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. (Electrical and Electronics Engineering)
2. B. Tech. (Computer Science and 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 Electrical and Electronics 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	03	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	Mid-Examinations of 120 Minutes duration to be evaluated for 20marks. The question paper shall be of subjective type in which four questions with an internal choice are to be answered. Remaining 10 marks is for continuous evaluation. 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.	**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. **MID-I:** after first spell of instructions(I & II-Units). **MID-II:** after second spell of instructions (III, IV & V-Units). 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.

S. No.	Description	Marks	Examination and Evaluation	Scheme of Evaluation
2.	Laboratory or Drawing	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 areno 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:

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:

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".

***

CURRICULUM STRUCTURE

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET

(AN AUTONOMOUS INSTITUTION)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Regulations:**R15** Programme Code: **G2**

I Year B. Tech. I Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5GC11	English through Literature	2	1	0	2
5GC13	Engineering Physics	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
5G311	Electronic Devices and Circuits -I	3	1	0	3
5G513	Engineering Drawing- I	1	--	3	3
5GC16	ELCS Lab-I	--	--	3	2
5GC18	Engineering Physics Lab	--	--	3	2
5G113	Problem Solving Through C Lab	--	--	6	4
5G312	Electronic Devices and Circuits Lab -I	--	--	3	2
5G114	IT Workshop	--	--	3	2
	Total	**16**	**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
5GC22	Engineering Chemistry	4	1	0	4
5GC24	Engineering Mathematics-II	3	1	0	3
5G121	C programming and Data Structures	3	1	0	3
5G321	Electronic Devices and Circuits -II	3	1	0	3
5G523	Engineering Drawing –II	1	--	3	3
5GC26	ELCS Lab-II	--	--	3	2
5GC27	Engineering Chemistry Lab	--	--	3	2
5G123	Programming in C and Data Structures Lab	--	--	6	4
5G524	Engineering workshop	--	--	3	2
	Total	**16**	**5**	**18**	**28**

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET

(AN AUTONOMOUS INSTITUTION)

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Regulations: **R15** Programme Code: **G2**

II Year B. Tech. I Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5GC32	Mathematical Methods-III	3	1	0	3
5G231	Switching Theory and Logic Design	3	1	0	3
5G232	Electrical Machines-I	3	1	0	3
5G233	Electrical Circuits-I	3	1	0	3
5G536	Fluid Mechanics and Hydraulic Machines	3	1	0	3
5G234	Electro Magnetic Fields	3	1	0	3
5G537	Fluid Mechanics and Hydraulic Machines Lab	--	--	3	2
5G237	Electrical Machines-I Lab	--	--	3	2
5G238	Seminar - I	--	--	2	2
	Total	**18**	**6**	**08**	**24**

II Year B. Tech. II Semester

Subject Code	Subject Name	Hours / Week			C
		L	T	P	
5G241	Electrical Machines-II	3	1	0	3
5G242	Electrical Circuits-II	3	1	0	3
5G345	Electronic Circuit Theory	3	1	0	3
5G243	Generation of Electric Power	3	1	0	3
5G244	Linear Control Systems	3	1	0	3
5GC41	Complex Variables & Special Functions	3	1	0	3
5G247	Electrical Circuits and Simulation Lab	--	--	3	2
5G248	Control systems Lab	--	--	3	2
5GC44	Aptitude & Reasoning Skills	--	--	2	2
	Total	**18**	**6**	**08**	**24**

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

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

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.

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: HomiJehangir Baba

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. I Semester

(5GC13) ENGINEERING PHYSICS

(Common to EEE and ECE)

COURSE OBJECTIVS:

- 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 – Bravias 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 BRath, 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.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

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, Rate of decay of radio-active materials, 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}, sinax and cosax, polynomials in x, e^{ax} V(x), xV(x), method of variation of parameters. Applications to oscillatory electrical circuits.

Unit III

Series solutions of differential equations: Validity of series solution of the equation, series solution when x=0 is an ordinary point of the equation,Frobeniusmethod .

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

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 Books:

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(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 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, typedef, 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.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. I Semester

(5G311)ELECTRONIC DEVICES AND CIRCUITS - I

(**Common to EEE and ECE**)

Course Objectives:

- To learn the basic fundamentals of circuit components, circuit laws and network theorems.
- To understand the concepts of semiconductor diode and its applications.
- To understand the basic concepts of BJT.

Unit-I

CIRCUIT ELEMENTS: Sources: Voltage and Current Sources, Resistors-Types- resistance colour coding-potentiometer-types, Capacitors-types-uses of capacitors, Inductors-types.

Unit-II

NETWORK THEOREMS (D.C. Excitation only):- Ohm's law, Kirchhoff laws-network reduction techniques-series, parallel, series parallel circuits-source transformations. Thevenin's Theorem- Norton's Theorem- Superposition Theorem-maximum power transfer theorem.

Unit-III

SEMICONDUCTOR DIODE: Energy Band Diagram, V-I Characteristics of PN Junction Diode (Ideal, Simplified and Piece-wise), Temperature Dependency, Transition and Diffusion Capacitances, Breakdown Mechanisms in semiconductor diodes, Zener diode characteristics.

Unit-IV

DIODE APPLICATIONS: Rectifier Circuits: Half Wave and Full Wave Rectifiers – General Filter Considerations – Capacitor Filter – RC Filter, Choke Filter, LC Filter, π Filter – Zener diode acts as a regulator.

Unit-V

INTRODUCTION OF BJTs: Transistor construction - Transistor operation, CB, CE and CC configurations and Characteristics

Text Books:

1. "Electronic Devices and Circuits" David A Bell, Fifth Edition, 2008, Oxford University Press.
2. "Circuits & Network Analysis & Synthesis", Sudhakar A &Shyammohan S Palli, 4th Edition, Tata McGraw Hill, 2010.
3. Engineering basics: Electrical, Electronics and computer Engineering" , T.Thyagarajan, New Age International, 2007

REFERENCEBOOKS:

1. "Electronic Devices and Circuits" J. Millman and Halkias, 1991 edition, 2008, TMH.
2. "Electronic Devices and Circuit Theory" Robert L.Boylestad and Louis Nashelsky, 9th edition, PHI.
3. "Electronic Principles" Albert Malvino, David J Bates, MGH, SIE 2007.
4. "Micro Electronic Circuits" Sedra and Smith, Oxford University Press.

Course Outcomes:

Upon completion of the course students will be

- Have the knowledge to analyze basic electrical circuits.
- Have the knowledge of semiconductor diode and its applications.
- Understand the basic concepts of BJT.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. I Semester

(5G513) ENGINEERING DRAWING- I
(Common to EEE, ECE, CSE and IT)

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.
- To impart and inculcate proper understanding of the theory of projections.
- To improve the visualization skills.

Unit I

INTRODUCTION: Lettering –Geometrical constructions - Construction of polygons by General method – Inscribing a triangle, square. Pentagon, hexagon in a circle.

Unit II

CONICS: Ellipse, Parabola and Hyperbola (General method only). Special Methods: Ellipse - Concentric Circles method, Oblong method & Arcs of Circles method - Drawing tangent& normal to the conics.

