, NewDelhi.
5. Introduction to structural analysis by B.D. Nautiyal, New age international publishers, NewDelhi.

Course Outcomes

- The students would be able to understand the behavior of materials under different stress and strain conditions.
- The students would be able to draw bending moment, shear force diagram, bending stress and shear stress distribution for beams under the different conditions of loading.
- The student would be able to apply knowledge to analyse concept of deflection, bending moment and shear force diagram in beams, frames, trusses and columns under various loading conditions using different analysis methods.
- The student would be able to apply knowledge to determine forces in determinate and indeterminate structures by the force and matrix method.
- The students would be able to perform ILD analysis of determinate beams and trusses.

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II Year B. Tech. II Semester

(5G644) BUILDING PLANNING & DRAWING

Course Objective:

- This subject provides the knowledge of building by laws, registration, planning of various types of buildings different sign convention of various Civil Engineering Materials, Doors, windows, tiles of roof, drawing of building plans etc.

PART-A

Unit I

BUILDING BYELAWS AND REGULATIONS: Introduction – Terminology – Objectives of building byelaws – Floor area ratio (FAR) – Floor space Index (FSI) – Principles underlying building byelaws – classification of buildings – Open space requirements – built up area limitations – Height of Buildings – Wall thickness – lighting and ventilation requirement.

Unit II

RESIDENTIAL BUILDINGS: Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings.

PUBLIC BUILDINGS AND CPM: Planning of Educational institutions, hospitals, dispensaries, Office buildings, banks, industrial buildings, hotels and motels, buildings for recreation.

Unit – III

PROJECT NETWORKING: Planning of construction projects – scheduling and monitoring Bar chart – CPM and PERT Network planning – computation of times and floats – their significance.

PART-B

Unit IV

SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminium alloys etc., Lead, Zinc, tin, white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond odd & even courses for one, one and half, two brick walls in thickness at the junction of a corner.

DOORS WINDOWS, VENTILATORS AND ROOFS: Panelled Door – glazed door – Half panelled and glazed door, glazed windows – panelled windows – Swing ventilator – Fixed ventilator-Couple roof – Collar roof – Kind Post truss – Queen post truss.

Unit V

Given line diagram with specification to draw, plan, section and elevation-sloped and flat roof buildings

Text Books:

1. Building Planning & Drawing by Dr N. Kumaraswamy and A.Kameswara Rao, Charitor Publications.
2. Planning and Designing and Scheduling- Gurucharan Singh and Jagadish Singh – Standard Publishers.
3. Planning and Designing of Buildings – Y.s.Sane

Reference Books:

1. PERT and CPM – Project planning and control with by Dr.B.C.Punmia & Khandelwal – Laxmi publications.
2. Building by laws by state and Central Governments and Municipal corporations.
3. ‘A’ Series & ‘B’ Series of JNTU Engineering College, Anantapur.
4. Building drawing – M.G.Shah, C.M.Kale, S.Y.Patki

Course Outcomes

- Student would have a basic knowledge about the planning of the residential as well as public building.
- Student would have knowledge of preparation of the working drawing.
- Student will be able to prepare of submission drawing according to the local bylaws.
- The students would be able to identify the basic principals of building.
- The students would be able to know basic principal of free hand descriptive sketching to creative a realistic sketch of an object.
- The students will able to generate the two dimensional orthographic view of a building.
- The students will able to prepare working and submission drawing of a building.
- The students will able to construct a two point perspective of given two dimensional orthographic view of object.

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II Year B. Tech. II Semester

(5G645) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

Course Objective:

- The objective of the course is to make the students understand the fluid flow concepts and get familiarity with flow measuring devices.

List of experiments:

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted rectangular notch and/or triangular notch.
5. Determination of coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes.
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine.
10. Performance test on Francis turbine.
11. Efficiency test on Centrifugal pump.
12. Efficiency test on Reciprocating pump.

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY

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II Year B. Tech. II Semester

(5G646) SURVEYING LAB – II

Course Objectives:

- To impart the practical knowledge in the field, it is essential to introduce in curriculum.
- Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.

LIST OF EXPERIMENTS:

1. Trigonometric Leveling - Heights and distance problem (Two Exercises)
2. Heights and distance using Principles of tacheometric surveying (Two Exercises)
3. Curve setting.
4. Setting out works for buildings & pipe lines.
5. Gradient of road using Theodolite.
6. Determination of area using total station.
7. Traversing using total station.
8. Contouring using total station.
9. Determination of remote height using total station.
10. Stake-out using total station.
11. Difference in height between two inaccessible points using total station.

ANY OF THE EIGHT EXPERIMENTS ARE MANDATORY