ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABUS

ELECTRONICS AND COMMUNICATION ENGINEERING

For

ECE FOUR YEAR DEGREE COURSE

(Applicable for batches admitted from 2013-2014)

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
(Autonomous)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA - 533 003, Andhra Pradesh, India

ACADEMIC REGULATIONS R13 FOR B. TECH. (REGULAR)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2013-14 onwards

1. **Award of B. Tech. Degree**

    A student will be declared eligible for the award of B. Tech. Degree if he fulfils the following academic regulations:

    1.1 A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years

    1.2 The candidate shall register for 180 credits and secure all the 180 credits.

2. **Courses of study**

    The following courses of study are offered at present as specializations for the B. Tech. Course:

S. No	Branch
01	Electronics and Communication Engineering
02	Electrical and Electronics Engineering
03	Civil Engineering
04	Mechanical Engineering
05	Computer Science and Engineering
06	Petro Chemical Engineering
07	Information Technology
08	Chemical Engineering
09	Electronics and Instrumentation Engineering
10	Bio-Medical Engineering
11	Aeronautical Engineering
12	Automobile Engineering
13	Bio Technology
14	Electronics and Computer Engineering
15	Mining Engineering
16	Petroleum Engineering
17	Metallurgical Engineering
18	Agricultural Engineering

3. **Distribution and Weightage of Marks**

    (i) The performance of a student in each semester shall be evaluated subject – wise with a maximum of 100 marks for theory and 75 marks for practical subject. The project work shall be evaluated for 200 marks.

    (ii) For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End - Examinations.

(iii) Out of 30 internal marks – 20 marks are assigned for subjective (**Theory, Design, Analysis, Simulation, Algorithms, Drawing, etc.**) examination 10 marks for objective examination.

(iv.)For theory subjects, during the semester there shall be 2 tests. The weightage of Internal marks for 30 consists of Descriptive – 15, Assignment - 05 (Theory, Design, Analysis, Simulation, Algorithms, Drawing, etc. as the case may be) Objective -10 (Conducted at College level with 20 Multiple choice question with a weightage of ½ Mark each). The objective examination is for 20 minutes duration. The subjective examination is for 120 minutes duration conducted for 40 marks.Each subjective type test question paper shall contain **4 questions** and all questions need to be answered. The Objective examination marks scaled for 10 and subjective examination marks scaled for 15 are to be added to the assignment marks of 5 for getting internal marks for 30. The better of the two tests will be taken for internal marks. As the syllabus is framed for 6 units, the 1st mid examination (both Objective and Subjective) is conducted in 1-3 units and second test in 4-6 units of each subject in a semester.

(v) The end semester examination is conducted covering the topics of all Units for 70 marks. Part – A contains a mandatory question (Brainstorming / Thought provoking / case study) for 22 marks. Part – B has 6 questions (One from each Unit). The student has to answer 3 out of 6 questions in Part – B and carries a weightage of 16 marks each.

(vi)For practical subjects there shall be continuous evaluation during the semester for 25 internal marks and 50 semester end examination marks. Of the 25 marks for internal, 15 marks shall be awarded as follows: day to day work 10 and Record-5, and 10 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner.

(vii)For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (20 marks for day – to – day work, and 10 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests.

(viii) For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for seminar.

(ix)Out of a total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination. The End Semester Examination (Viva – Voce) shall be conducted by the committee. The committee consists of an external examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be conducted at the end of the IV year. The Internal

Evaluation shall be on the basis of two seminars given by each student on the topic of his project and evaluated by an internal committee.

(x) Laboratory marks and the internal marks awarded by the College are not final. The marks are subject to scrutiny and scaling by the University wherever felt desirable. The internal and laboratory marks awarded by the College will be referred to a Committee. The Committee shall arrive at scaling factor and the marks will be scaled as per the scaling factor. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the University norms and shall be produced to the Committees of the University as and when they ask for.

4. **Attendance Requirements**
    4.1   A student is eligible to write the University examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.
    4.2   Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee
    4.3   Shortage of Attendance below 65% in aggregate shall not be condoned.
    4.4   A student who is short of attendance in semester may seek re-admission into that semester when offered within 4 weeks from the date of the commencement of class work.
    4.5   Students whose shortage of attendance is not condoned in any semester are not eligible to write their end semester examination of that class.
    4.6   A stipulated fee shall be payable towards condonation of shortage of attendance.
    4.7   A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester.
    4.8   If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

5. **Minimum Academic Requirements**
    The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.4.
    5.1   A student is deemed to have satisfied the minimum academic requirements if he has **earned the credits allotted to each theory/practical design/drawing subject/project andsecures not less than 35% of marks in the end semester exam, and minimum 40% of marks in the sum total of the internal marks and end semester examination marks.**
    5.2   A student shall be promoted from first year to second year if he fulfills the minimum attendance requirement.
    5.3   A student will be **promoted from II year to III year** if he fulfills the academic requirement **of 40% of the credits up to II year I semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.**
    5.4   A student shall be **promoted from III year to IV year** only if he fulfils the academic requirements of **40% of the credits up to III year I semesterfrom all**

the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

5.5   A student shall register and put up minimum attendance in all 180 credits and earn all 180 credits. **Marks obtained in the all 180 credits shall be considered for the calculation of percentage of marks.**

5.6   **Students who fail to earn 180 credits as indicated in the course structure within ten academic years (8 years of study + 2 years additionally for appearing for exams only) from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled.**

6   Course pattern

6.1   The entire course of study is for four academic years, all the years on semester pattern.

6.2   **A student is eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.**

6.3   **When a student is detained for lack of credits/shortage of attendance, he may be re-admitted into the same semester / year in which he has been detained. However, the academic regulations under which he was first admitted, shall continues to be applicable to him.**

7   Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

Class Awarded	% of marks to be secured	
First Class with Distinction	70% and above	From the aggregate marks secured from 180 Credits.
First Class	Below 70 but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

The marks obtained in internal evaluation and end semester examination shall be shown separately in the memorandum of marks.

8   Minimum Instruction Days

The minimum instruction days for each semester shall be 90 working days.

9   There shall be no branch transfers after the completion of the admission process.

10   **There shall be no transfer from one college/stream to another within the Constituent Colleges and Units of Jawaharlal Nehru Technological University Kakinada.**

11   WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the university or if any case of indiscipline is pending against him, the result of the student will be withheld and he will not be allowed into the next semester. His degree will be withheld in such cases.

12.   **TRANSITORY REGULATIONS**

12.1 Discontinued, detained, or failed candidates are eligible for readmission as and when next offered.

12.2 After the revision of the regulations, the students of the previous batches will be given two chances for passing in their failed subjects, one supplementary and the other regular. If the students cannot clear the subjects in the given two chances, they shall be given equivalent subjects as per the revised regulations which they have to pass in order to obtain the required number of credits.

12.3 In case of transferred students from other Universities, the credits shall be transferred to JNTUK as per the academic regulations and course structure of the JNTUK**.**

13. General

13.1 Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

13.2 The academic regulation should be read as a whole for the purpose of any interpretation.

13.3 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

13.4 The University may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the University.

13.5 The students seeking transfer to colleges affiliated to JNTUK from various other Universities/ Institutions have to pass the failed subjects which are equivalent to the subjects of JNTUK, and also pass the subjects of JNTUK on their own without the right to sessional marks which the candidates have not studied at the earlier Institution.

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ACADEMIC REGULATIONS R13 FOR B. TECH. (LATERAL ENTRY SCHEME)

Applicable for the students admitted into II year B. Tech. (LES) from the Academic Year 2013-14 and onwards

1.   **Award of B. Tech. Degree (LES)**
      A student will be declared eligible for the award of B. Tech. Degree (LES) if he fulfils the following academic regulations:
   - 1.1 A student shall be declared eligible for the award of the B. Tech Degree (LES), if he pursues a course of study in not less than three academic years and not more than six academic years.
   - 1.2 The candidate shall register for 132 credits and secure all the 132 credits.

2.   The students, who fail to fulfil the requirement for the award of the degree in 8 consecutive academic years (6 years of study + 2 years additionally for appearing exams only) from the year of admission, shall forfeit their seats.

3.   The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

4.   **Promotion Rule**

      A student shall be promoted from second year to third year if he fulfills the minimum attendance requirement.

      A student shall be promoted from III year to IV year only if he fulfils the academic requirements of **40% of the credits up to III year I semesterfrom all the examinations. Whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.**

5.   **Award of Class**

      After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

Class Awarded	% of marks to be secured	
First Class with Distinction	70% and above	**From the aggregate marks secured from 132 Creditsfrom II year to IV year.**
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

The marks obtained in the internal evaluation and the end semester examination shall be shown separately in the marks memorandum.

6.   All the other regulations as applicable to **B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme)**.

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	**Punishment**
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including

		practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that

		semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)
   (i) A show cause notice shall be issued to the college.
   (ii) Impose a suitable fine on the college.
   (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA

KAKINADA - 533 003, Andhra Pradesh, India

For Constituent Colleges and Affiliated Colleges of JNTUK

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

⇨ Ragging within or outside any educational institution is prohibited.

⇨ Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

	Imprisonment upto	Fine Upto
Teasing, Embarrassing and Humiliation	**6** Months +	**Rs. 1,000/-**
Assaulting or Using Criminal force or Criminal intimidation	**1** Year +	**Rs. 2,000/-**
Wrongfully restraining or confining or causing hurt	**2** Years	**Rs. 5,000/-**
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	5 Years +	**Rs. 10,000/-**
Causing death or abetting suicide	10 Months	**Rs. 50,000/-**

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE JNTUK A RAGGING FREE UNIVERSITY

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India

For Constituent Colleges and Affiliated Colleges of JNTUK

Ragging

ABSOLUTELY

NO TO RAGGING

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.

2. Ragging entails heavy fines and/or imprisonment.

3. Ragging invokes suspension and dismissal from the College.

4. Outsiders are prohibited from entering the College and Hostel without permission.

5. Girl students must be in their hostel rooms by 7.00 p.m.

6. All the students must carry their Identity Cards and show them when demanded

7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

Jawaharlal Nehru Technological University Kakinada

For Constituent Colleges and Affiliated Colleges of JNTUK

In Case of Emergency CALL TOLL FREE NO. : 1800 - 425 - 1288

LET US MAKE JNTUK A RAGGING FREE UNIVERSITY

COURSE STRUCTURE

I Year   **I Semester**

S. No.	Subject Code	Subject	T	P	Credits
1	EC111	English - I	3	-	3
2	EC112	Mathematics - I	3+1	-	3
3	EC113	Mathematical Methods	3+1	-	3
4	EC114	Engineering Physics	3+1	-	3
5	EC115	Professional Ethics and Human Values	3	-	3
6	EC116	Engineering Drawing	1+3	-	3
7	EC117	English Communication Skills Lab -1	-	3	2
8	EC118	Engineering Physics Laboratory	-	3	2
9	EC119	Engineering Workshop & IT Workshop	-	3	2
		Total:			**24**

I Year   **II Semester**

S. No.	Subject Code	Subject	T	P	Credits
1	EC121	English – II	3	-	3
2	EC122	Mathematics – III	3	-	3
3	EC123	Engineering Chemistry	3	-	3
4	EC124	Engineering Mechanics	3	-	3
5	EC125	Computer Programming	3	-	3
6	EC126	Network Analysis	3	-	3
7	EC127	Engineering Chemistry Laboratory	-	3	2
8	EC128	English Communication Skills Lab -2	-	3	2
9	EC129	C- Programming Lab	-	3	2
		Total:			**24**

II Year   **I Semester**

S. No.	Subject Code	Subject	T	P	Credits
1	EC211	Managerial Economics and Financial Analysis	3+1	-	3
2	EC212	Electronic Devices and Circuits	3+1	-	3
3	EC213	Data Structures using C++	3+1	-	3
4	EC214	Environmental Studies	3	-	3
5	EC215	Signals & Systems	3+1	-	3
6	EC216	Electrical Technology	3+1	-	3
7	EC217	Electronic Devices and Circuits Lab	-	3	2
8	EC218	Networks &Electrical Technology Lab	-	3	2
		Total:			**22**

II Year   **II Semester**

S. No.	Subject Code	Subject	T	P	Credits
1		Electronic Circuit Analysis	3+1	-	3
2		Management Science	3+1	-	3
3		Random Variables & Stochastic Processes	3+1	-	3
4		Switching Theory & Logic Design	3+1	-	3
5		EM Waves and Transmission Lines	3+1	-	3
6		Analog Communications	3+1	-	3
7		Electronic Circuit Analysis Lab	-	3	2
8		Analog Communications Lab	-	3	2
		Total:			**22**

III Year   **I Semester**

S. No.	Subject Code	Subject	T	P	Credits
1		Pulse & Digital Circuits	3+1	-	3
2		Linear IC Applications	3+1	-	3
3		Control Systems	3+1	-	3
4		Digital System Design & Digital IC Applications	3+1	-	3
5		Antennas and Wave Propagation	3+1	-	3
6		Pulse & Digital Circuits Lab	-	3	2
7		Linear IC Applications Lab	-	3	2
8		Digital System Design & DICA Lab	-	3	2
9		IPR & Patents	3	-	2
		Total:			**23**

III Year   **II Semester**

S. No.	Subject Code	Subject	T	P	Credits
1		Microprocessors and Microcontrollers	3+1	-	3
2		Digital Signal Processing	3+1	-	3
3		Digital Communications	3+1	-	3
4		Microwave Engineering	3+1	-	3
5		**Open Elective**	3+1	-	3
6		Microprocessors and Microcontrollers Lab	-	3	2
7		Digital Communications Lab	-	3	2
8		Digital Signal Processing Lab	-	3	2
9		Seminar	-	2	1
		Total:			**22**

IV Year   **I Semester**

S.No.	Subject Code	Subject	T	P	Credits
1		VLSI Design	3+1	-	3
2		Computer Networks	3+1	-	3
3		Digital Image Processing	3+1	-	3
4		Computer Architecture & Organization	3+1	-	3
5		**Elective – I** 1. Electronic Switching Systems 2. Analog IC Design 3. Object Oriented Programming & O S 4. Radar Systems 5. EMI/EMC	3+1	-	3
6		**Elective – II** 1. Optical Communication 2. Digital IC Design 3. Speech Processing 4. Artificial Neural Network & Fuzzy Logic 5. Network Security & Cryptography	3+1	-	3
7		VLSI Lab	-	3	2
8		Microwave Engineering Lab	-	3	2
		Total:			**22**

IV Year   **II Semester**

S.No.	Subject Code	Subject	T	P	Credits
1		Cellular & Mobile Communications	3+1	-	3
2		Electronic Measurements and Instrumentation	3+1	-	3
3		**Elective III** 1. TV & Satellite Communications 2. Mixed signal Design 3. Embedded systems 4. RF Circuit Design 5. Cloud Computing	3+1	-	3
4		**Elective IV** 1. Wireless Sensor Networks 2. System-on-Chip Design 3. Low Power VLSI Design 4. Bio-Medical Instrumentation 5. Advanced Computer Architecture	3+1	-	3
5		Project & Seminar	-	-	9
		Total:			**21**

Total Course Credits =   48+ 44 + 45 + 43 = 180

Open Electives:
1. Bio Medical Instrumentation
2. Artificial Neural Networks & Fuzzy Logic
3. Digital Image Processing (not for ECE Students)
4. Principles of Signals, Systems and Communications (Not for ECE Students)
5. Electronic Measurements & Instrumentation (Not for ECE Students)

Note: ECE Students can also choose the **Open Electives** offered by any other Department.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
I Year B. Tech Electronics and Communication Engineering – I Semester

	T	P	C
	3+1	0	3

ENGLISH –I
(Common to All Branches)

DETAILED TEXT-I English Essentials: Recommended Topics:

1. IN LONDON: M.K.GANDHI
   Course Educational Objectives: To apprise the learner how Gandhi spent a period of three years in London as a student.
   Course Outcomes: The learner will understand how Gandhi grew in introspection and maturity.