Unit III

CYCLOIDAL CURVES: Cycloid, Epi cycloid, Hypo cycloid (simple problems) - Drawing tangent & normal to the cycloidal curves.

Unit IV

PROJECTIONS OF POINTS & LINES: Projections of points - Projections of lines inclined to one reference plane.

Unit V

PROJECTIONS OF LINES INCLINED TO BOTH REFERENCE PLANES: Projections of lines; inclined to both reference planes.

Text Book:

Engineering drawing by N.D.Bhatt

Reference Books:

1. Engineering graphics by K.L. Narayana& P. Kannayya
2. Engineering drawing and graphics by Venugopal/ New age
3. Engineering drawing by Johle / TMI

Course Outcomes:

- Students will be able to know and understand the conventions and the methods of Engineering Drawing.
- Able to understand the application of industry standards and techniques applied in Engineering Drawing.
- Dimension and annotate two-dimensional engineering drawings.
- Students will be able to improve their visualization skills.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

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

SYLLABUS:

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. I Semester

(5GC18) ENGINEERING PHYSICSLAB

(Common to EEE and ECE)

ENGINEERING PHYSICS LAB

COURSE OBJECTIVES:

- The student will beable to handle and understanddifferent 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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. I Semester

(5G113)PROBLEM SOLVING THROUGH C LAB

(Common to ECE,EEE,ME and CE branches)

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 l:
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].

Exercise 4:
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

Exercise 11:
Minimum of 4 programs on Recursive Functions, Preprocessor commands.

Exercise 12:
Minimum of 4 programs on using Array Elements as Function Arguments.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. I Semester

(5G312)ELECTRONIC DEVICES AND CIRCUITS LAB -I

(Common to EEE & ECE)

Course Objectives:

The Course aims to provide the students with the ability

- To determine the characteristics of semiconductor diode.
- To perform various rectifier circuits in practical approach.
- To perform input and output characteristics of BJT for various configurations.

Perform the following Experiments

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs, Diodes, BJTs.
2. Study and operation of
   - Multi-meters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO
3. Verification of Kirchhoff's Voltage and Current Law
4. Forward and Reverse Bias Characteristics of PN junction Diode.
5. V-I Characteristics of Zener Diode
6. Half Wave Rectifier with and without filter.
7. Full Wave (Center trapped) Rectifier with and without filter.
8. Full Wave (Bridge) Rectifier with and without filter.
9. Zener Diode as a Voltage Regulator
10. Input and Output Characteristics of Transistor CB Characteristics.
11. Input and Output Characteristics of Transistor CE Characteristics.
12. Input and Output Characteristics of Transistor CC Characteristics.

Course Outcomes:

Upon completion of the course students will be

- Able to determine the parameters like cut-in voltage , resistances and breakdown voltage of semiconductor diode
- Able to design DC power supply circuits using rectifiers and filters
- Able to choose the desired configuration for specified applications.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. I Semester

(5G113) I.T. WORKSHOP
(Common to CSE, EEE, ECE and IT)

Course Objective:

- 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 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. Crimpling 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, 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, hyperlinking, 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, McGraw Hill
2. MOS study guide for word, Excel, Powerpoint& Outlook Exams", Joan Lambert, Joyce Cox, PHI.
2. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
3. Networking your computers and devices, Rusen, PHI
4. Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH

Course Outcome:

- 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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES:: RAJAMPET
(AN AUTONOMOUS INSTITUTION)

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

Text Books:

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.

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

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 &MeeraBanerji, 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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. II Semester

(5GC22) ENGINEERING CHEMISTRY

(Common to ECE and EEE)

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 andproperties 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 Enigneering 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.AgarwalandAndra 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. SeshaMaheswaramma 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.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

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- 43rdEdition (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.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

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.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. 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.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. II Semester

(5G321)ELECTRONIC DEVICES AND CIRCUITS - II
(Common to EEE & ECE)

Course Objectives:

The Course aims to provide the students with the ability

- To understand the concepts of biasing and stabilization in BJT.
- To understand the concepts of FET, MOSFET and their biasing techniques.
- To analyze the parameters like band width, gain and impedances for single and multistage amplifier circuits.
- To understand the working principles of special purpose electronic devices.

Unit-I

BIASING & STABILITY: Overview of BJT Configurations, Transistor Amplifying Action – Load Line Analysis of AC & DC – Operating Point. Types of Biasing: Fixed Bias – Emitter Bias – Emitter Feedback Bias - Collector to Base bias – Voltage Divider Bias. Bias Stability: Need for Stabilization – Stabilization Factors (s,S',S'') – Stability Factors for Voltage Divider Bias - Thermal Stability and Thermal Runaway – Heat Sinks**.**

Unit-II

FIELD EFFECT TRANSISTORS & ITS BIASING: - Construction of JFETs – Transfer Characteristics – FET Biasing: Fixed Bias Configuration – Self Bias Configuration – Voltage Divider Biasing – Construction and Characteristics of MOSFETs – Depletion type MOSFETs – Enhancement type MOSFETs – Biasing in MOSFETs.

Unit-III

SINGLE STAGE AMPLIFIERS: Single Stage Transistor Amplifier-How Transistor Amplifies-Graphical Demonstration of Transistor Amplifier- Practical Circuit of Transistor Amplifier-Phase Reversal- D.C. and A.C. Equivalent Circuits- Load line Analysis- A.C. emitter resistance-Formula for A.C. emitter resistance-Voltage gain in terms of A.C. emitter Resistance-Voltage gain-Classification of Amplifiers-Amplifier equivalent circuit-Equivalent circuit with signal source-Input impedance of and amplifier.

Unit-IV

MULTI STAGE AMPLIFIERS: Multistage transistor Amplifier-Important terms-R.C. Coupled Transistor amplifier-Direct coupled amplifier-Comparison of different types of coupling.

Unit-V

SPECIAL PURPOSE ELECTRONIC DEVICES: Varactor Diode, Tunnel Diode, LED, PIN Diode, Schottky Diode, SCR, UJT, Photodiode, Phototransistor.

Text Books:

1. "Electronic Devices and Circuits" David A Bell, Fifth Edition, 2008, Oxford University Press.
2. "Electronic Devices and Circuits" J. Millman and Halkias, 1991 edition, 2008, TMH.

Reference Books:

1. "Electronic Devices and Circuit Theory" Robert L.Boylestad and Louis Nashelsky, 9th edition, PHI.
2. "Principles of Electronics", V.K.Mehta, S.Chand Publications 2004
3. "Integrated Electronics, Analog and Digital Circuits and Systems" J. Millman and Halkias, TMH.
4. "Micro Electronic Circuits" Sedra and Smith, Oxford University Press.

Course Outcomes:

Upon completion of the course students will be

- Able to determine operating conditions of BJT in amplifier circuits.
- Able to design the amplifier circuits under given requirements.
- Able to have the knowledge and usage of special purpose electronic devices in various applications.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. II Semester

(5G523) ENGINEERING DRAWING- II
(Common to EEE, ECE, CSE and IT)

Course Objectives:

- To impart and inculcate proper understanding of the theory of projections of planes, solids and simple machine components.
- To improve the visualization skills of the student.
- To prepare the student for future engineering positions.

Unit I

PROJECTIONS OF PLANES: Projection of planes inclined to one reference plane - and inclined to both the reference planes.

Unit II

PROJECTIONS OF SOLIDS: Cylinder, Cone, Prism and Pyramid - Axis Inclined to one reference plane.

Unit III

PROJECTIONS OF SOLIDS: Cylinder, Cone, Prism and Pyramid - Axis inclined to both the reference planes.

Unit IV

ISOMETRIC PROJECTIONS: Projections of Lines, Planes and Simple Solids – Prism, Pyramid, Cylinder and Cone in simple positions only.

Unit V

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

Text Book:

Engineering drawing by N.D. Bhatt

Reference Books:

1. Engineering graphics by K.L. Narayana& P. Kannayya
2. Engineering drawing and graphics by Venugopal/ New age
3. Engineering drawing by Johle / TMI

Course Outcomes:

- Comprehend general projection theory, with an emphasis on the use of orthographic projection to represent three-dimensional objects in two-dimensional views.
- Can employ 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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

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

SYLLABUS

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

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. II Semester

(5GC27) ENGINEERING CHEMISTRY LAB

(Common to ECE and EEE)

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.

References:

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.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. II Semester

(5G123)PROGRAMMING IN C AND DATA STRUCTURES 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 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) WriteConverting infix expression into postfix expression

ii) Evaluating the postfix expression

Exercise 13

Implement Binary Tree using Double Linked List and its operations.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. II Semester

(5G322)ELECTRONIC DEVICES AND CIRCUITS LAB -II

(Common to ECE & EEE)

Course Objectives:

The Course aims to provide the student with the ability

- To determine characteristics of JFET, MOSFET, SCR and UJT.
- To determine parameters like gain, impedances and band width of BJT and FET amplifier circuits.

Perform the following Experiments

1. Identification, Specifications and Testing of Active Devices, Low power JFETs, MOSFETs, Photodiode, Phototransistor, LEDs, SCR and UJT.
2. JFET Characteristics.
3. MOSFET Characteristics
4. Frequency response of CE Amplifier.
5. Frequency response of CB Amplifier.
6. Frequency response of CC Amplifier.
7. Frequency response of Common Source FET Amplifier.
8. V-I Characteristics of LED.
9. SCR Characteristics.
10. UJT Characteristics.
11. Photodiode and Phototransistor Characteristics
12. Soldering Practice

Course Outcomes:

Upon completion of the course students will be

- Able to gain the knowledge and practical usage of JFET, MOSFET and some special electronic devices.
- Able to design the amplifier circuits under given requirements.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

I Year B. Tech. II Semester

(5G524) ENGINEERING WORKSHOP
(Common to CSE, EEE, ECE and IT)

Course Objectives:

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, Jeyapoovan, SaravanaPandian, 4/e Vikas.
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. I Semester

(5GC32) MATHEMATICAL METHODS-III

Course Objectives:

- To understand several important concepts in linear algebra, including systems of linear equations and their solutions; matrices and their properties; determinants and their properties; and Eigen values and Eigen vectors.
- To improve your ability to think logically, analytically and abstractly.
- The objective of curve fitting is to find the parameters of a mathematical model that describes a set of (usually noisy) data in a way that minimizes the difference between the model and the data.
- Introduce students to how to solve linear partial differential with different methods.
- Know how to derive a Fourier series of a given periodic function by evaluating Fourier coefficients. Understand the nature of the Fourier series that represent even and odd functions and how derivation of a Fourier series can be simplified in this way. Be able to expand an odd or even function as a half-range cosine or sine Fourier series.
- To equip students with adequate knowledge of mathematics that will enable them in formulating problems and solving problems analytically.

Unit I

Matrix algebra -Rank-Echelon form, normal form -solutions of linear system of homogenous and non-homogenous equations -Gauss Elimination Method

Eigen Values-Eigen Vectors-Properties. Cayley Hamilton theorem.

Unit II

Solution of algebraic and Transcendental Equations-Bisection Method-Method of false Position-Newton-Raphson method

Numerical solutions of ordinary differential Equations-Taylor's Series-Euler's methods–Runge-Kutta fourth order Method-Milne's predictor-corrector method. (Without proofs)

Unit III

Interpolation -Introduction – Forward Differences – Backward Differences – Newton's forward and backward difference interpolation formulae – Lagrange's Interpolation formula.

Numerical Differentiation - Numerical Integration – Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

Unit IV

Curve fitting: Fitting a straight line-second degree parabola-Exponential curve –power curve by the method of least squares.

Partial differential equations: Formationof partial differential equations by eliminating arbitrary constants and arbitrary functions-solutions of linear equation–Charpit's method-Method of separation of variables.

Unit V

Fourier series: Determination of Fourier coefficients-Fourier series of even and odd functions-Fourier series in an arbitrary interval-half range Fourier sine and cosine expansions.

Fourier transforms: Fourier sine Transforms-Cosine Transforms-Properties-Inverse Transforms-Finite Fourier Transforms.

Text Book:

Higher Engineering Mathematics, B. S. Grewal, 42ndedition, Khanna Publishers, New Delhi.

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. Mathematical Methods, T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.

Course Outcomes:

Upon completing this course students should be able to:

- Analyze real world scenarios to recognize when matrices, or linear systems are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches, judge if the results are reasonable, and then interpret and clearly communicate the result.
- Understand linear algebra concepts that are encountered in the real world, and be able to communicate the underlying mathematics involved to help another person gain insight into the situation.
- Apply numerical method to obtain approximate solutions to mathematical problems.
- Have the knowledge of interpolation, numerical integrations, and numerical differentiation; know how to approximate definite integrals and derivatives.
- Be competent in solving linear PDEs using classical solution methods.
- Compute the Fourier series representation of a periodic functions, in both exponential and sine-cosine forms. Be able to apply Fourier analysis to simple initial condition standing wave problems and determine the resulting time evolution.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. I Semester

(5G231)SWITCHING THEORY AND LOGIC DESIGN

COURSE OBJECTIVE:

- To understand the concepts and techniques associated with the number systems and codes.
- To minimize the logical expressions using Boolean postulates.
- To design various combinational and sequential circuits.

Unit I

NUMBERSYSTEMS, CODES & BOOLEAN ALGEBRA: Philosophy of number systems – r, (r-1)'s complement, representation of negative numbers, Binary arithmetic, Binary codes, Error detecting &Error correcting codes, hamming codes.

Boolean Algebra: Fundamental postulates of Boolean algebra, Basic theorems and Properties, Digital logic gates, Properties of XOR gate, universal gates.

Unit II

SWITCHING FUNCTIONS AND THEIR MINIMIZATION: Switching Functions-Canonical and Standard forms, Algebraic simplification using Boolean theorems, two level & Multilevel Realization of Boolean Functions using Universal Gates.

Minimization: K-Map methods, Prime implicants, don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime-Implicant chart, simplification rules.

Unit III

COMBINATIONAL LOGIC DESIGN & PROGRAMMABLE LOGIC DEVICES: Design using conventional logic gates-Binary Adders, Subtractors, Ripple Adder, Look Ahead carry adder, Magnitude comparator, Encoder, Decoder, Multiplexer, De-Multiplexer, Code-converters.