2. THE KNOWLEDGE SOCIETY- APJ KALAM
   Course Educational Objectives: To make the learners rediscover India as a land of Knowledge.
   Course Outcomes: The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.

3. THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE
   Course Educational Objectives: This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion.
   Course Outcomes: This develops in the student the scientific attitude to solve many problems which we find difficult to tackle.

4. PRINCIPLES OF GOOD WRITING:
   Course Educational Objectives: To inform the learners how to write clearly and logically.
   Course Outcomes: The learner will be able to think clearly and logically and write clearly and logically.

5. MAN'S PERIL
   Course Educational Objectives: To inform the learner that all men are in peril.
   Course Outcomes: The learner will understand that all men can come together and avert the peril.

6. THE DYING SUN—SIR JAMES JEANS
   Course Educational Objectives: This excerpt from the book "The Mysterious Universe" presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind. Sir James Jeans uses a poetic approach to discuss the scientific phenomena.
   Course Outcomes: This provides the students to think about the scientific phenomena from a different angle and also exposes the readers to poetic expressions.

7. LUCK—MARK TWAIN

Course Educational Objectives: This is a short story about a man's public image and his true nature. The theme of the story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.

Course Outcomes: The story is humourous in that it contains a lot of irony. Thus this develops in the learner understand humourous texts and use of words for irony.

Text Book: 'English Essentials' by Ravindra Publications

NON-DETAILED TEXT:

(From Modern Trailblazers of Orient Blackswan)
(Common single Text book for two semesters)

1. **G.D.Naidu**
   Course Educational Objectives: To inspire the learners by G.D.Naidu's example of inventions and contributions.
   Course Outcomes: The learner will be in a position to emulate G.D.Naidu and take to practical applications.

2. **G.R.Gopinath**
   Course Educational Objectives: To inspire the learners by his example of inventions.
   Course Outcomes: Like G.R.Gopinath, the learners will be able to achieve much at a low cost and help the common man.

3. **Sudhamurthy**
   Course Educational Objectives: To inspire the learners by the unique interests and contributions of Sudha Murthy.
   Course Outcomes: The learner will take interest in multiple fields of knowledge and make life worthwhile through social service.

4. **Vijay Bhatkar**
   Course Educational Objectives: To inspire the learner by his work and studies in different fields of engineering and science.
   Course Outcomes: The learner will emulate him and produce memorable things.

Text Book: 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA   **T   P   C**
I Year B. Tech Electronics and Communication Engineering – I Semester   3+1   0   3
MATHEMATICS – I
(DIFFERENTIAL EQUATIONS)
(Common to All Branches)

Course Learning Objectives:
> The objectives of the course is to make the student understand how to
- formulate and solve both ordinary and partial differential equations
- identify and analyze the applications of differential equations in Engineering and real world Problems
- become competent enough to work on multidisciplinary teams and design systems to meet desired needs with in economic, social, ethical, safety manufacturability and sustainability and optimal constraints.

UNIT I: Differential equations of first order and first degree:
Linear – Bernoulli – Exact-Reducible to exact.
Applications: Newton's Law of cooling-Law of natural growth and decay-orthogonal trajectories.

UNIT II: Linear differential equations of higher order:
Non-homogeneouslinear equations of higher order with constant coefficients with RHS term of the type e ^{ax}, Sin ax, cos ax, polynomials in x, e ^{ax}V(x), xV(x).
Applications: LCR circuit, Simple Harmonic motion

UNIT IIILaplace transforms:
Laplace transforms of standard functions-ShiftingTheorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (without proof).
Application: Solutions of ordinary differential equations using Laplace transforms.

UNIT IV Partial differentiation:
Introduction- Total derivative-Chain rule-Generalized Mean Value theorem for single variable (without proof)-Taylors and Mc Laurent's series for two variables– Functional dependence- Jacobian.
Applications:Maxima and Minima of functions of two variables without constraints. Three variables – with constraints – reducible to two variables form and Lagrange's method of undetermined multipliers.

UNIT VFirst order Partial differential equations:
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linearequation (Lagrange) and nonlinear (standard type) equations

UNIT VI Higher order Partial differential equations:

Solutions of Linear Partial differential equations with constant coefficients- Method of separation of Variables

Applications: One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.

Books:

1.   **B.S.GREWAL,** Higher Engineering Mathematics, 42nd Edition, Khanna Publishers

2.   **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India

3.   **GREENBERG,** Advanced Engineering Mathematics, 2nd edition, Pearson edn

4.   **DEAN G. DUFFY,** Advanced engineering mathematics with MATLAB, CRC Press

5.   **PETER O'NEIL,** advanced Engineering Mathematics, Cengage Learning.

Course out comes:

After completion of the course student could be able to

- formulate and solve both ordinary and partial differential equations
- identify and analyze the applications of differential equations in Engineering and real world
Problems
- find the conditions for the maxima and minima of function of two variables
- solve differential equations using Laplace transforms and the importance of Laplace transforms in engineering problems

Subject Category	ABET Learning Objectives	ABET Internal Assessments	JNTUK External Evaluation	Remarks
Theory Design Analysis Algorithms Drawing Others	1. Apply knowledge of math, science, & engineering 2. Design & conduct experiments, analyze & interpret data 3. Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints 4. Function on multidisciplinary teams 5. Identify, formulate, & solve engineering problems 6. Understand professional & ethical responsibilities 7. Communicate effectively 8. Understand impact of engineering solutions in global, economic, environmental, & societal context 9. Recognize need for & be able to engage in lifelong learning 10. Know contemporary issues 11. Use techniques, skills, modern tools for engineering practices	Objective tests Essay questions tests Peer tutoring based Simulation based Design oriented Problem based Experiential (project based) based Lab work or field work based Presentation based Case Studies based Role-play based Portfolio based	a) Questions should have: b) Definitions, Principle of operation or philosophy of concept. c) Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference. d) Design oriented problems e) Trouble shooting type of questions f) Applications related questions g) Brain storming questions	

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MATHEMATICS – II
(MATHEMATICAL METHODS)
(Common to All Branches)

Course Learning Objectives:

The objectives of the course is to make the student understand how to
- apply numerical methods to obtain the roots of equations
- appy iterative schemes to solve initial value problems associated with ordinary differential equations
- express a given data points as a polynomial and a periodic function as an infinite series of orthonormal functions
- become competent enough to apply mathematical concepts in the Theory of signals and systems

UNIT I:Solution of Algebraic and Transcendental Equations:
Introduction- Bisection Method – Method of False Position – Iteration Method – Newton –   Raphson Method (One variable and Simultaneous Equations)

UNIT II: Interpolation:
Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unevenly spaced points – Lagrange's Interpolation formula

UNIT III: Numerical solution of Ordinary Differential equations:
Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods

UNIT IV: Fourier Series:
Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-range sine and cosine series application: Amplitude, spectrum of a periodic function

UNIT V: Fourier Transforms:
Fourier integral theorem (only statement) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms

UNIT VI:Z-transform:
Introduction– properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z transform- -Convolution theorem – Solution of difference equation by Z -transforms.

BOOKS:
1.   **B.S. GREWAL,** HigherEngineering Mathematics, 42nd Edition, Khanna Publishers
2.   **DEAN G. DUFFY,** Advanced Engineering Mathematics with MATLAB, CRC Press
3.   **S.S.SASTRY,** Introductory methods of numerical analysis, PHI Publications
4.   **V.RAVINDRANATH and   P. VIJAYALAXMI,** Mathematical Methods, Himalaya
        Publishing House
5.   **ERWYN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India

Course outcomes:

After completion of the course student could be able to

- Apply numerical methods for root finding and understand the importance of these
- methods in high dimensional engineering problems
- find an interpolating polynomial fitting a given points
- understand the importance of Fourier analysis in the fields of Electrical, Electronics,
        Computer science, Thermal dynamics etc

Subject Category	ABET Learning Objectives	ABET Internal Assessments	JNTUK External Evaluation	Remarks
Theory Design Analysis Algorithms Drawing Others	1. Apply knowledge of math, science, & engineering 2. Design & conduct experiments, analyze & interpret data 3. Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints 4. Function on multidisciplinary teams 5. Identify, formulate, & solve engineering problems 6. Understand professional & ethical responsibilities 7. Communicate effectively 8. Understand impact of engineering solutions in global, economic, environmental, & societal context 9. Recognize need for & be able to engage in lifelong learning 10. Know contemporary issues 11. Use techniques, skills, modern tools for engineering practices	1. Objective tests 2. Essay questions tests 3. Peer tutoring based 4. Simulation based 5. Design oriented 6. Problem based 7. Experiential (project based) based 8. Lab work or field work based 9. Presentation based 10. Case Studies based 11. Role-play based 12. Portfolio based	1. Questions should have: 2. Definitions, Principle of operation or philosophy of concept. 3. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference. 4. Design oriented problems 5. Trouble shooting type of questions 6. Applications related questions 7. Brain storming questions	

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<h1 style="text-align:center; color:red;">ENGINEERING PHYSICS</h1>

UNIT-I
PHYSICAL OPTICS FOR INSTRUMENTS

"Objective Designing an instrument and enhancing the resolution for its operation would be effective as achieved through study of applicational aspects of physical Optics"

INTERFACE: Introduction – Interference in thin films by reflection – Newton's rings.

DIFFRACTION: Introduction – Fraunhofer diffraction - Fraunhofer diffraction at double slit (qualitative) – Diffraction grating – Grating spectrum – Resolving power of a grating – Rayleigh's criterion for resolving power.

POLARIZATION: Introduction – Types of Polarization – Double refraction – Quarter wave plate ad Half Wave plate.

UNIT-II
COHERENT OPTICS – COMMUNICATIONS AND STRUCTURE OF MATERIALS

Objectives while lasers are trusted Non-linear coherent sources established for the fitness of instrumentation, establishing a structure property relationship for materials requires allotment of an equivalent footing in convening the physics knowledge base.

LASERS: Introduction – coherent sources – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Three and Four level pumping schemes – Ruby laser – Helium Neon laser.

FIBER OPTICS: Introduction – Principle of Optical Fiber – Acceptance angle and acceptance cone – Numerical aperture.

CRYSTALLOGRAPHY: Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC

X-RAY DIFFRACTION TECHNIQUES: Directions and planes in crystals – Miller indices – Separation between successive [h k l] planes – Bragg's law.

UNIT-III
MAGNETIC, ELECTRIC FIELD RESPONSE OF MATERIALS & SUPERCONDUCTIVITY

"Objective many of the Electrical or Electronic gadgets are designed basing on the response of naturally abundant and artificially made materials, while their response to E- or H- fields controls their performance.

MAGNETIC PROPERTIES: Magnetic permeability – Magnetization – Organ or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, anti-ferro and ferri-magnetism – Hysteresis curve

DIELECTRIC PROPERTIES: Introduction – Dielectric constant – Electronic, ionic and orientational polarization – internal fields – Clausius – Mossotti equation – Dielectric loss, Breakdown and Strength.

SUPERCONDUCTIVITY: General properties – Meissner effect – Type I and Type II superconductors – BCS Theory Flux quantization London's equations – Penetration depth – DC and AC Josephson effects – SQUIDS.

UNIT – IV
ACOUSTICS AND EM – FIELDS:
Objective: The utility and nuances of ever pervading SHM and its consequences would be the first hand-on to as it clearly conveyed through the detailed studies of Acoustics of Buildings, while vectorial concepts of EM fields paves the student to gear – up for a deeper understanding.
ACOUSTICS: Sound absorption, absorption coefficient and its measurements, Reverberations time – Sabine's formula, Eyring's formula.
ELECTRO-MAGNETIC FIELDS: Gauss and stokes theorems (qualitative) – Fundamental laws of electromagnetism – Maxwell's Electromagnetic Equations (Calculus approach).

UNIT – V
QUANTUM MECHANICS FOR ELECTRONIC TRANSPORT
Objective: The discrepancy between classical estimates and laboratory observations of physical properties exhibited by materials would be lifted out through the understanding quantum picture of sub-atomic world dominated by electron and its presence.
QUANTUM MECHANICS: Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.
FREE ELECTRON THEORY: Classical free electron theory – electrical conductivity – Mean free path – Relaxation time and drifty velocity – Quantum free electron theory – Fermi – Dirac (analytical) and its dependence on temperature – Fermi energy – density of states – derivations for current density.
BAND THEORY OF SOLIDS: Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semi – conductors & insulators – Concepts of effective mass of electron - concept of hole.

UNIT – VI
SEMICONDUCTOR PHYSICS:
Objective: In the wake of ever increasing demand for the space and power the watch word "small is beautiful", understanding the physics of electronic transport as underlying mechanism for appliances would provide a knowledge base.
Introduction – Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion – Einstein's equation – Hall Effect – direct & indirect band gap semiconductors – Electronic transport Mechanism for LEDs, Photo conductors and solar cells.

TEXT BOOKS
1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd)
2. A text book of Engineering Physics by M.N. Avadhanulu & P.G. Kshirasagar (S. Chand publications)
3. Engineering Physics b;y M.R. Srinivasan (New Age international publishers)

REFERENCE BOOKS
A. 'Introduction to solid state physics' by Charles Kittle (Willey India Pvt.Ltd)
B. 'Applied Physics' by T. Bhimasenkaram (BSP BH Publications)
C. 'Applied Physics' by M.Arumugam (Anuradha Agencies)
D. 'Engineering Physics' by Palanisamy (Scitech   Publishers)

E. 'Engineering Physics' by D.K.Bhattacharya (Oxford University press)
F. 'Engineering Physics' by Mani Naidu S (Pearson Publications)
G. 'Engineering Physics' by Sanjay D Jain and Girish G Sahasrabudhe (University Press)
H.   'Engineering Physics' by B.K.Pandey & S. Chaturvedi (Cengage Learning)

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Professional Ethics and Human Values

UNIT I: Human Values:
 Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT II: Engineering Ethics:
The History of Ethics-Purposes for Engineering Ethics-Engineering Ethics-Consensus and Controversy –Professional and Professionalism –Professional Roles to be played by an Engineer –Self Interest, Customs and Religion-Uses of Ethical Theories-Professional Ethics-Types of Inquiry – Engineering and Ethics-Kohlberg's Theory – Gilligan's Argument – Heinz's Dilemma.

UNIT III: Engineering as Social Experimentation:
Comparison with Standard Experiments – Knowledge gained – Conscientiousness – Relevant Information – Learning from the Past – Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes – Codes and Experimental Nature of Engineering.

UNIT IV: Engineers' Responsibility for Safety and Risk:
Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s Long term Consequences- Expected Probability- Reversible Effects- Threshold Levels for Risk- Delayed v/s Immediate Risk- Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT V: Engineers' Responsibilities and Rights:
Collegiality-Techniques for Achieving Collegiality –Two Senses of Loyalty-obligations of Loyalty-misguided Loyalty – professionalism and Loyalty- Professional Rights –Professional Responsibilities – confidential and proprietary information-Conflict of Interest-solving conflict problems – Self-interest, Customs and Religion- Ethical egoism-Collective bargaining-Confidentiality-Acceptance of Bribes/Gifts-when is a Gift and a Bribe-examples of Gifts v/s Bribes-problem solving-interests in other companies-Occupational Crimes-industrial espionage-price fixing-endangering lives- Whistle Blowing-types of whistle blowing-when should it be attempted-preventing whistle blowing.

UNIT VI: Global Issues:
Globalization- Cross-culture Issues-Environmental Ethics-Computer Ethics-computers as the instrument of Unethical behavior-computers as the object of Unethical Acts-autonomous computers-computer codes of Ethics-Weapons Development-Ethics and Research-Analysing Ethical Problems in Research-Intellectual Property Rights.

Text Books:

1. "Engineering Ethics & Human Values" by M.Govindarajan,   S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009
2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications
4. "Professional Ethics and Human Values" by Prof.D.R.Kiran-
5. "Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication
6. "Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill – 2003.
7. "Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.