PLD's: ROM, PROM, PLA, PAL, and Realization of Switching functions using PLD's. Comparison between PLA, PAL, ROM.

Unit IV

SEQUENTIAL CIRCUITS : Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples),Basic flip-flops, Triggering and excitation tables, flip flop conversions, Steps in synchronous sequential circuit design, Design of modulo-N Synchronous counters – up/down counter, ring counter, Johnson counter, Design of modulo-N Asynchronous counter-Sequence detector.

Unit V

FSM MINIMIZATION AND ASM CHARTS: Finite state machine-capabilities and limitations, Mealy and Moore models and their conversions, minimization of completely specified sequential machines, Partition technique. **Algorithmic State Machines:** Salient features of the ASM chart, examples of weighing machine and binary multiplier.

Text Books:

1. M.Morris Mano, *Digital Design*. Pearson, 3rd Ed,2006.
2. ZviKohavi and NirajK.Jha.*Switching& Finite Automata Theory*. Cambridge university press, 3rd Ed,2012.

Reference Books:

1. Charles H. Roth,Jr.*Fundamentals of Logic Design*. Cengage Learning, 2015, 5th Ed.
2. William I. Fletcher, *An Engineering Approach to Digital Design*. Pearson, 3rd Ed,2015.
3. A.Anand Kumar, *Switching Theory and Logic Design*.2nd Edition, Prentice Hall of India, 2008.

Course outcomes:

By the end of this course, students will be able to

- Analyze the number systems and codes.
- Simplify the logics expressions using Boolean laws and postulates and design them by using logic gates.
- Minimize the logic expressions using map method and tabular method.
- Design of combinational logic circuits using conventional logic gates and various programmable logic devices.
- Design of sequential logic circuits.
- Design the FSM for completely specified and incompletely specified sequential circuits.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. I Semester

(5G232)ELECTRICAL MACHINES-I

COURSE OBJECTIVE:

Electrical machines course is one of the important courses of the Electrical Engineering discipline. In this course different types of DC generators and motors which are widely used in industry are covered and their performance aspects will be studied.

Unit I

DC GENERATORS –CONSTRUCTION & OPERATION: Basic principle of Electromechanical energy conversion - Energy balance equation - constructional features of dc generators - principle of operation - function of commutator-armature windings - Lap and Wave windings - simplex windings(Progressive only) - equalizer rings and dummy coils.

Unit II

TYPESOF DC GENERATORS & ARMATURE REACTION: E.M.F equation - methods of excitation - separately excited and self-excited generators - Losses - reduction of losses - efficiency - Armature reaction - Cross magnetizing and de-magnetizing AT/pole – compensating winding - commutation - reactance voltage - methods of improving commutation.

Unit III

CHARACTERISTICS & PARALLEL OPERATION OF DC GENERATORS: O.C.C - Internal and External Characteristics - causes of failure of self-excitation and remedial measures - Load characteristics. Parallel operation of DC generators - use of equalizer bar and cross connection of field windings - load sharing.

Unit IV

PRINCIPLE & SPEED CONTROL OF DC MOTORS: D.C Motors - Principle of operation - Back E.M.F. - Torque equation - characteristics of shunt, series and compound motors - Speed control of DC Shunt Motors - Armature voltage and field flux control methods - Ward-Leonard system - Speed control of DC Series Motors -3 point and 4 point starters, Applications of DC motors.

Unit V

TESTING OF DC MACHINES: Brake test - Swinburne's test - Hopkinson's test - Field's test - Retardation test - separation of stray losses in a DC motor.

TEXT BOOKS:

1. I.J. Nagrath& D.P. Kothari, *Electrical Machines*. Tata McGraw – Hill Publishers, New Delhi, 4th Edition, 2010.
2. P.S. Bimbhra, *Electrical Machinery*. Khanna Publishers. New Delhi, 7th Ed, 2011.

Reference Books:

1. JB Gupta, *Theory and Performance of Electrical Machines* (DC machines, Poly phase circuits & AC machines) in SI Units. S.K. KATARIA & Sons, New Delhi, 2013.
2. Albert E Clayton & N N Hancock, *Performance and Design of Direct Current Machines.* CBS Publishers, New Delhi, 2004, 3rd Ed.
3. S.K. Bhattacharya, *Electrical Machines*. Tata McGraw Hill Publishers, New Delhi, 4th edition, 2014.
4. A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*. McGraw-Hill Companies, New Delhi, 2013, 7th Ed.

Course Outcomes:

By the end of this course, students will be able to:

- Demonstrate the construction and principle of DC generator.
- Compute the performance of DC generators.
- Emphasize the concept of armature reaction and commutation.
- Analyze the characteristics and parallel operation of DC Generators
- Understand principle, starting and speed control of DC motors.
- Evaluate the performance of DC machines by conducting various tests.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. I Semester

(5G233) ELECTRICAL CIRCUITS-I

COURSE OBJECTIVE:

This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes Basic concepts, 1-Φ AC circuits, Network theorems, Two port networks, Magnetic circuitsand Network topology etc

Unit I

BASIC CONCEPTS OF ELECTRICALCIRCUITS: Circuit Concept, R-L-C Parameters, Voltage-Current Relationship for Passive Elements, Kirchhoff's Laws, Network Reduction Techniques-Series, Parallel and Series- Parallel Circuits , Star-Delta Transformations,Voltage and Current division rules, Voltage and Current Sources-Independent and Dependent Sources, Source Transformation, Mesh, Super Mesh, Nodal and Super Node analysis.

Unit II

FUNDAMENTALS OF 1-Φ AC CIRCUITS: Advantages of AC supply, Types of AC waveforms, Importance of Sine Wave, Basic definitions: Cycle. Time period, frequency, Peak value, peak –peak value. Determination of Average ,R.M.SValues, Peak and Form Factor for different Periodic Waveforms, Phase and Phase Difference , j-notation, Steady State Analysis of R, L and C with Sinusoidal Excitation, Concept of Reactance, Impedance, Susceptance and Admittance, Real and Reactive Power, Complex Power,Concept of Power Factor. Resonance – Definition, Resonant frequency, bandwidth and Q-factor for series and parallel resonant circuits, Problems.

Unit III

NETWORK THEOREMS: Superposition, Thevenin's, Norton's, Maximum Power Transfer, Millman's, Reciprocity, Compensation and Tellegen's Theorems for DC and AC excitations.

Unit IV

TWO PORT NETWORKS: Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations, Inter connections, Concept of Transformed Network - Two Port Network Parameters using Transformed Variables.

Unit V

MAGNETICALLY COUPLED CIRCUITS AND NETWORK TOPOLOGY: Coupled circuits – self & mutual inductance, Dot convention, Coefficient of coupling, Analysis of Magnetic circuits: Series, Parallel and Composite circuits, comparison of electrical and magnetic circuits.

Network Topology: Basic Definitions – Graph – Tree, Basic Cutset and Basic Tieset Matrices for Planar Networks, Duality & Dual Networks.

Text Books:

1. A. Sudhakar&Shyam Mohan. *Electric Circuits*. 5th Edition, Tata McGraw Hill Company, 2015.
2. A. Chakrabarti. *Circuit Theory*. 6th edition, DhanpatRai& Co, New Delhi, 2014.

Reference Books:

1. M.E. Van Valkenberg. *Network Analysis*. 3rd edition, Pearson Publications, New Delhi 2006.
2. William H. Hayt& Jack E. Kennedy & Steven M. Durbin. *Engineering Circuit Analysis*. 8th edition, TATA McGraw Hill Company, 2013.
3. J.A.Edminister&M.D.Nahvy. *Theory and Problems of Electric Circuits*. 4th Edition Schaums Outline series, New Delhi TATA McGraw Hill Company, 2004.
4. G. K. Mittal, Ravi Mittal. *Network Analysis*. 14th Edition, Khanna Publishers, New Delhi, 1997.
5. C. K. Alexander and M. N. O. Sadiku. *Fundamentals of Electric Circuits*. 5th Edition, Tata McGraw hill Publishing Company Limited, New Delhi, 2012.

Course Outcomes:

- Analyze the Basic concepts of Electrical Circuits.
- Analyze the Concepts of 1-Φ electric circuits.
- Analyze the Phenomenon of Resonance.
- Solve electric circuits for voltage, current and power using network theorems.
- Compute Two port Network parameters.
- Analyze magnetic circuits.
- Compute the Basic Cutset and Basic Tieset Matrices.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. I Semester

(5G536) FLUID MECHANICS AND HYDRAULIC MACHINES

Course Objective:

To introduce the study of various fluid properties and their significance in engineering problems and thebasic concepts of fluid flow, both kinematics and dynamics, including the derivation of energy equation neededfor the analysis of fluid flow problems, different types of flow inpipes, theory of boundary layer, losses in pipes and basics of turbo machinery in essentials of hydro electric power plants.

Unit I

FLUID STATICS: Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers.

FLUID KINEMATICS: Stream line, path line and streak lines and stream tube, classification of flows, equation of continuity for one dimensional flow.

Unit II

FLUID DYNAMICS: Surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

CLOSED CONDUIT FLOW: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: pitot tube, venturimeter, and orifice meter, Flow nozzle, Turbine flow meter.

Unit III

BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

HYDROELECTRIC POWER STATIONS: Elements of hydro electric power station-types-concept of pumped storage plants-storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area; heads and efficiencies.

Unit IV

HYDRAULIC TURBINES: Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube theory- functions and efficiency.

PERFORMANCE OF HYDRAULIC TURBINES: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

Unit V

CENTRIFUGAL PUMPS: Classification, working, work done – manomertic head- losses and efficiencies specific speed- pumps in series and parallel-performance - characteristic curves, NPSH.

Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

TEXT BOOKS:

1. Modi and Seth, *Hydraulics, fluid mechanics and Hydraulic machinery*.
2. Rajput, *Fluid Mechanics and Hydraulic Machines*.

REFERENCE BOOKS:

1. D.S. Kumar, *Fluid Mechanics and Fluid Power Engineering.*Kotaria& Sons.
2. D. Rama Durgaiah, *Fluid Mechanics and Machinery*. New Age International.
3. Banga& Sharma, *Hydraulic Machines.* Khanna Publishers.

4. James W. Dally, William E. Riley, *Instrumentation for Engineering Measurements*. John Wiley & Sons Inc. 2004.

Learning Outcomes:

- An ability to understand the fluid properties and their engineering significance and able to differentiate between different pressures and the methods of fluid pressure measurement.
- The student shall have basic idea about the fundamentals of fluid flow. The student is exposed to the fundamental equations, used in the analysis of fluid flow problems like continuity, energy and momentum equations.
- An ability to understand the different types of pipe flow and the conditions governing them and understands the working of the different devices used for measurement of fluid flow under different conditions.
- An ability to understand the fundamentals of turbo machinery, elements of hydro electric power plant.
- An ability to understand the performance of hydraulic turbines and hydraulic pumps.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. I Semester

(5G234) ELECTROMAGNETIC FIELDS

Course objective:

To provide the basic skills required to understand, develop, and design various engineering applications involving electromagnetic fields.

Review of Vector Algebra:

Scalar and vector fields - Vector algebra - Cartesian, Circular Cylindrical and Spherical co-ordinate systems-Divergence Theorem - Stoke's Theorem

Unit I

ELECTROSTATICS-I: Electrostatic fields-Coulomb's law - Electric Field Intensity (EFI) - Various Charge Distributions - EFI due to a Continuous volume charge distribution, line and surface charge Electric Flux density-Gauss's Law - Applications of Gauss law to symmetrical charge distributions and differential volume element - Maxwell's first equation. Energy expended in moving a point charge in an electric field-Potential –Maxwell's second equation - Potential Gradient-Potential for different Charge distributions-energy density in electrostatic fields

Unit II

ELECTROSTATICS-II: Electric Dipole-Dipole moment - potential and EFI due to an electrical Dipole-Torque on an Electric Dipole in an electric field-Current density - conduction and convection current density - Ohm's law in point forms - continuity equation-Conductors and Dielectric materials Polarization , Boundary Conditions Capacitance-capacitance of parallel plate, Spherical and Co-axial capacitors with composite dielectric Laplace's and poison's equations.

Unit III

MAGNETOSTATICS: Static magnetic fields-Biot-Savart's law, Magnetic Field Intensity(MFI) - MFI due to a straight current carrying filament, Circular, Square, Solenoid current carrying wire, Relation between magnetic flux, Magnetic flux density and MFI. Ampere's Circuital law - Maxwell's third equation- Applications of Ampere's law to infinite line current, Infinite sheet of current, Infinitely long co-axial transmission line, Scalar magnetic potential and its limitations-Vector magnetic potential , Vector Poisson's equation.

Unit IV

FORCE IN MAGNETIC FIELDS AND INDUCTANCE: Magnetic Forces- Force on moving charges, - Lorentz force equation, Force on a current element -Force on a straight and long current carrying conductor in magnetic field-Force between two straight long and parallel current carrying conductors. Magnetic Dipole and Dipole moment - Torque on a current loop placed in a magnetic field.

Magnetization - Classification of magnetic materials - B-H curve - Magnetic Boundary conditions. - Self-Inductance of a solenoid, Toroid, Co-axial cable, energy stored and density in magnetic field.

Unit V

ELECTRODYNAMIC FIELDS: Time varying fields - Faraday's laws of electromagnetic induction - Maxwell's fourth equation - statically and dynamically induced EMF – simple problems. Modifications of Maxwell's equations for time varying fields(Point forms and Integral forms) - displacement current - poynting theorem and poynting vector

Text Books:

1. Matthew N.O. Sadiku. *Elements of Electromagnetic Fields*. 6th edition, Oxford Publications, Jan' 2014
2. William H. Hayt& John A. Buck. *Engineering Electromagnetics*. 8th Edition, Mc. Graw Hill Companies, Sep'2014.