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ENGINEERING DRAWING

Course Educational Objectives: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

UNIT I
Objective: The objective is to introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.
Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

UNIT II
Objective: The objective is to introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.
Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

UNIT III
Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.
Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT IV
Objective: The objective is to make the students draw the projections of the plane inclined toboth the planes.
Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT V
Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT VI
Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

TEXT BOOKS:
1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.
3. Engineering Graphics by PI Varghese, McGrawHill Publishers

REFERENCE BOOKS:
1. Engineering Graphics for Degree by K.C. John, PHI Publishers
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

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<h1 style="color:red">ENGLISH – COMMUNICATION SKILLS LAB – I</h1>

Suggested Lab Manuals:

Course Educational Objectives: To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

BASIC COMMUNICATION SKILLS

UNIT 1	A. Greeting and Introductions
	B. Pure Vowels
UNIT 2	A. Asking for information and Requests
	B. Diphthongs
UNIT 3	A. Invitations
	B. Consonants
UNIT 4	A. Commands and Instructions
	B. Accent and Rhythm
UNIT 5	A. Suggestions and Opinions
	B. Intonation

Text Book:

'Strengthen your Communication Skills' Part-A by Maruthi Publications

Reference Books:

6. INFOTECH English (Maruthi Publications)
7. Personality Development and Soft Skills (Oxford University Press, New Delhi)

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ENGINEERING PHYSICS LAB

List of Experiments

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton's rings –Radius of Curvature of Plano_Convex Lens.
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of stretched string – Sonometer.
8. Determination of velocity of sound – Volume resonator.
9. L C R Senes Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p.n junction.
15. Hall Effect for semiconductor.

REFERENCE:
1. Engineering Physics Lab Manual by Dr.Y. Aparna & Dr.K.Venkateswarao (V.G.S.Book links)
2. Physics practical manual, Lorven Publications.

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<h1 style="text-align:center;color:red;">ENGINEERING WORKSHOP & IT WORKSHOP</h1>

ENGINEERING WORKSHOP:

Course Educational Objectives: To impart hands-on practice on basic engineering trades and skills.

Note: At least two exercises to be done from each trade.

Trade:

Carpentry	1. T-Lap Joint
	2. Cross Lap Joint
	3. Dovetail Joint
	4. Mortise and Tennon Joint
Fitting	1. Vee Fit
	2. Square Fit
	3. Half Round Fit
	4. Dovetail Fit
Black Smithy	1. Round rod to Square
	2. S-Hook
	3. Round Rod to Flat Ring
	4. Round Rod to Square headed bolt
House Wiring	1. Parallel / Series Connection of three bulbs
	2. Stair Case wiring
	3. Florescent Lamp Fitting
	4. Measurement of Earth Resistance
Tin Smithy	1. Taper Tray
	2. Square Box without lid
	3. Open Scoop
	4. Funnel

IT WORKSHOP:

Course Educational Objectives: Enabling the student to understand basic hardware and software tools through practical exposure

PC Hardware:
Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Troubleshooting Hardware and software _ some tips and tricks.

Internet & World Wide Web:
Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums .Awareness of cyber hygiene(protecting the personal computer from getting infected with the viruses), worms and other cyber-attacks .

Productivity tools crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools

(Note: Student should be thoroughly exposed to minimum of 12 Tasks)

PC Hardware

Task 1:Identification of the peripherals of a computer.
To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices
Task 2(Optional): A practice on disassembling the components of a PC and assembling them to back to working condition.
Task 3: Examples of Operating systems- DOS, MS Windows,Installation of MS windows on a PC.
Task 4: Introduction to Memory and Storage Devices, I/O Port, Device Drivers, Assemblers, Compilers, Interpreters, Linkers, Loaders.
Task 5:
Hardware Troubleshooting (Demonstration):
Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).
Software Troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues

Internet & Networking Infrastructure

Task 6: Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC,Bluetooth Technology, Wireless Technology, Modem, DSL, Dialup Connection.
Orientation & Connectivity Boot Camp and web browsing: Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.
Task 7: **Search Engines & Netiquette:**
Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums
Task 8: Cyber Hygiene (Demonstration): Awareness of various threats on the internet. Importances of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced

Word

Task 9: MS Word Orientation:
 Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving
Task 10: Creating project : Abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

Excel

Task 11: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations
Creating a Scheduler - Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

LOOKUP/VLOOKUP

Task 12: Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Power Point

Task 13: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

Task 14: Focusing on the power and potential of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.

TEXT BOOK:

Faculty to consolidate the workshop manuals using the following references
1. Computer Fundamentals, Anita Goel, Pearson
2. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson,2008
3. Information Technology Workshop, 3e, G Praveen Babu, M V Narayana BS Publications.
4. Comdex Information Technology, Vikas Gupta, dreamtech.

REFERENCE BOOK:
1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N.B. Venkateswarlu

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ENGLISH –II
(Common to All Branches)

<u>**DETAILED TEXT-II :**</u>
Course Outcomes: English for Engineers and Technologists
<u>**Recommended Topics :**</u>

1. **TECHNOLOGY WITH A HUMAN FACE**
   Course Educational Objectives: To make the learner understand how modern life has been shaped by technology.
   Course Outcomes: The proposed technology is people's technology. It serves the human person instead of making him the servant of machines.

2. **CLIMATE CHANGE AND HUMAN STRATEGY**
   Course Educational Objectives: To make the learner understand how the unequal heating of earth's surface by the Sun, an atmospheric circulation pattern is developed and maintained.
   Course Outcomes: The learner's understand that climate must be preserved.

3. **EMERGING TECHNOLOGIES**
   Course Educational Objectives: To introduce the technologies of the 20th century and 21st centuries to the learners.
   Course Outcomes: The learner will adopt the applications of modern technologies such as nanotechnology.

4. **WATER- THE ELIXIR OF LIFE**
   Course Educational Objectives: To inform the learner of the various advantages and characteristics of water.
   Course Outcomes: The learners will understand that water is the elixir of life.

5. **THE SECRET OF WORK**
   Course Educational Objectives: In this lesson, Swami Vivekananda highlights the importance of work for any development.
   Course Outcomes: The students will learn to work hard with devotion and dedication.

6. **WORK BRINGS SOLACE**
   Course Educational Objectives: In this lesson Abdul Kalam highlights the advantage of work.
   Course Outcomes: The students will understand the advantages of work. They will overcome their personal problems and address themselves to national and other problems.

Text Book: 'Sure Outcomes' by Orient Black Swan Pvt. Ltd. Publishers

NON-DETAILED TEXT:

(From Modern Trailblazers of Orient Blackswan)
(Common single Text book for two semesters)

5. **J.C. Bose**
    Course Educational Objectives: To apprise of J.C.Bose's original contributions.
    Course Outcomes: The learner will be inspired by Bose's achievements so that he may start his own original work.

6. **Homi Jehangir Bhaba**
    Course Educational Objectives: To show Bhabha as the originator of nuclear experiments in India.
    Course Outcomes: The learner will be inspired by Bhabha's achievements so as to make his own experiments.

7. **Vikram Sarabhai**
    Course Educational Objectives: To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes.
    Course Outcomes: The learner will realize that development is impossible without scientific research.

8. **A Shadow- R.K.Narayan**
    Course Educational Objectives: To expose the reader to the pleasure of the humorous story
    Course Outcomes: The learner will be in a position to appreciate the art of writing a short story and try his hand at it.

Text Book: 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

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MATHEMATICS – III
(LINEAR ALGEBRA & VECTOR CALCULUS)
(Common to All Branches)

Course Learning Objectives:

The objectives of the course is to make the student understand the
- importance of matrix methods in high dimensional engineering problems (ex.: Electrical circuits) and finding the solutions of system of equations
- integral calculus over regions in plane and space and applications to area and volumes
- analyze and solve the engineering problems in mathematical aspect and interpret the solutions in terms of the actual problem

UNIT I Linear systems of equations:
Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods-
Gauss Elimination - Gauss Jordon and Gauss Seidal Methods.
Application: Finding the current in an electrical circuit.

UNIT   II Eigen values - Eigen vectors and Quadratic forms:
Eigen values - Eigen vectors– Properties –Iteration method to find largest eigen value and eigen vectors - Cayley-Hamilton Theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative definite - semi definite - index – signature.
Application: Free vibration of a two-mass system.

UNIT III Multiple integrals:
Review concepts of Curve tracing (Cartesian - Polar and Parametric curves)-
Applications of Integration to Lengths, and Surface areas of revolution in Cartesian and Polar Coordinates.
Multiple integrals - double and triple integrals – change of variables – Change of order of Integration
Application: Areas of surfaces and volumes of solids,Moments of inertia.

UNIT IV Special functions:
Beta and Gamma functions- Properties - Relation between Beta and Gamma functions
Application: Evaluation ofimproper integrals

UNIT V Vector Differentiation:
Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities
Application: Equation of continuity, potential surfaces, irrotational fields, potential functions

UNIT VI Vector Integration:

Line integral – work done – Potential function – surface integral –area, volume integral-volume- Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems application: work done, Force

BOOKS:

1. **GREENBERG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
2. **B.V. RAMANA,** Higher Engineering Mathematics, Tata McGrawhill
3. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
4. **PETER O'NEIL,** Advanced Engineering Mathematics, Cengage Learning
5. **D.W. JORDAN AND T. SMITH,** Mathematical Techniques, Oxford University Press

Course outcomes:

After completion of the course student could be able to

- apply numerical methods to find the solutions of system of equations
- find eigenvalues and eigen vectors
- evaluate multiple and triple integrals and apply the concepts to find the physical quantities like surface areas and volumes of solids
- understand the importance of vector differential and integral calculus and interpret the
- physical and engineering concepts (electromagnetic theory, circuit theory etc.) in an elegant way

Subject Category	ABET Learning Objectives	ABET Internal Assessments	JNTUK External Evaluation	Remarks

Theory Design Analysis Algorithms Drawing Others	Apply knowledge of math, science, & engineering 1. Design & conduct experiments, analyze & interpret data 2. Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints 3. Function on multidisciplinary teams 4. Identify, formulate, & solve engineering problems 5. Understand professional & ethical responsibilities 6. Communicate effectively 7. Understand impact of engineering solutions in global, economic, environmental, & societal context 8. Recognize need for & be able to engage in lifelong learning 9. Know contemporary issues 10. Use techniques, skills, modern tools for engineering practices	1. Objective tests 2. Essay questions tests 3. Peer tutoring based 4. Simulation based 5. Design oriented 6. Problem based 7. Experiential (project based) based 8. Lab work or field work based 9. Presentation based 10. Case Studies based 11. Role-play based 12. Portfolio based	1. Questions should have: 2. Definitions, Principle of operation or philosophy of concept. 3. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference. 4. Design oriented problems 5. Trouble shooting type of questions 6. Applications related questions 7. Brain storming questions	

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ENGINEERING CHEMISTRY

UNIT-I: WATER TECHNOLOGY
Hard Water – Estimation of hardness by EDTA method – Potable water- Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming and foaming , scale formation, corrosion, caustic embrittlement, turbine deposits – Softening of water – Lime soda, Zeolite processes – Reverse osmosis – Electro Dialysis, Ion exchange process
Objectives: For prospective engineers knowledge about water used in industries (boilers etc.) and for drinking purposes is useful; hence chemistry of hard water, boiler troubles and modern methods of softening hard water is introduced.

UNIT-II : ELECTROCHEMISTRY
Concept of Ionic conductance – Ionic Mobility's – Applications of Kohlrausch law – Conductometric titrations – Galvanic cells – Electrode potentials – Nernst equation – Electrochemical series – Potentiometric titrations – Concentration cells – Ion selective electrode –Glass electrodes – Fluoride electrode; Batteries and Fuel cells
Objectives: Knowledge of galvanic cells, electrode potentials, and concentration cells is necessary for engineers to understand corrosion problem and its control; also this knowledge helps in understanding modern bio-sensors, fuel cells and improve them.

UNIT-III: CORROSION
Causes and effects of corrosion – theories of corrosion (dry, chemical and electrochemical corrosion) – Factors affecting corrosion – Corrosion control methods – Cathodic protection – Sacrificial Anodic, Impressed current methods – Surface coatings – Methods of application on metals (Hot dipping, Galvanizing, tinning , Cladding, Electroplating, Electroless plating) – Organic surface coatings – Paints – Their constituents and their functions.
Objectives: the problems associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them

UNIT-IV: HIGH POLYMERS
Types of Polymerization – Stereo regular Polymers – Physical and Mechanical properties of polymers – Plastics – Thermoplastics and thermo setting plastics – Compounding and Fabrication of plastics – Preparation and properties of Polyethylene, PVC and Bakelite – Elastomers – Rubber and Vulcanization – Synthetic rubbers – Styrene butadiene rubber – Thiokol – applications.
Objectives: Plastics are materials used very widely as engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastomers helps in selecting suitable materials for different purposes.

UNIT-V: FUELS

Coal – Proximate and ultimate analysis – Numerical problems based on analysis – Calorific vaule – HCV and LCV – Problems based on calorific values; petroleum – Refining – Cracking – Petrol – Diesel knocking; Gaseous fuels – Natural gas – LPG, CNG – Combustion – Problems on air requirements.

Objectives: A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them.

UNIT-VI: CHEMISTRY OF ADVANCED MATERIALS

Nanometerials (Preparation of carbon nanotubes and fullerenes – Properties of nanomaterials – Engineering applications) – Liquid crystals (Types – Application in LCD and Engineering Applications) – Fiber reinforced plastics – Biodegradable polymers – Conducting polymers – Solar cells (Solar heaters – Photo voltaic cells – Solar reflectors – Green house concepts – Green chemistry (Methods for green synthesis and Applications) – Cement – Hardening and setting – Deterioration of cement concrete

Objectives: With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here.

TEXT BOOKSS
1. Jain and Jain (Latest Edition), Engineering Chemistry, Dhanpat Rai Publishing company Ltd,
2. N.Y.S.Murthy, V.Anuradha, KRamaRao "A Text Book of Engineering Chemistry", Maruthi Publications
3. C.Parameswara Murthy, C.V.Agarwal, Adhra Naidu (2006) Text Book of Engineering Chemistry, B.S.Publications
4. B.Sivasankar (2010), Engineering Chemistry, McGraw-Hill companies.
5. Ch.Venkata Ramana Reddy and Ramadevi (2013) , Engineering Chemistry, Cengage Learning

REFERENCES
1. S.S. Dara (2013) Text Book of Engineering Chemistry, S.Chand Technical Series
2. K.Sesha Maheswaramma and Mridula Chugh (2013), Engineering Chemistry, Pearson Publications.
3. R.Gopalan, D.Venkatappayya, Sulochana Nagarajan (2011), Text Book of Engineering Chemistry, Vikas Publications.
4. B.Viswanathan and M.Aulice Scibioh (2009), Fuel Cells, Principals and applications, University Press.

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ENGINEERING MECHANICS

Course Educational Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes ,resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

UNIT – I
Unit Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.
Introduction to Engg. Mechanics – Basic Concepts.
Systems of Forces: Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Introduction**,** limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction

UNIT- II
Unit Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.
Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, and Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

UNIT – III
Unit Objectives: The students are to be exposed to concepts of centre of gravity.
Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures
Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, pappus theorem.

UNIT -IV
Unit Objectives:The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.
Area moments of Inertia : Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia:** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V
Unit Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.
Kinematics: Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

UNIT – VI
Unit Objectives: The students are to be exposed to concepts of work, energy and particle motion
Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

TEXT BOOKS:
1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.
2. Engineering Mechanics: Statics and Dynamics 3rd edition, Andrew Pytel and Jaan Kiusalaas; Cengage Learning publishers.

REFERENCES:
1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11th Edn – Pearson Publ.
2. Engineering Mechanics, statics – J.L.Meriam, 6th Edn – Wiley India Pvt Ltd.
3. Engineering Mechanics, dynamics – J.L.Meriam, 6th Edn – Wiley India Pvt Ltd.
4. Engineering Mechanics, statics and dynamics – I.H.Shames, – Pearson Publ.
5. Mechanics for Engineer, statics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
6. Mechanics for Engineers, dynamics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
7. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best & W.G. McLean, 5th Edn – Schaum's outline series - Mc Graw Hill Publ.
8. Engineering Mechanics, Fedinand. L. Singe, Harper – Collins.
9. Engineering Mechanics statics and dynamics , A Nelson, Mc Graw Hill publications
10. Engineering Mechanics, Tayal. Umesh Publ.

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COMPUTER PROGRAMMING

Objectives: Formulating algorithmic solutions to problems and implementing algorithms in C

UNIT I:
Unit objective: Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux
Introduction: Computer systems, Hardware and Software Concepts**,**
Problem Solving: Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and highlevel languages, Creating and Running Programs: Writing, Editing(vi/emacs editor), Compiling(gcc), Linking and Executing in under Linux.
BASICS OF C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arthmetic , relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

UNIT II:
Unit objective: understanding branching, iteration and data representation using arrays
SELECTION – MAKING DECISION: TWO WAY SELECTION: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples**.**
ITERATIVE: loops- while, do-while and for statements, break, continue, initialization and updating, event and counter controlled loops, looping applications: Summation, powers, smallest and largest.
ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-Darrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix**.**
STRINGS: concepts, c strings.

UNIT III:
Objective: Modular programming and recursive solution formulation
FUNCTIONS- MODULAR PROGRAMMING: functions, basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

UNIT IV:
Objective: Understanding pointers and dynamic memory allocation
POINTERS: pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments

UNIT V:
Objective: Understanding miscellaneous aspects of C
ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields, program applications
BIT-WISE OPERATORS: logical, shift, rotation, masks.

UNIT VI:
Objective: Comprehension of file operations
FILE HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs

Text Books:

1. Problem Solving and Program Design in C, Hanly, Koffman, 7thed, PERSON
2. Programming in C, Second Edition Pradip Dey and Manas Ghosh, OXFORD Higher Education
3. Programming in C, A practical approach Ajay Mittal PEARSON
4. The C programming Language by Dennis Richie and Brian Kernighan
5. Programming in C, B. L. Juneja, Anith Seth, Cengage Learning.

Reference Books:
1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE
2. Programming with C, Bichkar, Universities Press
3. Programming in C, Reema Thareja, OXFORD
4. C by Example, Noel Kalicharan, Cambridge

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Network Analysis

Preamble:
This course introduces the basic concepts of circuit analysis which is the pre requisite for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes single phase circuits, magnetic circuits, network theorems, transient analysis and network topology.

Course Educational Objectives:
4. To study the basic concepts of passive elements, types of sources and network transformation.
5. To study the concept of magnetic coupled circuit.
6. To understand the behavior of RLC networks for sinusoidal excitations, concept of power
and powerfactor.
7. To study the performance of R-L, R-C and R-L-C circuits with variation of one of the parameters and to understand the concept of resonance.
8. To understand the applications of network topology to electrical circuits.
9. To understand the applications of network theorems for analysis of electrical networks.

UNIT-I
Introduction to Electrical Circuits
Passive components and their V-I relations. Sources (dependent and independent) - Kirchhoff's laws, series, parallel,series-parallel, star-to-delta and delta-to-star transformation, source transformation technique, nodal analysis and mesh analysis.

UNIT-II
Magnetic Circuit
Basic definition of MMF, flux and reluctance. Analogy between electrical and magnetic circuits.
Faraday's laws of electromagnetic induction - Concept of self and mutual inductance - Dot convention-coefficient of coupling and composite magnetic circuit - Analysis of series and parallel magnetic circuits.

UNIT-III
Single Phase A.C. Systems
Periodic waveforms (determination of rms, average value and form factor). Concept of phase angle and phase difference.
Complex and polar forms of representations, steady state analysis of R, L and C circuits.
Real, Reactive and Apparent Power -Power triangle - Power factor and its significance

UNIT-IV
Resonance
Locus diagrams for various combination of R, L and C. Resonance, concept of band width and Quality factor.

UNIT-V
Network topology
Definitions of Graph and Tree. Basic cutset and tieset matrices for planar networks. Loop and nodal methods of analysis of networks with dependent and independent voltage and current sources. Duality and Dual networks.

UNIT-VI
Network theorems (DC & AC Excitations)
Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem.

Course Outcomes:After completion of the course, students are able to analyze
- various electrical networks in presence of active and passive elements.
- any R, L, C network with sinusoidal excitation.
- any R, L, C network with variation of any one of the parameters i.e R, L, C.
- any magnetic circuit with various dot conventions.
- electrical networks with network topology concepts.
- electrical networks by using network theorems.

TEXT BOOKS:
1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,Mc Graw Hill Company,6 th edition
2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd

REFERENCE BOOKS:
1. Introduction to Circuit Analysis and Design by Tildon Glisson. Jr, Springer Publications
2. Electric Circuit Analysis by K.S. Suresh Kumar, Pearson publications
3. Electric Circuits by David A. Bell, Oxford publications
4. Introductory Circuit Analysis by Robert L Boylestad, Pearson Publications
5. Circuit Theory(Analysis and Synthesis) by A.chakrabarthi,Dhanpat Rai&co.

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ENGINEERING CHEMISTRY LABORATORY

List of Experiments

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.,

2. Trial experiment – Estimation of HCI using standard Na_2co_3 solutions

3. Estimation of $KMnO_4$using standard Oxalic acid solution.

4. Estimation of Ferric iron using standard $K_2Cr_2O_7$ solution.

5. Estimation of Copper using standard $K_2Cr_2O_7$ solution.

6. Estimation of Total Hardness water using standard EDTA solution.

7. Estimation of Copper using standard EDTA solution.

8. Estimation of Copper using Colorimeter

9. Estimation of pH of the given sample solution using pH meter.

10. Conductometric Titrations between strong acid and strong base

11. Conductometric Titrations between strong acid and Weak base

12. Potentiometric Titrations between strong acid and strong base

13. Potentiometric Titrations between strong acid and Weak base

14. Estimatinog of Zinc using standard potassium ferrocyanide solution

15. Estimation of Vitamin – C

TEXT BOOKSS

1. Dr.Jyotsna Cherukuis(2012)Laboratory Manual of Engineering Chemistry-II, VGS Techno Series
2. Chemistry Practical Manual, Lorven Publications
3. K. Mukkanti (2009) Practical Engineering Chemistry, B.S.Publication

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ENGLISH – COMMUNICATION SKILLS LAB – II

Suggested Lab Manuals:

OBJECTIVE: To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

ADVANCED COMMUNICATION SKILLS

UNIT 6   Body language

UNIT 7   Dialogues

UNIT 8   Interviews and Telephonic Interviews

UNIT 9   Group Discussions

UNIT 10   Presentation Skills

UNIT 11   Debates

Text Book:

'Strengthen your Communication Skills' Part-B by Maruthi Publications

Reference Books:

1. INFOTECH English (Maruthi Publications)
2. Personality Development and Soft Skills (Oxford University Press, New Delhi)

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C PROGRAMMING LAB

Exercise l

a) Write a C Program to calculate the area of triangle using the formula

area = $(s (s-a) (s-b)(s-c))^{1/2}$ where s= (a+b+c)/2

b) Write a C program to find the largest of three numbers using ternary operator.

c) Write a C Program to swap two numbers without using a temporary variable.

Exercise 2

a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

b) Write a C program to find the roots of a quadratic equation.

c) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 3

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.

b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the

c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 4

a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.

b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.

c) Write a C Program to check whether the given number is Armstrong number or not.

Exercise 5

a) Write a C program to interchange the largest and smallest numbers in the array.

b) Write a C program to implement a liner search.

c) Write a C program to implement binary search

Exercise 6

a) Write a C program to implement sorting of an array of elements.

b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them

Exercise 7

Write a C program that uses functions to perform the following operations:

　　i.　　To insert a sub-string in to given main string from a given position.

　　ii.　　To delete n Characters from a given position in a given string.

　　iii.　　To replace a character of string either from beginning or ending or at a specified location

Exercise 8
Write a C program that uses functions to perform the following operations using Structure:

    i) Reading a complex number   ii) Writing a complex number

    iii) Addition of two complex numbers   iv) Multiplication of two complex
    numbers

Exercise 9
Write C Programs for the following string operations without using the built in functions

    - to concatenate two strings

    - to append a string to another string

    - to compare two strings

Exercise 10
Write C Programs for the following string operations without using the built in functions

    - to find t he length of a string

    - to find whether a given string is palindrome or not

Exercise 11
a) Write a C functions to find both the largest and smallest number of an array of integers.

b) Write C programs illustrating call by value and call by reference cncepts.

Exercise 12
Write C programs that use both recursive and non-recursive functions for the following

    i) To find the factorial of a given integer.

    ii) To find the GCD (greatest common divisor) of two given integers.

    iii) To find Fibonacci sequence

Exercise 13
a) Write C Program to reverse a string using pointers

b) Write a C Program to compare two arrays using pointers

Exercise 14
a) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.

b) Write a C program to swap two numbers using pointers

Exercise 15
Examples which explores the use of structures, union and other user defined variables

Exercise 16
a) Write a C program which copies one file to another.

b) Write a C program to count the number of characters and number of lines in a file.

c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Unit – I: (*The Learning objective of this Unit is to understand the concept and nature of Managerial Economic s and its relationship with other disciplines, Concept of Demand and Demand forecasting)
Introduction to Managerial Economics and demand Analysis:
Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement-Demand forecasting and its Methods.
(**The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand)

Unit – II: (*The Learning objective of this Unit is to understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis)
Production and Cost Analyses:
Production function-Isoquants and Isocosts-Law of Variable proportions-Cobb-Douglas Production function-Economics of Sale-Cost Concepts-Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis-Determination of Break-Even Point (Simple Problem)
(**One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs).

Unit – III: (*The Learning Objective of this Unit is t understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods)
Introduction to Markets, Theories of the Firm & Pricing Policies:
Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.
(** One has to understand the nature of different markets and Price Output determination under various market conditions)

Unit – IV: (*The Learning objective of this Unit is to know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles)
Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.
(**One should equipped with the knowledge of different Business Units)

Unit – V: (*The Learning objective of this Unit is to understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation)
Introduction to Accounting & Financing Analysis:
Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow cash flow statements (Simple Problems)
(**The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis)

 Unit – VI: (*The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods)
Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.
(**The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making)
Note: *Learning Objective
        ** Learning Assessment

TEXT BOOKS
1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakara rao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

REFERENCES:
1. V. Maheswari: Managerial Economics, Sultan Chand.
2. Suma Damodaran: Managerial Economics, Oxford 2011.
3. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
4. Vanitha Agarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
6. Maheswari: Financial Accounting, Vikas Publications.
   S. A. Siddiqui & A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age
International Publishers,

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ELECTRONIC DEVICES AND CIRCUITS

OBJECTIVES:

The main objectives of this course are given below:
- The basic concepts connected with semiconductor physics and the terms like atomic structure, effective mass, Intrinsic, Extrinsic semiconductors are introduced.
- Concept of hole and electron, conductivity in p-type and n-type semiconductors, continuity equation, Fermi level in semiconductors and Hall Effect, which emphasis to study semiconductor devices are explained.
- After p-type and n-type semiconductors, we shall study the semiconductor devices formed using these two types of semiconductors.
- Also study the physical phenomena such as conduction, transport mechanism, electrical characteristics of p-n junction diode, zener diode, tunnel diode and so on.
- The application of diodes as rectifiers, types of rectifiers with their operation and characteristics, rectifier circuits with different filters are discussed.
- The principal of working and operation of Bipolar Junction Transistor and Field Effect Transistor and their characteristics are explained.
- The operations of transistors in different configurations are described and compared their performance parameters.
- The need of transistor biasing and its significance is explained. The quiescent point or operating point is explained.
- Different transistor biasing circuits are given and the expressions for stability factors are derived.
- H-parameter equivalent circuit analysis of BJT transistor amplifiers in different configurations is explained.
- Small signal equivalent circuit analysis of FET transistor amplifiers in different configuration is explained.

OUTCOMES:

At the end of this course the student can able to:
- Understand the basic concepts of semiconductor physics, which are required for formation of p-n junction and to study the electrical behaviour of the electronic devices.
- Understand the formation of p-n junction and how it can be used as a p-n junction diode in different modes of operation.
- Know the construction, operation and electrical behaviour of special semiconductor devices such as Zener diode, LED, Tunnel diode etc., with their V-I Characteristics.
- Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.

- Know the importance and requirement of real time operating system to perform the task by an embedded system on real time environment.
- Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations.
- Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions.
- Perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations.

SYLLABUS:

UNIT-I: Semiconductor Physics: Insulators, Semiconductors, and Metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semiconductors, extrinsic semiconductors, drift and diffusion, charge densities in semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors

UNIT- II: Junction Diode Characteristics: Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode. **Special Semiconductor Diodes**: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, LCD, Photo diode, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT. Construction, operation and characteristics of all the diodes is required to be considered.

UNIT- III: Rectifiers and Filters: Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, L- section filter, Π- section filter, Multiple L- section and Multiple Π section filter ,comparison of various filter circuits in terms of ripple factors.

UNIT- IV: Transistor Characteristics: BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, and characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values. **FET:** FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT- V: Transistor Biasing and Thermal Stabilization : Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self-bias, Stabilization against variations in V_{BE}, Ic, and β, Stability factors, (S, S', S''), Bias compensation, Thermal runaway, Thermal stability.
 FET Biasing- methods and stabilization.

UNIT- VI: **Small Signal Low Frequency Transistor Amplifier Models:** **BJT:** Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers. **FET:** Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

TEXT BOOKS:

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, Second Edition.
2. Electronic Devices and Circuits-B.P.Singh, Rekha Singh,Pearson Publications,Second Edition.
3. Electronic Devices and Circuits-David A.Bell, Oxford University Press, Fifth Edition.

REFERENCE BOOKS:

1. Electronic Devices and Circuits-K. Satya Prasad, VGS Book Links.
2. Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, Second Edition
3. Integrated Electronics- Jacob Millman, C. Halkies, C.D.Parikh, Tata Mc-Graw Hill, 2009.
4. Electronic Devices and Circuit Theory-R.L. Boylestad and Louis Nashelsky,Pearson Publications,Tenth Edition.
5. Electronic Devices and Circuits -BV Rao, KBR Murty, K Raja Rajeswari, PCR Pantulu, Pearson, 2nd edition.

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
II Year B. Tech Electronics and Communication Engineering – I Semester

DATA STRUCTURES

Objectives: Comprehensive knowledge of data structures and ability to implement the same in software applications

UNIT I:
Objective: exposure to algorithmic complexities, recursive algorithms, searching and sorting techniques

Preliminaries of algorithm, Algorithm analysis and complexity,
DATA STRUCTURE- Definition, types of data structures
Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, Tail recursion
List Searches using Linear Search, Binary Search, *Fibonacci Search*
Sorting Techniques: Basic concepts, Sorting by : insertion (Insertion sort), selection (heap sort), exchange (bubble sort, quick sort), distribution (radix sort) and merging (merge sort) *Algorithms.*

UNIT II:
Objectives: Applying stack and queue techniques for logical operations

Stacks and Queues: Basic Stack Operations, Representation of a Stack using Arrays, Stack Applications: Reversing list,   Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions.
Queues: Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack, Applications of Queues-Round robin Algorithm, Circular Queues, Priority Queues.