REFERENCE BOOKS:

1. Joseph A.Edminister ,Theory and problems of Electromagnetics 4th Edition ,Schaum's Outline series Mc.Graw Hill companies,New Delhi,2009.
2. A.Gangadhar& P.M. Ramanathan. *Field Theory*. 5th edition, Khanna publishers, New Delhi, 2008.
3. AshutoshPramanik. *Electromagnetism*,Problems with solutions. 3rdEdition.PHI

Course Outcomes

Analyze the behavior of

- Static Electric fields due to electric charges at rest.
- Static magnetic fields due to DC currents.
- Time varying electric and magnetic fields.
- Demonstrate the Physical significance of Maxwell's equations for both time variant and time invariant electric and magnetic fields.
- EvaluateElectric field and capacitance by applying Gauss's Law.
- EvaluateMagnetic field and Inductance by applying Ampere's Law.
- Find the operation of different types of Electric machines by applying various laws of Electromagnetics.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. I Semester

(5G537) FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Any **Ten** of the following experiments are to be conducted

a) Impact of jets on Vanes.
b) Performance Test on Pelton Wheel.
c) Performance Test on Francis Turbine.
d) Performance Test on Kaplan Turbine.
e) Performance Test on Single Stage Centrifugal Pump.
f) Performance Test on Multi Stage Centrifugal Pump.
g) Performance Test on Reciprocating Pump.
h) Calibration of Venturimeter.
i) Calibration of Orifice meter.
j) Determination of friction factor for a given pipe line.
k) Determination of loss of head due to sudden contraction in a pipeline.
l) Turbine flow meter.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. I Semester

(5G237)ELECTRICAL MACHINES-I LAB

Any **Ten** of the following experiments are to be conducted

1. Magnetization characteristics of DC shunt generator. (Determination of critical field resistance and Critical speed)
2. Load test on DC shunt generator. (Determination of characteristics)
3. Load test on DC series generator. (Determination of characteristics)
4. Load test on DC compound generator (Cumulative and differential connection). (Determination of characteristics)
5. Hopkinson's test on DC shunt machines. (Predetermination of efficiency)
6. Fields test on DC series machines. (Determination of efficiency)
7. Retardation test on DC shunt motor (Determination of stray losses)
8. Swinburne's tests on DC shunt motor. (Predetermination of efficiencies)
9. Speed control of DC shunt motor by
   a. Armature control method
   b. Field flux control method
10. Brake test on DC compound motor. (Determination of performance curves).
11. Brake test on DC shunt motor. (Determination of performance curves).
12. Separation of losses in DC shunt machine.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. II Semester

(5G241)ELECTRICAL MACHINES-II

Course objective:

As an extension of Electrical machines-I course, this subject facilitates to study the performance of Transformers and Induction motors which are the major part of Transmission of electrical power, industrial drives and agricultural pump sets.

Unit-I

CONSTRUCTION & OPERATION OF SINGLE PHASE TRANSFORMERS: Single phase transformer - types - constructional details - emf equation - operation on no load and on load - phasor diagrams - Losses - minimization of core losses - effect of variations of frequency & supply voltage on core losses.

Unit-II

PERFORMANCE OF SINGLE PHASE TRANSFORMERS: Equivalent circuit - Efficiency - regulation - OC and SC tests, Polarity test - Sumpner's test - predetermination of efficiency and regulation - separation of core losses test - Parallel operation - Auto transformers - Equivalent circuit - comparison with two winding transformers - All day efficiency.

Unit-III

THREE - PHASE TRANSFORMERS: Three-Phase transformers - connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ - open Δ and Scott connection (Qualitative treatment only), Third harmonics in phase voltages - three winding transformers.

Unit-IV

THREE-PHASE INDUCTION MOTORS: Three-Phase induction motors - construction - production of R.M.F. - principle - Effect of slip on rotor parameters at standstill and during operation - Rotor power input, rotor copper loss and mechanical power developed and their interrelation-torque equation - deduction from torque equation - expressions for maximum torque and starting torque - torque slip characteristics - double cage and deep bar rotors - equivalent circuit - crawling and cogging.

Unit-V

CIRCLE DIAGRAM, STARTING & SPEED CONTROL OF THREE-PHASE INDUCTION MOTORS: No - Load and blocked rotor tests - stator resistance test - Circle diagram - predetermination of performance - methods of starting - starting current and torque calculations - speed control - change of frequency, change of poles, methods of consequent poles, cascade connection, Injection of an emf into rotor circuit (qualitative treatment only) - Induction Generator -principle of operation.

Text Books:

1. I.J. Nagrath& D.P. Kothari, *Electrical Machines*. Tata McGraw – Hill Publishers, New Delhi, 4th Edition, 2010.
2. P.S. Bimbhra, *Electrical Machinery*. Khanna Publishers. New Delhi, 7th Ed, 2011.

Reference books:

1. JB Gupta, *Theory and Performance of Electrical Machines* (DC machines, Poly phase circuits & AC machines) in SI Units. S.K. KATARIA & Sons, New Delhi, 2013.
2. A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*. McGraw-Hill Companies, New Delhi, 2013, 7th Ed.
3. MG.Say, *Performance and Design of AC Machines*, 3rd edition, BPB Publishers, 2002.
4. Langsdorf, *Theory of Alternating Current Machinery*. Tata McGraw-Hill Companies, 2nd Ed, 2004.
5. B.L. Theraja& A.K. Theraja, *A. text of Electrical Technology in SI units* Vol: II. S. Chand publishers, 23rd edition 2006.

Course outcomes:

By the end of this course, students will be able to:

- Demonstrate the construction and operation of single phase transformer.
- Compute the performance of single phase transformer.
- Compute the performance of single phase Auto transformer.
- Analyze the three phase transformer connections.
- Demonstrate the construction and principle of three phase induction motor.
- Plot the Torque-Slip characteristics of three phase induction motor.
- Compute the performance of three phase induction motor.
- Control the speed of three phase induction motor.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. II Semester

(5G242)ELECTRICAL CIRCUITS-II

Course Objective:

This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of three phase circuits , transient analysis, applications of Laplace and Fourier transforms and network synthesis techniques etc.

Unit I

THREE PHASE CIRCUITS: Phase Sequence - Star and Delta Connection-Relation Between Line and Phase Voltages and Currents in Balanced Systems-Analysis of Balanced Three Phase Circuits-Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems.Analysis of Three Phase Unbalanced Circuits-Loop Method-Application of Millman's Theorem-Star Delta Transformation Technique – Two Wattmeter Method of Measurement of Three Phase Power.

Unit II

LAPLACE TRANSFORMS: Definition of Laplace transform – advantages, basic theorems(differentiation and integration) - Laplace transform of important functions – inverse Laplace transform – transform impedance of network elements (R, L & C), application of Laplace transform – series RL, RC, RLC – parallel RLC circuits – initial and final value theorem.

Unit III

TRANSIENT ANALYSIS: Initial conditions-DCTransient response of RL, RC and RLC series circuits by using differential equation approach and Laplace transform method , Problems. Response of RL and RC networks to pulse excitation.

AC Transient response of RL, RC and RLC series circuits by using differential equation and Laplace transform method, Problems.

Unit IV

FOURIER SERIES: Introduction – trigonometric Fourier series - evaluation of Fourier coefficients – waveforms symmetry, exponential form Fourier series, effective value, Fourier transforms & Properties – relationship with Laplace transform.

Unit V

NETWORK FUNCTIONS AND SYNTHESIS: Network functions – necessary conditions for driving point function-necessary conditions for transfer function-applications of network analysis in deriving network functions- Positive real functions-definitions and properties. Synthesis of single port networks (RL, RC and LC networks) in Foster and Cauer forms.