UNIT III:
Objectives: Exposure to list representation models in various types of applications

Linked Lists: Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, Reversing a   single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, Advantages and disadvantages of single linked list, Circular linked list, Double linked list

UNIT IV:
Objectives: Implementation of tree implementation in various forms

Trees: Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree , Binary Tree Traversals (recursive), Creation of binary tree from in, pre and post order traversals

UNIT-V:
Objectives: Advanced understanding of other variants of trees and their operations

Advanced concepts of Trees: Tree Travels using stack (non-recursive), Threaded Binary Trees. Binary search tree, Basic concepts, BST operations: insertion, deletion, Balanced binary trees – need, basics and applications in computer science (No operations)

UNIT VI:
Objectives: orientation on graphs, representation of graphs, graph traversals, spanning trees
Graphs: Basic concepts, Representations of Graphs: using Linked list and adjacency matrix, Graph algorithms
Graph Traversals (BFS & DFS), applications: Dijkstra's shortest path, Transitive closure, Minimum Spanning Tree using   Prim's Algorithm, warshall's Algorithm (**Algorithemic Concepts Only, No Programs required**).

TEXT BOOKS:
1. Data Structure with C, Seymour Lipschutz, TMH
2. Data Structures using C,Reema Thareja, Oxford
3. Data Structures, 2/e, Richard F, Gilberg , Forouzan, Cengage
4. Data structures and algorithm analysis in C, 2nd ed, mark allen weiss

REFERENCE BOOKS:
1. Data Structures and Algorithms, 2008,G.A.V.Pai, TMH
2. Classic Data Structures, 2/e, Debasis, Samanta,PHI,2009
3. Fundamentals of Data Structure in C, 2/e, Horowitz, Sahni, Anderson Freed, University Prees

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
II Year B. Tech Electronics and Communication Engineering – I Semester

	T	P	C
ENVIRONMENTAL STUDIES	**3**	**0**	**3**

Course Learning Objectives:

The objectives of the course is to impart

1. Overall understanding of the natural resources

2. Basic understanding of the ecosystem and its diversity

3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities

4. An understanding of the environmental impact of developmental activities

5. Awareness on the social issues, environmental legislation and global treaties

Course Outcomes:

The student should have knowledge on

1. The natural resources and their importance for the sustenance of the life and recognise the need to conserve the natural resources

2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web

3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity

4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices

5. Social issues both rural and urban environment and the possible means to combat the challenges

6. The environmental legislations of India and the first global initiatives towards sustainable development.

7. About environmental assessment and the stages involved in EIA and the environmental audit

Syllabus:

UNIT - I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT - II

Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - III

Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT - IV

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

Solid Waste Management: Sources, classification,effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

UNIT - V

Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT - VI

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism

The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

Text Books:
1.   Environmental Studies by R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
2.   A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi
3.   Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

Reference:
1.   Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2.   Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada
3.   Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi
4.   Environmental Studies by Piyush Malaviya, Pratibha Singh, Anoop singh: Acme Learning, New Delhi

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
II Year B. Tech Electronics and Communication Engineering – I Semester

SIGNALS & SYSTEMS

OBJECTIVES:

The main objectives of this course are given below:
- Understand the terminology of signals and systems.
- Understand the role of signals and systems in engineering design and society.
- Understand the use of signals and basic system building blocks and their roles in system design.
- Understand the analogy between vectors and signals.
- Understand signal representation techniques and signal characteristics.
- Understand the difference and the applications of analog versus digital signals and the conversion between them.
- Understand the process of sampling and the effects of under-sampling.
- Understand the Fourier, Laplace and z-transforms.
- Understand the use of transforms in signal/system analysis, characterization, and manipulation.
- Understand the relations between the Fourier, Laplace and z-transforms.

OUTCOMES:

At the end of this course the student can able to:
- Know the principles of vector spaces, concepts of orthogonal basis functions, signal approximation and evaluation of mean-square error.
- Learn to treat signals as vectors in a vector-space.   Know how to analyze, approximate, and manipulate signals using vector-space concepts.
- Know the representation of continuous-time periodic signals using Fourier series. Learn the concept of discrete Fourier spectrum.
- Determine Fourier transforms for continuous-time signals, and understand how to interpret and plot magnitude and phase spectrum.
- Know the concept of Hilbert transformer as a 90° phase-shifter.
- Understand the sampling theorem and how it links continuous-time signals to discrete-time signals. In particular, know how to derive the sampling theorem from first principles—from the basic properties of the Fourier transform; how the spectrum of a sampled signal relates to the spectrum of the original signal; how to use the sampling theorem to understand aliasing effect, and how to reduce or prevent aliasing.
- Understand the relationships among the various representations of LTI systems—linear constant coefficient differential equation, frequency response, transfer function, and impulse response.
- Know the concepts of distortion-less transmission, ideal filter characteristics, and physical realizability of filters.

- Understand the difference between signal-bandwidth and system-bandwidth.
- Understand the concept of convolution to relate input and output of an LTI system.
- Know how to perform graphical convolution.
- Understand the concept of correlation to measure the similarity between signals.
- Know the concept of correlation detection of signal in the presence of noise.
- Understand the need to define a new transform, the Laplace Transform, to treat a class of continuous-time signals broader than what the Fourier transform can handle.
- Understand the concept of ROC for continuous-time signal analysis.
- Know the evaluation of LT using waveform synthesis.
- Understand a new mathematical tool, the Z-transform, to treat discrete-time signals and to analyze discrete-time systems.
- Understand the concept of ROC for discrete-time signal analysis.

SYLLABUS:

UNIT- I: SIGNAL ANALYSIS & FOURIER SERIES: Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Exponential and sinusoidal signals, Concepts of Impulse function, Unit step function, Signum function. Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum

UNIT –II: FOURIER TRANSFORMS & SAMPLING: Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform. Sampling theorem – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT-III: SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS: Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT –IV: CONVOLUTION AND CORRELATION OF SIGNALS: Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of

periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT –V: LAPLACE TRANSFORMS : Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT –VI: Z–TRANSFORMS : Fundamental difference between continuous and discrete time signals, discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time using complex exponential signal, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.
3. Signals & Systems- Narayan Iyer and K Satya Prasad, Cenage Pub.

REFERENCE BOOKS:

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition.
2. Signals and Systems – K Raja Rajeswari, B VisweswaraRao, PHI, 2009
3. Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.
4. Signals and Systems – T K Rawat , Oxford University press, 2011

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
II Year B. Tech Electronics and Communication Engineering – I Semester

This course covers various topics related to principle of operation and performance of various electrical machines.

ELECTRICAL TECHNOLOGY

Learning objectives:
   i.   To understand the principle of operation, constructional details and operational characteristics of DC generators.
   ii.   To understand the principle and characteristics of DC motors. To introduce starting and speed control methods of DC motors.
   iii.   To learn the principle of operation and constructional details of transformers. Develop the equivalent circuit and evaluate the performance of transformers.
   iv.   To learn the principle of operation and constructional details of three phase induction motor. Study the torque – slip characteristics and starting methods of induction motor.
   v.   To study the principle of operation of single phase induction motor, shaded pole motor, capacitor motor and AC servo motor.
   vi.   To study the principle of operation of Alternators
   vii.   To learn the principle of operation of Ammeters, Voltmeters and Watt meters

Syllabus:

UNIT I: **DC GENERATORS:** Principle of operation and construction of DC generators - EMF equation – types of generators – magnetization and load characteristics of DC generators

UNIT II: **DC MOTORS :** Principle of operation and construction ofDC Motors – types of DC Motors – Characteristics of DC motors – basic starting methods for DC shunt motor – losses and efficiency – Swinburne's test – speed control of DC shunt motor – flux and Armature voltage control methods.

UNIT III: **TRANSFORMERS**: Principle of operation of single phase transformer – types – constructional features – phasor diagram on no-load and load – equivalent circuit, **losses** and efficiency of transformer - regulation of transformer – OC and SC tests – predetermination of efficiency and regulation.

UNIT IV: **INDUCTION MACHINE**: Principle of operation and construction of three-phase induction motors –slip ring and squirrel cage motors – slip-torque characteristics – efficiency calculation – starting methods. Principle of operation and construction of single phase induction motor - shaded pole motors – capacitor motors and AC servomotor.

UNIT IV: ALTERNATORS: Alternators – Constructional features – Principle of operation – Types - EMF Equation – Distribution and Coil span factors – Predetermination of regulation by Synchronous Impedance Method – OC and SC tests.

UNIT IV: ELECTRICAL INSTRUMENTS: Basic Principles of indicating instruments – Moving Coil and Moving iron Instruments (Ammeters and Voltmeters) Wattmeters-types, - Controlling and Deflecting torques.

Learning outcomes:

1. Able to understand the principles of electro mechanical energy conversion.

2. Able to explain the operation of DC generator and analyze the characteristics of DC generator.

3. Able to explain the principle of operation of DC motor and analyze their characteristics. Acquire the skills to analyze the starting and speed control methods of Dc motors.

4. Capability to develop equivalent circuit and evaluate performance of transformers.

5. Ability to analyze speed – torque characteristics of induction motor and understand starting methods of induction motor.

6. Capability to understand the operation of various special machines.

TEXT BOOKS:
1. Principles of Electrical Machines by V.K. Mehta & Rohit Mehta, S.Chand publications
2. Theory & performance of Electrical Machines by J.B.Guptha. S.K.Kataria & Sons

REFERENCE BOOKS:
1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah,TMH Publications
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications,2nd edition
3. Basic Electrical Engineering by Nagsarkar,Sukhija, Oxford Publications,2nd edition

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA

II Year B. Tech Electronics and Communication Engineering – I Semester

ELECTRONIC DEVICES AND CIRCUITS LAB

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments: (Minimum of Ten Experiments has to be performed)

1. P-N Junction Diode Characteristics
   Part A: Germanium Diode (Forward bias& Reverse bias)
   Part B: Silicon Diode (Forward Bias only)
2. Zener Diode Characteristics
   Part A: V-I Characteristics
   Part B: Zener Diode as Voltage Regulator
3. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
4. BJT Characteristics(CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
5. FET Characteristics(CS Configuration)
   Part A: Drain Characteristics
   Part B: Transfer Characteristics
6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

PART C: Equipment required for Laboratory

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators

4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
II Year B. Tech Electronics and Communication Engineering – I Semester

NETWORKS &ELECTRICAL TECHNOLOGY LAB

PART – A

Any five experiments are to be conducted from each part

1. Serial and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.

2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.

3. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification.

4. Verification of Superposition and Reciprocity theorems.

5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.

6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.

PART – B

1. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.

2. Swinburne's Test on DC shunt machine (Predetermination of efficiency of a given DC Shunt machine working as motor and generator).

3. Brake test on DC shunt motor. Determination of performance characteristics.

4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).

5. Brake test on 3-phase Induction motor (performance characteristics).

6. Regulation of alternator by synchronous impedance method.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
II Year B. Tech Electronics and Communication Engineering – II Semester

ELECTRONIC CIRCUIT ANALYSIS

OBJECTIVES:

The main objectives of this course are given below:
- Small signal high frequency BJT transistor amplifier Hybrid-π equivalent circuit and the expressions for conductances and capacitances are derived.
- Analysis of common source and common drain FET amplifiers at high frequencies is given.
- Cascading of single stage amplifiers is discussed. Expressions for overall voltage gain are derived.
- Other types of transistor amplifier circuits, Darlington pair circuits, Boot strapped sweep circuit, Cascode amplifiers are also discussed.
- The concept of feedback is introduced. Effect of negative feedback on amplifier characteristics is explained and necessary equations are derived.
- Different feedback configurations and their analysis are given.
- Basic principle of oscillator circuits is explained.
- Generation of sinusoidal waveforms by the oscillator circuits without external A.C input is explained.
- Different oscillator circuits are given with their analysis by deriving the frequency of oscillation and condition for oscillation.
- Power amplifiers Class A, Class B, Class C, Class AB and other types of amplifiers are analyzed.
- Advantages and disadvantages of different types of power amplifiers are discussed.
- Thermal considerations and use of heat sinks is also explained.
- Different types of tuned amplifier circuits are analyzed.
- Tuned amplifier circuits, wideband amplifier circuits and compensation aspects are explained.

OUTCOMES:

At the end of this course the student can able to:
- Design and analysis of small signal high frequency transistor amplifier using BJT and FET.
- Design and analysis of multi stage amplifiers using BJT and FET and Differential amplifier using BJT
- Know the concept of feedback and different topologies of feedback with their analysis and performance comparison.
- Understand the principle of an Oscillator and condition for oscillators.

- Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
- Know the classification of the power amplifiers and their analysis and performance comparison.
- Know the different types of tuned amplifiers and their analysis and performance comparison.

SYLLABUS:

UNIT-I: Small Signal High Frequency Transistor Amplifier models: BJT: Transistor at high frequencies, Hybrid- π common emitter transistor model, Hybrid π conductances, Hybrid π capacitances, validity of hybrid π model, determination of high-frequency parameters in terms of low-frequency parameters , CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.**FET:** Analysis of common Source and common drain Amplifier circuits at high frequencies.

UNIT-II: Multistage Amplifiers : Classification ofamplifiers, methods of coupling**, c**ascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Analysis of multi stage amplifiers using FET, Differential amplifier using BJT.

UNIT –III: Feedback Amplifiers : Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

UNIT-IV: Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wein bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators with BJT and FET and their analysis, Crystal oscillators, Frequency and amplitude stability of oscillators.

UNIT-V: Power Amplifiers: Classification of amplifiers,Class A power Amplifiers and their analysis, Harmonic Distortions, Class B Push-pull amplifiers and their analysis, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks, Advanced power amplifiers, Distortion in amplifiers.

UNIT-VI: Tuned Amplifiers : Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, effect of cascading single tuned amplifiers on band width, effect of cascading double tuned amplifiers on band width, staggered tuned amplifiers, stability of tuned amplifiers, wideband amplifiers.

TEXT BOOKS:

1. Integrated Electronics- J. Millman and C.C. Halkias, Tata Mc Graw-Hill, 1972.
2. Electronic Circuit Analysis-B.V.Rao,K.R.Rajeswari, P.C.R.Pantulu,K.B.R.Murthy, Pearson Publications.
3. Electronic Devices and Circuits- Salivahanan, N.Suressh Kumar, A. Vallavaraj, TATA McGraw Hill, Second Edition

REFERENCE BOOKS:

1. Microelectronic Circuits-Sedra A.S. and K.C. Smith, Oxford University Press, Sixth Edition.
2. Electronic Circuit Analysis and Design – Donald A. Neaman, Mc Graw Hill.
3. Electronic Circuits-I-Ravish R Singh-Peason Publications.
4. Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, Tenth Edition.
5. Electronic circuits Principles and Application-R.D.S.Samuel,B.Sujatha,Elesevier Publications.

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
II Year B. Tech Electronics and Communication Engineering – II Semester

MANAGEMENT SCIENCE

UNIT – I:
(*The Learning objective of this Unit is to understand the concept and nature of Management, Evolution of Management theories, Motivation and leadership Styles).
Introduction to Management: Concept – Nature and Importance of Management, Functions-Evaluation of Management, Motivation Theories – Leadership Styles – Decision Making Process-designing Organization Structure – Principles and types of Organization.
(**The learner is able to understand the concept and functions of Management, and Theeories of Motivation, Styles of Leardership)

UNIT – II:
(The Learning objective of this Unit is to Equip with the concepts of Operations, project management and inventory control).
Operations and Project Management: Work-Study-Statistical Quality Control Through Control Charts-Inventory Control-EOQ & ABC Analysis (Simple Problems) Project Management-PERT/CPM-Project Crashing (Simple Problem).
(**The learner is able to understand the main idea of Inspection and scrutinize the different methods of inspection, the concept of Inventory Management and Control and Inventory Pricing).

UNIT – III:
(* The Objective of this unit is to understand the main functional areas of organization i.e., Financial Management, Production Management, Marketing Management, Human Resource Management, and Product Life Cycles and Channels of Distribution).
Functional Management: Concept and Functions of Finance, HR, Production, Marketing Management and Services – Job Evolution and Merit Rating – Product Life Cycles – Channels of Distribution – Types/Methods of Production.
(**At the end of this chapter the learner is able to understand the different functional areas in an organization and their responsibilities – Product Life Cycle and Channels of Distribution.).