Text books:

1. A. Sudhakar, Shyammohan S Palli. *Circuits and Networks*. (Analysis and Synthesis), 5th edition, Tata McGraw Hill Publishing company Ltd., 2015.
2. D. Roy Choudhury. *Networks and Systems*. 2nd edition, New Age international publishers, 2010.

Reference books:

1. A. Chakrabarthi. *Circuit Theory (Analysis and Synthesis)*.6th edition, DhanpatRai& Co. New Delhi, 2014.
2. M.E. Van Valkenburg. *Network analysis*. 3rd edition, PHI, 2006.
3. William H Hayt, Jr. Jack E. Kemmerly, Steven M. Durbin. *Engineering Circuit Analysis*. 8th edition, Tata McGraw Hill publishing company Ltd. 2013.
4. Umesh Sinha. *Network Analysis and Synthesis*. 5th edition, Satyaprakashan, New Delhi, 2010.

5. *Engineering Network Analysis & FilterDesign*. GopalBhise G, DurgeshKulshreshta C, Prem Chadha R. 2009.

Course outcomes:

- Analyze the concepts of 3-Φ ac circuits.
- Analyze the Laplace transforms.
- Compute the transient response of electrical circuits for DC and AC excitations.
- Analyze the Fourieranalysis.
- Determine the Network functions for electrical circuits.
- Design electrical circuits using synthesis.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. II Semester

(5G345) ELECTRONIC CIRCUIT THEORY

COURSE OBJECTIVES:

- The course aims to provide the student with the ability
- To analyze and design the transistor amplifiers, feedback and tuned amplifiers.
- To design oscillators.

Unit I

SMALL SIGNAL ANALYSIS OF AMPLIFIERS:- Small Signal model of BJT – h-parameter model of BJT – Analysis of CB, CE and CC configurations using h-parameters – simplified hybrid model – miller's theorem – dual of miller's theorem – Small signal model of JFET and MOSFET – Common source and common Drain amplifiers, using FET, Analysis ofCascaded Transistor Amplifiers, RC Coupled amplifier, Frequency response of RC Coupled, Direct coupled and Transformer coupled amplifiers.

Unit II

BJT Frequency Response: General frequency considerations, Low and high frequency response of BJT amplifier , Effect of coupling and Bypass capacitors, Hybrid- π transistor model, CE short circuit current gain, Current gain with resistive load, Gain Bandwidth product, Emitter follower at High frequencies.

Unit III

Feedback Amplifiers: concept of Feedback, Classification of feedback amplifiers, Transfer Gain with feedback, General characteristics of negative feedback amplifiers. Voltage series, voltage shunt, current series, and current shunt feedback amplifiers with discrete components(Topologies).

Unit IV

Oscillators: Condition for oscillations. Oscillator Types, Frequency and amplitude stability of oscillators, generalized analysis of LC oscillators-Hartley and Colpitts oscillators, RC-phase shift and Wien bridge oscillators, Crystal Oscillators-Quartz and Pierce.

Unit V

Large Signal and Small Signal Single Tuned Amplifiers:

Direct coupledand Transformer Coupled Class A power Amplifiers, Efficiency of Class A power amplifier, Push-pull and Complementary Symmetry Class B power Amplifiers, phase inverter, Transistor power dissipation. Introduction to tuned amplifiers, Q-Factor, Analysis of Small Signal Single Tuned Amplifiers–Capacitive coupled,Inductive coupled amplifiers.

Text Books:

1. J. Millman and C.C. Halkias- Integrated Electronics, McGraw-Hill, 1972.
2. Robert T. Paynter- Introductory Electronic Devices and Circuits, Pearson Education, 7th Edition.

Reference Books:

1. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits Theory, Pearson/Prentice Hall, 9th Edition, 2006.
2. Donald A. Neumann- Electronic Circuit Analysis and Design, McGraw Hill.

COURSE OUTCOMES:

Upon completion of the course, student can

- Analyze the single stage and multistage amplifiers using h-parameter model at low frequencies.
- Understand the concept and analysis of BJT amplifier circuits at High frequencies using Hybrid- π model.
- Design the feedback amplifiers and oscillators.
- Design and analyze large signal and tuned amplifier

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. II Semester

(5G243)GENERATION OF ELECTRIC POWER

Course objective:

Electrical power plays significant role in day-to-day life of entire mankind. To familiarize the students with different types of power generating systems and the economics associated with power generation.

Unit I:

INTRODUCTION & THERMAL POWER STATIONS Overview of Conventional sources of energy - Structure of Electric Power System - Growth of PS in IndiaLayout of thermal plant –use of lignite and coal - showing paths of coal – steam – water – air - ash and flue gases - brief description of TPS components: economizer – boilers - super heaters - turbines and condenser-chimney and cooling towers.

Unit II:

HYDRO ELECTRIC ANDGAS POWER STATIONS Arrangement and location of hydro electric station, principle of working of a hydro – electric plants, components, Advantages and disadvantages

Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only)

Unit III:

NUCLEAR POWER STATIONS Nuclear fission - chain reaction - principle of operation of nuclear reactor - nuclear fuel – moderator - control rods - reflectors and coolants - shielding and safety precautions - radiation hazards - nuclear reactors – PWR - BWR and breeder reactor

Unit IV:

ECONOMIC ASPECTS OF POWER GENERATION: Load curve - load duration and integrated load duration curve – load - demand– diversity – capacity - utilization and Plant use factors.Costs of generation – depreciation - methods of calculations – Tariffs - flat rate - block rate - two part - three part and power factor tariffs

Unit-V:

NON CONVENTIONAL ENERGY SOURCES: Over View of – Solar, wind, Geothermal, Ocean thermal energy conversion, Tidal, Wave, Bio mass/Bio gas, MHD generators, Fuel Cells, Thermo Electric Power and Piezeo Electric power.

Text Books:

1. V.K.Mehta and Rohith Mehta. *Principles of Power Systems*. Schand& Company Ltd, New Delhi 2004
2. M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti. *A Text Book on Power System Engineering*. DhanpatRai& Co. Pvt. Ltd., 1999.
3. G.D. Rai. Non-Conventional Energy Sources. Khanna Publishers, Delhi, 2007.

Reference Books:

1. C.L.Wadhwa. *Electrical Power Systems*. New Age international (P) limited, 2005
2. M.V.Deshpande. *Elements of Power Station Design And Practice*. Wheeler publishing, 1999
3. *Electrical power Generation,Transmission and Distribution*, S N Singh,PHI,2003.
4. J B Gupta, *A course in Power Systems* , Published by S K Kotaria& Sons
5. Khan B.H., Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi,2006

Course Outcomes:

- Learns about generation of electric power from thermal sources.
- Demonstrates the working of Hydro and Gas power Plants.
- Understands the importance of Nuclear Power Generation.
- Able to know the economic aspects of Power generation.
- Basic knowledge about different Non conventional Sources.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. II Semester

(5G244)LINEAR CONTROL SYSTEMS

Course objective:

To provide an introduction to the analysis of linear control systems. This will permit an engineer to exploit time domain and frequency domain tools.