UNIT – IV:
(*The objective of this unit is to equip with the concept and practical issues relating to Strategic Management)
Strategic Management: Vision, Mission, Goals, Strategy – Corporate Planning Process – Environmental Scanning – SWOT analysis – Different Steps in Strategy Formulation, Implementation and Evaluation.
(**The learner is able to familiar with the meaning of Vision, Mission, Goals and Strategies of the Organization and to implement successfully).

UNIT – V:
(*The objective of this unit is to understand the need and importance of Business Ethics and Communication Skills in Contemporary situations).
Business Ethics & Communications: Ethics in Business and Management – Ethics in HRM, Finance & Marketing Management – Business Ethics & Law

(** The Learner is able to know the practical Issues of Business Ethics in various functional areas, to improve Report Writing skills and Understand the Communication Process)

UNIT – VI:
(*The Learning objective of this unit is to equip with the contemporary management practices, i.e., MIS, MRP, JIT and ERP etc.,)

Contemporary Management Practices: Basic concepts of MIS, MRP, Just-In-Time (JIT)System, Total Quality Management (TQM), Six Sigma and Capability Maturity Models (CMM) Levies, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process Outsourcing (BPO), Business Process Re-Engineering and Bench Marking, Balance Score Card.

(**The Learner is able to Understand the various contemporary issues in Management Practices like TQM and BPO etc.,)

Note: *Learning Objective
        ** Learning Assessment

TEXT BOOKS
1. Kumar/Rao/Chhalill 'Introduction to Management Science' Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, Management Science' TMH 2011.

REFERENCES
1. Koontz & Weihrich: 'Essentials of Management' TMH 2011
2. Seth & Rastogi: Global Management Systems, Cengage Learning, Delhi, 2011
3. Robbins: Organizational Behaviors, Pearson Publications, 2011
4. Kanishka Bedi: Production & Operational Management, Oxford Publications, 2011
5. Manjunath: Management Science, Pearson Publications, 2013
6. Biswajit Patnaik: Human Resource Management, PHI, 2011
7. Hitt and Vijaya Kumar: Strategic Management, Cengage Learning
8. Dr. PG. Ramanujam, BVR Naidu, PV Rama Sastry: Management Science Himalaya Publishing House, 2013
9. Management Shapers, Universities Press

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
II Year B. Tech Electronics and Communication Engineering – II Semester

RANDOM VARIABLES AND STOCHASTIC PROCESSES

OBJECTIVES:

- The aim of the Course is to give students an heuristic introduction to elementary probability theory, in preparation for courses on statistical analysis and advanced courses on probability and stochastic processes
- To show how simple and important the probability and matrix theory can be used to build this notion into a beautiful and useful piece of applied mathematics and engineering.
- To cover the important concepts of Probability theory and Stochastic processes

OUTCOMES:

- To provide a solid introduction to probability theory and stochastic processes. And to introduce basic ideas and tools of the theory of stochastic processes and to discuss in depth through many examples important stochastic processes including Gaussian, Rayleigh, Poisson etc.
- With this background the students should be able to specify and solve simple probabilistic problems.
- They should gain also some practice in working with basic stochastic models.
- Knowledge of stochastic processes is essential for the study/analysis of computer networks, wireless communications, multimedia systems, financial market etc.
- This course is an introduction to the theory of stochastic (random) processes and its applications to many real-life problems. Fun part of this course will include the study of some bizarre problems in stochastic processes

SYLLABUS:

UNIT I :   THE RANDOM VARIABLE : Introduction,Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Conditional Density, Properties.

UNIT II: OPERATION ON ONE RANDOM VARIABLE – EXPECTATIONS : Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Nonmonotonic Transformations of Continuous Random Variable.

UNIT III: MULTIPLE RANDOM VARIABLES : Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem: Unequal Distribution, Equal Distributions. **OPERATIONS ON MULTIPLE RANDOM VARIABLES:** Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT IV: RANDOM PROCESSES – TEMPORAL CHARACTERISTICS: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, N^{th}-order and Strict-Sense Stationarity, Time Averages and Ergodicity, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

UNIT V: RANDOM PROCESSES – SPECTRAL CHARACTERISTICS: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

UNIT VI: LINEAR SYSTEMS WITH RANDOM INPUTS : Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, Autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectra of Input and Output, Band pass, Band-Limited and Narrowband Processes, Properties, Modeling of Noise Sources: Resistive (Thermal) Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Average Noise Figures, Average Noise Figure of cascaded networks.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH, 4th Edition,
    2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S.Unnikrisha,
    PHI, 4th Edition, 2002.

REFERENCE BOOKS:

1. Probability Theory and Stochastic Processes – B. Prabhakara Rao, Oxford University Press.
2. Probability and Random Processes with Applications to Signal Processing, Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
3. Statistical Theory of Communication, S.P.Eugene Xavier, New Age Publications, 2003.
4. Signals, Systems & Communications, B.P. Lathi, B.S. Publications, 2003.
5. Introduction to Random Processes with Applications to Signals and Systems, Gardener W.A, McGraw-Hill, 2nd Edition.
6. Schaum's Outline of Probability, Random Variables, and Random Processes.
7. An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook, 1968.

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
II Year B. Tech Electronics and Communication Engineering – II Semester

SWITCHING THEORY AND LOGIC DESIGN

OBJECTIVES:

The main objectives of this course are given below:
- The fundamentals of digital electronics such as representation of binary numbers, logic gates, and minimization techniques are explained.
- The design of combinational logic circuits such as adder, subtractor, multiplexers, demultiplexers, encoders, decoders etc. based on logic gates are explained.
- The basic concepts of programmable logic devices, PROM, PAL, PLA are explained.
- The importance of flip flops in digital electronics and its applications are explained.
- Various types of flip flops and their truth tables, realization of these flip flops from basic logic gates are explained.
- The designs of counters with the help of flip flops, various types of counters are explained.
- The importance of registers, various types of registers is explained.

OUTCOMES:

At the end of this course the student can able to:
- Representation of various number systems, basic operations of logic gates, application of logic gates.
- Apply the basic laws and rules of Boolean algebra to simplify the expressions.
- Simplification of Boolean expressions using Karnaugh maps.
- Design of combinational logic circuits for given truth table and Boolean expression.
- Implementation of combinational logic gates using NAND and NOR gates.
- Understand the basics of programmable logic devices (PLD), realization of Boolean functions using PLD.
- Operation of flip flops, design of counters and registers using flip flops, importance of stables.

SYLLABUS:

UNIT – I: Review of No. systems & codes: Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members, problem solving.
   i) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9's compliment code etc.,
   ii) Logic operations and error detection & correction codes; Basic logic operations - NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations.

UNIT – II: Minimization techniques: Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up and 6 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

UNIT – III: Combinational logic circuits design : Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

UNIT – IV: Introduction PLDs : PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

UNIT – V: Sequential circuits I: Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

UNIT – VI: Sequential circuits II : Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Meelay to Moore conversion and vice-versa.

TEXT BOOKS:

1. Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill TMH edition.
2. Switching Theory and Logic Design by A. Anand Kumar
3. Digital Design by Mano PHI.
REFERENCE BOOKS:

1. Modern Digital Electronics by RP Jain, TMH
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers
3. Micro electronics by Milliman MH edition.
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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
II Year B. Tech Electronics and Communication Engineering – II Semester

EM WAVES AND TRANSMISSION LINES

OBJECTIVES:

The main objectives of this course are given below:
- The importance of electrostatics and its applications is explained with help of two basic laws-coulombs law and gauss law.
- Two important Maxwell equations based on electrostatics are derived.
- The importance of continuity equation, Laplace equation especially in solving the boundary value problems is explained.
- The importance of biot-savarts law, ampere's circuit law is explained with applications.
- Another two more important Maxwell equations are derived for static fields.
- The Maxwell equations for time varying field are derived.
- The wave equation is derived based on the Maxwell equations. The wave propagation in conductors, dielectrics is explained.
- EM Wave characteristics are analysed when they enter from one medium to another medium with normal incidence and oblique incidence.
- The importance of transmission lines, various types of transmission lines, transmission line parameters, applications of transmission lines are explained.
- The construction of smith chart, its use in solving the transmission line problems is explained.

OUTCOMES:

At the end of this course the student can able to:
- Understand the coulomb's law, electric field intensity ($\mathbf{E}$) and calculation of $\mathbf{E}$due to line, surface and volume charge densities.
- Understand the gauss law and its applications in finding the electric field intensity.
- Define electric potential, energy density, convection and conduction currents.
- Derive the two important Maxwell equations for electrostatic fields.
- Understand the biot-savart's law, ampere's circuit law and applications of these laws in finding the magnetic field intensities.
- Derivation of two Maxwell equations for magneto static fields, magnetic vector potential.
- Understand the Maxwell equations for time varying fields, Maxwell equations in differential form and integral form.
- Derive the wave equations for conducting medium and dielectric medium.
- Understand the concepts attenuation constant, phase constant, propagation constant, skin depth and significance.

- Understand the reflection and refraction of plane wave from one medium to another medium.
- Know the significance of pointing theorem and its use in various applications
- Understand the various transmission lines and their applications.
- Know the importance of smith chart and calculation of transmission line parameters like reflection coefficient, VSWR etc.

SYLLABUS:

UNIT I: ELECTROSTATICS: Coulomb's Law, Electric Field Intensity Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

UNIT II: Magneto Statics : Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy. Illustrative Problems**. Maxwell's Equations (Time Varying Fields):** Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface : Dielectric-Dielectric and Dielectric-Conductor Interfaces. Illustrative Problems.

UNIT III: EM Wave Characteristics - I: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H. Sinusoidal Variations. Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth. Polarization. Illustrative Problems.

UNIT IV: EM Wave Characteristics – II: Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance. Poynting Vector and Poynting Theorem – Applications, Power Loss in a Plane Conductor. Illustrative Problems.

UNIT V: Transmission Lines - I : Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, lossless lines, distortion less lines, Loading - Types of Loading. Illustrative Problems.

UNIT VI: Transmission Lines – II : Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. Low loss radio frequency lines and UHF Transmission lines, UHF Lines as Circuit Elements; $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines – Impedance Transformations. Smith Chart – Configuration and Applications, Single and Double Stub Matching. Illustrative Problems.

TEXT BOOKS:

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.

REFERENCE BOOKS:

1. Electromagnetic Fields and Wave Theory –GSN Raju, Pearson Education 2006
2. Engineering Electromagnetics:Nathan Ida, Springer(India)Pvt.Ltd., New Delhi, 2nd   ed., 2005.
3. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.
4. Electromagnetic Field Theory and TransmissionLines :G SasiBhushanaRao,Wiley India 2013
5. Transmission Lines and Networks–Umesh Sinha,Satya Prakashan (Tech. India Publications), New Delhi, 2001.
6. Electromagnetic waves and transmission lines – R S Rao, PHI, EEE edition

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
II Year B. Tech Electronics and Communication Engineering – II Semester

ANALOG COMMUNICATIONS

OBJECTIVES:

The main objectives of this course are given below:
- Students know some fundamental concepts associated with analog communication systems using the modulation/demodulation theory. In particular analog communication systems employing amplitude modulation and angle modulation are considered.
- Students will be able to analyze basic analog communication systems in time and frequency domains.
- Students will be able to analyze the performance of analog communication systems in the presence of noise.
- Students know the concept of pulse modulation techniques.

OUTCOMES:

At the end of this course the student can able to:
- know the basic elements of analog communication system.
- understand the need for modulation and analyze conventional AM system in the time- and frequency domains.
- understand the concept of signal multiplexing in frequency-domain.
- analyze the suppressed carrier amplitude modulation schemes.
- compare different amplitude modulation techniques.
- analyze the performance of analog modulation schemes in the presence of noise.
- Calculate the signal-to-noise ratio of analog modulation schemes.
- know the operation of different types of AM and FM transmitters.
- know the operation of widely used super heterodyne receivers for AM and FM.
- know different types of pulse modulation schemes.
- understand the concept of signal multiplexing in time-domain.

SYLLABUS:

UNIT-I: AMPLITUDE MODULATION : Introduction to communication system, Need for modulation, Frequency Division Multiplexing , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.

UNIT-II: DSB & SSB MODULATION: Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves,

COSTAS Loop. Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave plus Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT-III: ANGLE MODULATION: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM.

UNIT-IV: NOISE: Noise in Analog communication System, Noise in DSB& SSB System, Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis

UNIT-V: TRANSMITTERS & RECEIVERS: Radio Transmitter - Classification of Transmitter, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter. **Radio Receiver** - Receiver Types - Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

UNIT-VI: PULSE MODULATION: Time Division Multiplexing, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, TDM Vs FDM

TEXT BOOKS:

1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 2007 3rd Edition.
2. Communication Systems – B.P. Lathi, BS Publication, 2006.
3. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.

REFERENCE BOOKS:

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2ndEd.,.
2. Communication Systems– R.P. Singh, SP Sapre, Second Edition TMH, 2007.
3. Fundamentals of Communication Systems - John G. Proakis, Masond, Salehi PEA, 2006.

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
II Year B. Tech Electronics and Communication Engineering – II Semester

ELECTRONIC CIRCUIT ANALYSIS LAB

Note: The students are required to design the electronic circuit and they have to perform the simulation using Multisim/ Pspice/Equivalent Licensed simulation software tool. Further they are required to verify the result using necessary hardware in the hardware laboratory**.**

PART A: List of Experiments :(Minimum of Ten Experiments has to be performed)
  1. Determination of f_T of a given transistor.
  2. Voltage-Series Feedback Amplifier.
  3. Current-Shunt Feedback Amplifier.
  4. RC Phase Shift/Wien Bridge Oscillator.
  5. Hartley/Colpitt's Oscillator.
  6. Two Stage RC Coupled Amplifier.
  7. Darlington Pair Amplifier.
  8. Bootstrapped Emitter Follower.
  9. Class A Series-fed Power Amplifier.
  10. Transformer-coupled Class A Power Amplifier.
  11. Class B Push-Pull Power Amplifier.
  12. Complementary Symmetry Class B Push-Pull Power Amplifier.
  13. Single Tuned Voltage Amplifier.
  14. Double Tuned Voltage Amplifier.

PART B: Equipment required for Laboratory

Software:
  i. Multisim/ Pspice/Equivalent Licensed simulation software tool.
  ii. Computer Systems with required specifications.

Hardware:
  1. Regulated Power supplies.
  2. Analog/Digital Storage Oscilloscopes.
  3. Analog/Digital Function Generators.
  4. Digital Multimeters.
  5. Decade Résistance Boxes/Rheostats.
  6. Decade Capacitance Boxes.
  7. Ammeters (Analog or Digital).
  8. Voltmeters (Analog or Digital).
  9. Active & Passive Electronic Components.

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
II Year B. Tech Electronics and Communication Engineering – II Semester

ANALOG COMMUNICATIONS LAB

Note: The students are required to implement and analyze the analog communication systems using MATLAB$^{®}$/SIMULINK$^{®}$. Further they are required to verify the results using necessary hardware in the laboratory**.**

PART A: **List of Experiments :(Minimum of Ten Experiments has to be performed)**

1. Amplitude Modulation – Modulation & Demodulation.
2. AM - DSB SC – Modulation & Demodulation.
3. Spectrum Analysis of Modulated signal using Spectrum Analyzer
4. Diode Detector
5. Pre-emphasis & De-emphasis
6. Frequency Modulation – Modulation & Demodulation.
7. AGC Circuits
8. Sampling Theorem
9. Pulse Amplitude Modulation – Modulation & Demodulation.
10. Pulse Width Modulation – Modulation & Demodulation.
11. Pulse Position Modulation – Modulation & Demodulation.
12. PLL FM Detector.

PART B: Equipment required for Laboratory
Software:
   i.   MATLAB$^{®}$/SIMULINK$^{®.}$
   ii. MATLAB$^{®}$ Communications Toolbox.

Hardware:
1. Regulated Power supplies.
2. Analog/Digital Storage Oscilloscopes.
3. Analog/Digital Function Generators.
4. Digital Multimeters.
5. Circuit Components.
6. Spectrum Analyzer.
7. Computer Systems with latest specifications and Windows XP Operating system.

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – I Semester

PULSE AND DIGITAL CIRCUITS

OBJECTIVES

The student will be made

- To understand the concept of wave shaping circuits, Switching Characteristics of diode and transistor.
- To design and analyze different types of Multivibrators.
- To Introduce to Time-base Generators.
- To understand the working of logic families & Sampling Gates.

UNIT I
LINEAR WAVESHAPING: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square, ramp and exponential inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.   T.B.: 1,2& Ref: 1

UNIT II
NON-LINEAR WAVE SHAPING : Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.   T.B.: 1,2& Ref: 1

UNIT III
SWITCHING CHARACTERISTICS OF DEVICES : Diode as a switch, piecewise linear diode characteristics, Design and analysis of Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.
Bistable Multivibrator: Analysis And Design of Fixed Bias, Self Bias Bistable Multi Vibrator, Collector Catching Diodes, Commutating Capacitors, Triggering of Binary Circuits, Emitter Coupled Bistable Multivibrator (Schmitt Trigger).
T.B.: 1,2& Ref: 1

UNIT IV
Monostable Multivibrator: Analysis and Design of Collector Coupled Monostable Multi vibrator, Triggering of Monostable Multivibrator, Applications of Monostable Multivibrator.
Astable Multivibrator: Analysis and Design of Collector Coupled Astable Multivibrator, Application of Astable Multivibrator as a Voltage to Frequency Converter.
T.B.: 1,2& Ref: 1
UNIT V
VOLTAGE TIME BASE GENERATORS:
General features of a time base signal, Methods of generating time base waveform Exponential Sweep Circuits, Negative Resistance Switches, basic principles in Miller and

Bootstrap time base generators, Transistor Miller time base generator, Transistor Bootstrap time base generator.   T.B.: 1,2& Ref: 1.

UNIT VI
LOGIC FAMILIES & SAMPLING GATES:
LOGIC FAMILIES: Diode Logic, Transistor Logic, Diode-Transistor Logic, Transistor-Transistor Logic, Emitter Coupled Logic, AOI Logic, Comparison of Logic Families.
SAMPLING GATES: Basic Operating Principles of Sampling Gates, Diode Unidirectional Sampling Gate and Two-Diode Bi-Directional Sampling Gate, Four-Diode gates, Six-Diode Gates, Reduction of Pedestal in Sampling Gates, Applications of Sampling Gates.
T.B.: 1,2& Ref: 1

TEXT BOOKS:
1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, Mothiki S Prakash Rao McGraw-Hill, Second Edition, 2007.
2. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005
REFERENCES :
1.. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002
2. Wave Generation and Shaping - L. Strauss.
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OUTCOMES
After going through this course the student will be able to
- Design linear and non-linear wave shaping circuits.
- Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
- Design different multivibrators and time base generators.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – I Semester

LINEAR IC APPLICATIONS

OBJECTIVES
The student will
- Study characteristics, realize circuits, design for signal analysis using Op-amp ICs.
- Study the linear and non-linear applications of operational amplifiers.
- Study IC 555 timer, PLL and VCO with their applications.
- To understand & compare different types of Analog to Digital Converters and Digital to Analog Converters
- Acquire skills required for designing and testing integrated circuits

UNIT I
INTEGRATED CIRCUITS: Differential Amplifier- DC and AC analysis of Dual input Balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input – Balanced/ Unbalanced Output), DC Coupling and Cascade Differential Amplifier Stages, Level translator.

UNIT II
Characteristics of OP-Amps, Integrated circuits-Types, Classification, Package Types and Temperature ranges, Power supplies, Op-amp Block Diagram, ideal and practical Op-amp Specifications, DC and AC characteristics, 741 op-amp & its features, Op-Amp parameters & Measurement, Input & Out put Off set voltages & currents, slew rates, CMRR, PSRR, drift, Frequency Compensation technique.

UNIT III
LINEAR and NON-LINEAR APPLICATIONS OF OP-AMPS: Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters, Buffers. Non- Linear function generation, Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log Amplifiers, Precision rectifiers.

UNIT IV
ACTIVE FILTERS, ANALOG MULTIPLIERS AND MODULATORS: Introduction, Butterworth filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters.
Four Quadrant Multiplier, IC 1496, Applications of Analog Switches and Multiplexers, Sample & Hold Amplifiers.

UNIT V
TIMERS & PHASE LOCKED LOOPS: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of

PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators. Applications of VCO (566).

UNIT VI
DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.DAC and ADC Specifications, Specifications AD 574 (12 bit ADC).

TEXT BOOKS:
1. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition,2003.
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI,1987.

REFERENCES :
1. Design with Operational Amplifiers & Analog Integrated Circuits – Sergio Franco, McGraw Hill, 1988.
2. OP AMPS and Linear Integrated Circuits concepts and Applications, James M Fiore, Cenage Learning India Ltd.
3. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin & Fredrick Driscoll, PHI, 6th Edition.
4. Operational Amplifiers–C.G. Clayton, Butterworth & Company Publ. Ltd./Elsevier, 1971.
5. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition

OUTCOMES
After going through this course the student will be able to
- Design circuits using operational amplifiers for various applications.
- Analyze and design amplifiers and active filters using Op-amp.
- Diagnose and trouble-shoot linear electronic circuits.
- Understand the gain-bandwidth concept and frequency response of the three basic amplifiers. Understand thoroughly the operational amplifiers with linear integrated circuits.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – I Semester

CONTROL SYSTEMS

OBJECTIVES
The student will
- Learn the fundamental concepts of Control systems and mathematical modelling of the system
- Study the concepts of time response and frequency response of the system
- Understand the basics of stability analysis of the system

UNIT I
INTRODUCTION
Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

UNIT II
TRANSFER FUNCTION REPRESENTATION
Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using mason's gain formula.

UNIT III
TIME RESPONSE ANALYSIS
Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT IV
STABILITY ANALYSIS IN S-DOMAIN
The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.
Root Locus Technique:
The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT V
FREQUENCY RESPONSE ANALYSIS
Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.
STABILITY ANALYSIS IN FREQUENCY DOMAIN:

Polar Plots, Nyquist Plots Stability Analysis.

UNIT VI
 CLASSICAL CONTROL DESIGN TECHNIQUES
Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers. State Space Analysis of Continuous Systems Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability

TEXT BOOKS:
1. Automatic Control Systems 8th edition– by B. C. Kuo 2003– John wiley and sons.
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International
(P) Limited, Publishers, 2nd edition.

REFERENCE BOOKS:
1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Modern Control Systems-Richard C. Dorf and Robert H.Bishop Pearson

OUTCOMES
After going through this course the student will be able to

   * Represent the mathematical model of a system
   * Determine the response of different order systems for various inputs
   * Analyse the stability of the system

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – I Semester

DIGITAL SYSTEM DESIGN & DIGITAL IC APPLICATIONS

OBJECTIVES
The student will be introduced to

- The electrical behavior of CMOS both in static and dynamic conditions and before that study the diode/transistor-transistor logic and Emitter coupled logic.

- In this course, students can study Integrated circuits for all digital operational designs like adder, subtractor, multipliers, multiplexers, registers, counters, flip flops, encoders, decoders and memory elements like RAM and ROM.

- Design and to develop the internal circuits for different digital operations and simulate them using hardware languages using integrated circuits.

- Understand the concepts of SSI Latches and Flip-Flops and Design of Counters using Digital ICs, modeling of sequential logic integrated circuits using VHDL

Unit-I:
Digital Design Using HDL: Design flow, program structure, History of VHDL, VHDL requirements, Levels of Abstraction, Elements of VHDL, Concurrent and Sequential Statements, Packages, Libraries and Bindings, Objects and Classes, Subprograms, Comparison of VHDL and Verilog HDL.

[handwritten: Unit II]

Unit-II:
VHDL Modelling : Simulation, Logic Synthesis, Inside a logic Synthesizer, Constraints, Technology Libraries, VHDL and Logic Synthesis, Functional Gate-Level verification, Place and Route, Post Layout Timing Simulation, Static Timing, Major Netlist formats for design representation, VHDL Synthesis-Programming Approach.

[handwritten: Unit – III]

Unit-III:
Programmable Logic Devices (PLDs) & Memories: Programmable Read Only Memory, Programmable Logic Array, Programmable Array Logic Devices, ROM: Internal structure, 2D-Decoding, Commercial ROM types, timing and applications,. Static RAM: Internal structure, SRAM timing, standard, synchronous SRAMS, Dynamic RAM: Internal structure, timing, synchronous DRAMs. Design considerations of PLDs with relevant Digital ICs.

[handwritten: unit – VI]

Unit-IV:
Digital Logic Families and Interfacing: Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families.bipolar logic,transistor-transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic.

[handwritten: unit I]

[handwritten: unit numbers are not in the correct order, the correct order is Mentioned aside.]

Unit-V:

Combinational Logic Design: Adders & Subtractors, Ripple Adder, Look Ahead Carry Generator, Binary Parallel Adder, Binary Adder-Subtractor, ALU, Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, parity circuits, comparators, multipliers, Barrel Shifter, Simple Floating-Point Encoder, Cascading Comparators, Dual Priority Encoder, Design considerations with relevant Digital ICs, modeling of Circuits by using VHDL.

Unit-VI:

Sequential Logic Design: SSI Latches and Flip-Flops, Counters, Design of Counters using Digital ICs, Ring Counter, Johnson Counter, Modulus N Synchronous Counters, MSI Registers, Shift Registers, Modes of Operation of Shift Registers, Universal Shift Registers, MSI Shift Registers, Design considerations with relevant Digital ICs, modeling of circuits by using VHDL.

Text Books:

1. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Edition, 2005.
2. Designing with TTL Integrated Circuits: Robert L. / John R. Morris & Miller.

References:

1. "Fundamentals of Digital logic design with VHDL". Stephen Brown & Zvonko Vranesic,
   Tata McGraw Hill, 2nd edition.

2. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

OUTCOMES

After going through this course the student will be able to

- Understand the concepts of different logics and implementations using Integrated circuits.
- Design and analyze any Digital design in real time applications.
- Extend the digital operations to any width by connecting the ICs and can also design, simulate their results using VHDL.
- Understand the concepts of MSI Registers and Modes of Operation of Shift Registers, Universal Shift Registers.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – I Semester

ANTENNAS AND WAVE PROPAGATION

OBJECTIVES

The student will be able to

- understand the applications of the electromagnetic waves in free space.

- introduce the working principles of various types of antennas

- discuss the major applications of antennas with an emphasis on how antennas are employed to meet electronic system requirements.

- understand the concepts of radio wave propagation in the atmosphere.

UNIT I

ANTENNA FUNDAMENTALS: Introduction, Radiation Mechanism – single wire, 2 wire, dipoles, Current Distribution on a thin wire antenna. Antenna Parameters - Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beamwidths, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, illustrated Problems.

UNIT II

THIN LINEAR WIRE ANTENNAS: Retarded Potentials, Radiation from Small Electric Dipole, Quarterwave Monopole and Halfwave Dipole – Current Distributions, Evaluation of Field Components, Power Radiated, Radiation Resistance, Beamwidths, Directivity, Effective Area and Effective Hight. Natural current distributions, fields and patterns of Thin Linear Center-fed Antennas of different lengths, Radiation Resistance at a point which is not current maximum. Antenna Theorems – Applicability and Proofs for equivalence of directional characteristics, Loop Antennas: Small Loops - Field Components, Comparison of far fields of small loop and short dipole, Concept of short magnetic dipole, D and R_r relations for small loops.

UNIT III

ANTENNA ARRAYS : 2 element arrays – different cases, Principle of Pattern Multiplication, N element Uniform Linear Arrays – Broadside, Endfire Arrays, EFA with

Increased Directivity, Derivation of their characteristics and comparison; Concept of Scanning Arrays. Directivity Relations (no derivations). Related Problems. Binomial Arrays, Effects of Uniform and Non-uniform Amplitude Distributions, Design Relations. Arrays with Parasitic Elements, Yagi - Uda Arrays, Folded Dipoles and their characteristics.

UNIT IV

Non-Resonant Radiators: Introduction, Traveling wave radiators – basic concepts, Long wire antennas – field strength calculations and patterns, Broadband Antennas: Helical Antennas – Significance, Geometry, basic properties; Design considerations for monofilar helical antennas in Axial Mode and Normal Modes (Qualitative Treatment).

Microstrip Antennas-Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas –Geometry and Parameters, Impact of different parameters on characteristics.

UNIT V

VHF, UHF AND MICROWAVE ANTENNAS: Reflector Antennas : Flat Sheet and Corner Reflectors. Paraboloidal Reflectors – Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds, Cassegrainian Feeds.

Horn Antennas – Types, Optimum Horns, Design Characteristics of Pyramidal Horns; Lens Antennas – Geometry, Features, Dielectric Lenses and Zoning, Applications, Antenna Measurements – Patterns Required, Set Up, Distance Criterion, Directivity and Gain Measurements (Comparison, Absolute and 3-Antenna Methods).

UNIT VI

WAVE PROPAGATION: Concepts of Propagation – frequency ranges and types of propagations. Ground Wave Propagation–Characteristics, Parameters, Wave Tilt, Flat and Spherical Earth Considerations. Sky Wave Propagation – Formation of Ionospheric Layers and their Characteristics, Mechanism of Reflection and Refraction, Critical Frequency, MUF and Skip Distance – Calculations for flat and spherical earth cases, Optimum Frequency, LUHF, Virtual Height, Ionospheric Abnormalities, Ionospheric Absorption.

Fundamental Equation for Free-Space Propagation, Basic Transmission Loss Calculations. Space Wave Propagation – Mechanism, LOS and Radio Horizon. Tropospheric Wave

Propagation – Radius of Curvature of path, Effective Earth's Radius, Effect of Earth's Curvature, Field Strength Calculations, M-curves and Duct Propagation, Tropospheric Scattering.

TEXT BOOKS

1. Antennas for All Applications – John D. Kraus and Ronald J. Marhefka, 3rd Edition, TMH, 2003.

2. Elec tromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.

REFERENCES

1. Antenna Theory Analysis and Design - C.A. Balanis, John Wiley and Sons, 3rd Edition, 2013.

2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.

3. Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.

4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th Edition, 1955.

5. Antennas – John D. Kraus, McGraw-Hill, 2nd Edition, 1988.

OUTCOMES
After going through this course the student will be able to
- Identify basic antenna parameters.
- Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and microstrip antennas
- Quantify the fields radiated by various types of antennas
- Design and analyze antenna arrays
- Analyze antenna measurements to assess antenna's performance
- Identify the characteristics of radio wave propagation

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – I Semester

PULSE AND DIGITAL CIRCUITS LAB

Minimum Twelve experiments to be conducted:

1. Linear wave shaping.

2. Non Linear wave shaping – Clippers.

3. Non Linear wave shaping – Clampers.

4. Transistor as a switch.

5. Study of Logic Gates & Some applications.

6. Study of Flip-Flops & some applications.

7. Sampling Gates.

8. Astable Multivibrator.

9. Monostable Multivibrator.

10. Bistable Multivibrator.

11. Schmitt Trigger.

 12. UJT Relaxation Oscillator.

Equipment required for Laboratories:

 1. RPS - 0 – 30 V

2. CRO - 0 – 20 M Hz.

3. Function Generators - 0 – 1 M Hz

4. Digital Trainer Kits

5. Components

6. Multi Meters

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – I Semester

LIC APPLICATIONS LAB

Minimum Twelve Experiments to be conducted:

1.   Study of OP AMPs – IC 741, IC 555, IC 565, IC 566, IC 1496 – functioning, parameters and Specifications.

2.   OP AMP Applications – Adder, Subtractor, Comparator Circuits.

3.   Integrator and Differentiator Circuits using IC 741.

4.   Active Filter Applications – LPF, HPF (first order)

5.   Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.