Unit I

INTRODUCTION: Concepts of Control Systems-Classification- Open Loop and closed loop control systems and their differences-Examples- Feed-Back Characteristics, Effects of feedback-Mathematical models-differential Equations-Transfer function-Mechanical Translational & Rotational systems, electrical analogy — Block Diagram representation of systems considering electrical systems as examples- Block diagram algebra, Signal Flow graph and Mason's gain formula. Transfer function of DC servo motor – AC servo motor -synchro transmitter and receiver.

Unit II

TIME RESPONSE ANALYSIS: Types of test signals, Type and Order of a systems, Time Response of first and second order system, Time domain specifications- and– steady state error – static error constants – generalized error coefficients.Effects of proportional, integral, derivative Controllers.

Unit III

STABILITY ANALYSIS: Concepts of stability: Characteristic equation, location of roots in s-plane for stability, asymptotic stability and relative stability, Routh-Hurwitz stability criterion-Root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

Unit IV

FREQUENCY RESPONSE ANALYSIS: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-Stability Analysis.-

Unit V

Design and Compensation Techniques: Compensation techniques – Lag, Lead, Lead-Lag Compensators design using Bode Plot

State Space Analysis

Concepts of state, state variables and state model-derivation of state model for physical systems, Diagonalization- State transition Matrix and its properties – Solution of linear state equation – Concepts of controllability and Observability.

Text Books:

1. Katsuhiko Ogata "*Modern Control Engineering"* — Prentice Hall of India Pvt. Ltd., 5th edition, 2010
2. I.J.Nagrath and M. Gopal *"Control Systems Engineering"* New Age International (P) Limited, Publishers, 5th edition, 2007.

Reference Books:

1. Control Systems Engineering - by NISE 5th Edition – John wiley& sons, 2010.
2. A. NagoorKani "*Control Systems"* – First Edition RBA Publications, 2006.
3. B. C. Kuo and FaridGolnaraghi "*Automatic Control Systems"*— John wiley and son's, 8th edition, 2003.

Course Outcomes

- To Understand the basic components of control systems.
- To Gain knowledge in various time domain and frequency domain tools for analysis and design of linear control systems and compensators.
- To Understand the methods to analyze the stability of systems from transfer function forms.
- To Understand the concept of state variable analysis.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. II Semester

(5GC41) COMPLEX VARIABLES & SPECIAL FUNCTIONS

Course Objectives:

- The course aims to provide the students with the ability
- To understand the complex variables and their functions.
- To apply this knowledge to evaluate the complex integrals in real life situations.

Unit – I

Beta and Gamma Functions – their properties – Evaluation of improper integrals using Beta and Gamma functions.

Complex variables: Exponential, trigonometric, hyperbolic functions and their properties – General power z^c (c is complex), principal value.

Unit – II

Functions of a complex variable – Continuity – Differentiability – Analyticity – Properties – Cauchy – Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method.

Unit – III

Complex Integration: Line integral – Evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula.

Complex power series: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series.

Unit – IV

Singular point – Isolated singular point – Pole of order m – Essential singularity.

Residue – Evaluation of residues – Residue theorem. Evaluation of integrals of the type $\int_{-\infty}^{\infty} f(x)dx$ *and* $\int_{0}^{2\pi} f(\cos\theta, \sin\theta)d\theta$.

Determination of zeros – Argument principle – Rouche's theorem.

Unit – V

Conformal mapping: Definition – Translation, rotation, and inversion –- Transformation by e^z, $\ln z$, z^2, z^n, $\sin z$, $\cos z$.

Bilinear transformation -Fixed points – Cross ratio – Determination of bilinear transformation mapping for three given points

Text Book:

Higher Engineering Mathematics, B. S. Grewal, Khanna Publication.

Reference Books:

1. A Text Book of Engineering Mathematics, B. V. Ramana, Tata McGraw Hill.
2. A Text Book of Engineering Mathematics, Vol – III, T.K. V Iyengar, B. Krishna Gandhi and Others S. Chand & Company.
3. Complex Variables – Chruchile and Brown.
4. Complex Variables – Schaum Series.

Course Outcomes:

Upon completion of the course, students will

- Understand the properties of Beta and Gamma functions.
- Have the knowledge on functions of a complex variable.
- Understand the concepts of exponential, trigonometric, hyperbolic functions and their properties.

- Have the knowledge of complex integration and apply it solve complex integrals of different type.
- Learn about conformal mapping.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. II Semester

(5G247)ELECTRICAL CIRCUITS AND SIMULATION LAB

Any **TEN** experiments to be conducted from the following

1. Verification of KCL & KVL.
2. Verification of Maximum Power Transfer Theorem.
3. Verification of superposition theorem.
4. Verification of Thevenin's and Norton's theorem.
5. Verification of Compensation theorem.
6. Verification of Reciprocity and Millmann's Theorems
7. Determination of Self Inductance, Mutual Inductance and Co-efficient of Coupling of a single phase transformer.
8. Series and Parallel Resonance
9. Determination of Impedance and Admittance Parameters
10. Determination of transmission and Hybrid Parameters
11. Locus diagrams on RL and RC circuits.
12. Simulation of DC Circuits
13. DC Transient Response

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. II Semester

(5G248) CONTROL SYSTEMS & SIMULATION LAB

Any **Ten** of the following experiments are to be conducted

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC Machine
6. Effect of P, PD, PI, PID Controller on a second order systems
7. Lag and lead compensation – Magnitude and phase plot
8. Temperature controller using PID
9. Characteristics of magnetic amplifiers
10. Characteristics of AC servo motor
11. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
12. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
13. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB.
14. State space model for classical transfer function using MATLAB – Verification.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES::RAJAMPET
(AN AUTONOMOUS INSTITUTION)

II Year B. Tech. I Semester

(5GC44) Aptitude And Reasoning Skills

QUANTITATIVE APTITUDE:

1. Number Systems
2. Averages
3. Problems on ages
4. Allegations
5. Percentages
6. Profit and loss
7. Simple interest and Compound interest
8. Ratio and Proposition and variation
9. Time and Work
10. Time and Distance
11. Menstruation
12. Permutation and Combinations
13. Progressions
14. Inequalities
15. Logarithms
16. HCF and LCM
17. Decimal Fractions
18. Simplification
19. Square Roots and Cube Roots
20. Pipes and Cisterns
21. Area, Volume and Surface Areas
22. Calendar, Clocks
23. True Discount, Banker's Discounts
24. Data Interpretation, Tabulation, Bar Graphs, Pie charts, Line Graphs

REASONING:

1. Directions
2. Blood Relations
3. Problems on Cubes
4. Series and Sequences
5. Odd man out
6. Coding and Decoding

7. Data sufficiency
8. Logical deductions
9. Arrangements and Combinations
10. Groups and Teams
11. 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, IrnK.Wolf, Barron's GRE, Galgotia Publications, New Delhi, 2006.
4. R.S.Agarwal, Vrebal 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.
8. George J Summers, Puzzles and Teasers, Jaico Publishing House, Mumbai, 2005.

Library:

1. Mittal.U, Puzzles to Puzzle you (Book-I & II).
2. Aptitude (Quantitative, Analytical, Logical), By Globarena.
3. Aptitude – Student work book, Part-I &II, By Globarena.
4. Material for Soft Skills, By Globarena