6.   IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.

7.   Function Generator using OP AMPs.

8.   IC 555 Timer – Monostable Operation Circuit.

9.   IC 555 Timer – Astable Operation Circuit.

10.   Schmitt Trigger Circuits – using IC 741 and IC 555.

11.   IC 565 – PLL Applications.

12.   IC 566 – VCO Applications.

13.   Voltage Regulator using IC 723.

14.   Three Terminal Voltage Regulators – 7805, 7809, 7912.

Equipment required for Laboratories:
1.   RPS
2.   CRO
3.   Function Generator
4.   Multi Meters
5.   IC Trainer Kits (Optional)
6.   Bread Boards
7.   Components:- IC741, IC555, IC565, IC1496, IC723, 7805, 7809, 7912 and other essential components.
8.   Analog IC Tester

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – I Semester

DIGITAL SYSTEM DESIGN & DICA LAB

The students are required to Design and draw the internal structure of the following Digital Integrated Circuits and to develop VHDL Source code, Perform Simulation using relevant Simulator and analyze the obtained simulation results using necessary Synthesizer. Further, it is required to verify the logical operations of the Digital ICs (Hardware) in the Laboratory.

1.   Realization of Logic Gates

2.   3 to 8 Decoder -74138

3.   8 x 1 Multiplexer-74151 and 2x 4 De-multiplexer-74155

4.   4- Bit comparator-7485

5.   D Flip-Flop-7474

6.   Decade counter -7490

7.   4 Bit counter-7493

8.   Shift registers-7495

9.   Universal shift registers-74194/ 195

10.   RAM (16 x 4)-74189 (Read and Write operations)

11.   Stack and Queue implementation using RAM

12.   ALU Design

EQUIPMENT REQUIRED FOR LABORATORY

1.   Xilinx ISE Software.

2.   Digital ICs.

3.   Personal Computers.

4.   Necessary Hardware Kits.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – I Semester

IPR & PATENTS

It is common for all branches

Unit I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Regulatory – Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

Unit II

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of performers – Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law- Semiconductor Chip Protection Act.

Unit III

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

Unit IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law

Unit V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law.

Unit VI

Introduction to Cyber Law – Information Technology Act - Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy - International aspects of Computer and Online Crime.

REFERENCE BOOKS:

1. Deborah E.Bouchoux: "Intellectual Property". Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections
4. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
7. M.Ashok Kumar and Mohd.Iqbal Ali: "Intellectual Property Right" Serials Pub.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – II Semester

MICROPROCESSORS AND MICROCONTROLLERS

OBJECTIVES
The student will be able to
- Learn concepts of microprocessors, different addressing modes and programming of Various Microprocessors (8086, 80386, 80486, Pentium etc.)
- Understand interfacing of 8086, with memory and other peripherals.
- learn concept of DMA, USART RS-232 and PIC controller.
- Study the features of 8051 Microcontroller, its instruction set, Interfacing and also other controllers.

UNIT-I: 8086 MICROPROCESSOR
Register organization of 8086, Architecture, signal description of 8086, physical memory organization, general bus operation, I/O addressing capability, special purpose activities, Minimum mode, maximum mode of 8086 system and timings, machine language instruction formats, addressing modes and instruction set of 8086, assembler directives and operators.

UNIT-II: PROGRAMMING WITH 8086 MICROPROCESSOR
Machine level programs, programming with an assembler, Assembly language programs, introduction to stack, stack structure of 8086, interrupts and interrupt service routines, interrupt cycle of 8086, non-maskable interrupt and maskable interrupts, interrupt programming.

UNIT-III: BASIC AND SPECIAL PURPOSE PROGRAMMABLE PERIPHERALS AND THEIR INTERFACING WITH 8086
Semiconductor memory interfacing, dynamic RAM interfacing, interfacing i/o ports, PIO 8255 modes of operation of 8255, interfacing to D/A and A/D converters, stepper motor interfacing, control of high power devices using 8255, Programmable interrupt controller 8259A, the keyboard /display controller 8279, programmable communication interface 8251 USART, DMA Controller 8257.

UNIT-IV: ADVANCED MICROPROCESSORS
Salient features of 0386DX, architecture and signal description of 80386, register organization of 80386 and addressing modes, data types of 80386, real address mode of 80386, protected mode of 80386, segmentation and Paging, virtual 8086 mode and enhanced mode. Instruction set of 80386, Comparison of 80386 with 80486.

UNIT-V: 8051 MICROCONTROLLER
Introduction to microcontrollers, 8051 Microcontrollers, 8051 pin description, connections, I/O ports and memory organization, MCS51 addressing modes and instructions, assembly language programming tools.

UNIT-VI: PIC MICROCONTROLLERS AND ARM 32-BIT MICROCONTROLLER
Overview and features, PIC16Cx/7X instructions, interrupts in PIC 16C61/71, PIC 16F8XX Flash controllers, I/O ports and timers. Introduction to 16/32 Bit processors, ARM architecture and organization, ARM / Thumb programming model, ARM / Thumb instruction set.

TEXT BOOKS:
1. "Microprocessor and Interfacing", Douglas V. Hall
2. A.K.Ray, K.M.Bhurchandi ,"Advanced Microprocessors and Peripherals", Tata McGraw Hill Publications,2000.

REFERENCES:
1. N.Sentil   Kumar,   M.Saravanan,   S.Jeevananthan,   "Microprocessors   and Microcontrollers", Oxford University Press,2010
2. Ajay V Deshmukh,"Microcontrollers", TATA McGraw Hill publications, 2012.
3. Krishna Kant, "Microprocessors and Microcontrollers", PHI Publications, 2010.

OUTCOMES
After going through this course the student will be able to
- Write programs for different addressing modes.
- perform 8086 interfacing with different peripherals and implement programs
- describe the key features of serial and parallel communication and able to
- Design a microcontroller for simple applications.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – II Semester

DIGITAL SIGNAL PROCESSING

OBJECTIVES
The student will be able to

- Define and use Discrete Fourier Transforms (DFTs)
- Use Z - transforms and discrete time Fourier transforms to analyze a digital system.
- Understand and Design FIR, IIR filters
- Know the Concepts of Multirate Digital Signal Processing.

UNIT I
INTRODUCTION: Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

UNIT II
DISCRETE FOURIER SERIES &FOURIER TRANSFORMS: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT,Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT III
REALIZATION OF DIGITAL FILTERS: Review of Z-transforms, Applications of Z – transforms, solution of difference equations of digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function,

UNIT IV
IIR & FIR DIGITAL FILTERS: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from anal`og filters, Design Examples: Analog-Digital transformations Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT V
MULTIRATE DIGITAL SIGNAL PROCESSING: Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion, multi-stage implementation of sampling rate conversion, Related Problems.

UNIT VI

INTRODUCTION TO DSP PROCESSORS: Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC), Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory,multiport memory, VLSI rchitecture, Pipelining, Special addressing modes, On-Chip Peripherals. Architecture of TMS 320C5X-Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Registrar,Index Registrar, Auxiliary Registger Compare Register, Block Move Address Register, Parallel Logic Unit,Memory mapped registers, program controller, Some flags in the status registers, On- chip registers, On-chip peripherals

TEXT BOOKS:
1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G.Manolakis,Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A.V. Oppenheim and R.W. Schaffer, PHI
3. Digital Signal Processors – A**vatar singh and Srinivasan**

Reference Books:
1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill, 2006
2. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
3. DSP Primer - C. Britton Rorabaugh, Tata McGraw Hill, 2005.
4. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris,Thomson, 2007.
5. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006

OUTCOMES
After going through this course the student will be able to
- Understand discrete time signal processing and characterization of signals, filter design techniques, and imperfections caused by finite word length.
- Estimate the spectra of signals that are to be processed by a discrete time filter, and to verify the performance of a variety of modern and classical spectrum estimation techniques.
- Design and simulate a digital filter
- Understand and design new digital signal processing systems.
- Design and realize FIR, IIR filters

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – II Semester

DIGITAL COMMUNICATIONS

OBJECTIVES
The student will be able to
- understand pulse digital modulation systems such as PCM,DPCM and DM
- understand various digital modulation techniques and able to analyze various systems for their performance in terms of probability of error
- understand the concept of Information Measure, entropy and source coding
- understand Error Control Codes.

UNIT I
PULSE DIGITAL MODULATION: Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM).Delta modulation (DM) and its drawbacks, Adaptive delta modulation, comparison of PCM, DM, DPCM and ADM systems, noise in PCM and DM systems.

UNIT II
DIGITAL MODULATION TECHNIQUES: Introduction, ASK, FSK, PSK, DPSK, DEPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK, Comparison of different Modulations.

UNIT III
DATA TRANSMISSION : Baseband signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent and non-coherent detection, calculation of error probability of ASK, BPSK, BFSK and QPSK. Eye diagrams.

UNIT IV
INFORMATION THEORY: Discrete messages, concept of amount of information and its properties, Average information, Entropy and its properties. Information rate, Mutual information and its properties.

UNIT V
SOURCE CODING: Introduction, Advantages, Shannon's theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth –S/N trade off.

UNIT VI
LINEAR BLOCK CODES: Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH Codes.
CONVOLUTIONAL CODES: Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram, Viterbi decoding algorithm.

TEXT BOOKS:
1. Digital communications - Simon Haykin, John Wiley, 2005
2. Principles of Communication Systems – H. Taub and D. Schilling, TMH,2003.

REFERENCES:
1. Digital and Analog Communication Systems - Sam Shanmugam, John Wiley, 2005.
2. Digital Communications – John Proakis, TMH, 1983.
3. Electronic Communication Systems – Tomasi.
4. Modern Analog and Digital Communication – B.P.Lathi, Oxford reprint, 3rd edition, 2004.
5. Digital Communications – J. Das et al.

OUTCOMES
After going through this course the student will be able to
• analyze the performance of a Digital Communication System for probability of error and are able to design a digital communication system
• Understand and able to analyze various source coding techniques
• Compute and analyze Block codes, cyclic codes and convolution codes
• Understand the basics of information theory and error correcting codes.
• Design a coded communication system

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – II Semester

<u>MICROWAVE ENGINEERING</u>

OBJECTIVES

The student obtains the

- fundamental understanding of electrical characteristics of waveguides and transmission lines through electromagnetic field analysis.

- Ability to analyze and design various waveguides and cavity, strip lines and microstrip lines and familiarize the students with various coupling mechanisms used in waveguides.

- Understanding of the basic properties of Polarization and Ferrite materials composition in the case of waveguide components.

- Understanding of the multiport junction concept for splitting the microwave energy in a desired direction.

- Understanding of the function, design, and integration of the major microwave components like oscillator, modulator, power amplifier, filter, and mixer in building a Microwave test bench setup for measurements.

UNIT I

MICROWAVE TRANSMISSION LINES: Introduction, Microwave Spectrum and Bands, Applications ofMicrowaves. Rectangular Waveguides – TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Sketches of TEand TM mode fields in the cross-section, Mode Characteristics – Phase and Group Velocities, Wavelengthsand Impedance Relations; Power Transmission and Power Losses in Rectangular Guide,Impossibility of TEM mode. Illustrative Problems.

UNIT II
Microstrip Lines– Introduction, Zo Relations, Effective Dielectric Constant,Losses, Q factor.
Cavity Resonators– Introduction, Rectangular and Cylindrical Cavities, Dominant Modesand Resonant Frequencies, Q factor and Coupling Coefficients, Excitation techniques-waveguides and cavities, Illustrative Problems.
Coupling Mechanisms – Probe, Loop, Aperturetypes. Waveguide Discontinuities – Waveguide irises, Tuning Screws and Posts.

UNIT III
WAVEGUIDE COMPONENTS AND APPLICATIONS:,. WaveguideAttenuators – Resistive Card, Rotary Vane types; Waveguide Phase Shifters – Dielectric, Rotary Vane types. Matched Loads. Scattering Matrix – Significance, Formulation and Properties. S-Matrix Calculations for – 2 port Junction, E-plane and H-plane Tees, Magic Tee, Hybrid Ring; Directional Couplers – 2Hole, Bethe Hole types, Ferrite Components– Faraday Rotation, S-Matrix Calculations for Gyrator, Isolator, Circulator, Illustrative Problems.

UNIT - IV
MICROWAVE TUBES: Limitations and Losses of conventional tubes at microwave frequencies.
Microwave tubes – O type and M type classifications. O-type tubes : 2 Cavity Klystrons – Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory –Expressions for o/p Power and Efficiency. Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency, Electronic Admittance; Oscillating Modes and o/p Characteristics, Electronic and Mechanical Tuning, Illustrative Problems.

UNIT V
HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Suppression of Oscillations, Nature of the four Propagation Constants.
M-type Tubes: Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.

UNIT VI
MICROWAVE SOLID STATE DEVICES: Introduction, Classification, Applications. TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Oscillation Modes. Avalanche Transit Time Devices – Introduction, IMPATT and TRAPATT Diodes – Principle of Operation and Characteristics.
MICROWAVE MEASUREMENTS: Description of Microwave Bench – Different Blocks and their Features, Precautions; Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Cavity Q. Impedance Measurements.

TEXT BOOKS:

1. Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition, 1994.
2. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004.

REFERENCES:
1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
2. Microwave Engineering- D.M.Pozar, 3rd Edition

3. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., NewAge International Publishers Ltd., 1995.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th ed., 1955.
5. Microwave and Radar engineering – Kulakarni

OUTCOMES

After going through this course the student will

- Gain knowledge of transmission and waveguide structures and how they are used as elements in impedance matching and filter circuits.
- Apply analysis methods to determine circuit properties of passive or active microwave devices.
- Design passive and active circuits like couplers, dividers, filters, amplifiers and oscillators using microstrip technology
- Gain knowledge and understanding of microwave analysis methods.
- Characterize Microwave devices in terms of the directionality of communication.
- Analyze and measure various microwave parameters using a Microwave test bench

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – II Semester

<u>**OPEN ELECTIVE**</u>

<u>**ARTIFICIAL NEURAL NETWORK & FUZZY LOGIC**</u>

OBJECTIVES

- To expose the students to the concepts of feed forward neural networks.

- To provide adequate knowledge about feedback neural networks.

- To teach about the concept of fuzziness involved in various systems.

- To provide adequate knowledge about fuzzy set theory.

- To provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.

- To provide adequate knowledge of application of fuzzy logic control to real time• systems.

UNIT-I:

Introduction Biological Neural Networks, Characteristics of Neural Networks, Models of Neuron, Basic Learning Rules, Stability & Convergence

UNIT-II:

Supervised Learning Neural Networks Adaptive networks, Adaline and madaline, Single layer and multi layer perceptrons Radial basis function networks, Modular neural networks

UNIT-III:

Feedback Neural Networks Analysis of linear auto adaptive feed forward networks, Analysis of pattern storage Networks, Stochastic Networks & Stimulated Annealing, Boltzman machine

UNIT-IV:

 Unsupervised Learning Networks Competitive learning, Kohonen self-organizing maps, learning vector quantization Principal component analysis of Hebbian Learning, Adaptive Resonance Theory

UNIT-V:

Architectures for Pattern Recognition Associative memory, Pattern mapping, Stability – Plasticity dilemma, ART, temporal patterns, Pattern visibility: Neocognitron

UNIT-VI:

Applications of Neural Networks Pattern classification, Associative memories, Optimization, Applications in Image Processing, Applications in decision making

Fuzzy Set Theory Introduction to Fuzzy Set with Properties, Fuzzy Relations, Fuzzy Arithmetic, Fuzzy Logic, Applications and Fuzzy Control

Text Books

1. B. Yegnanarayana, "Artificial Neural Networks", PHI

2. James A Freeman, David M Skapura, "Neural Networks-Algorithms, Applications and Programming Techniques," Person Education B.E._ETC09.doc - 20 – 20

Ref. Books

1. Anderson, "An introduction to Artificial Neural Networks", Prentice Hall

2. William J Palm III, "Introduction to MATLAB 7 for Engineers," TMH

3. G. J. KLIR, B. Yuan, "Fuzzy Set Theory", 1997 PHI.

4. W. Petryez "Fuzzy Sets Engineering", CRL Press 1995.

OUTCOMES

- Gain the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling real time systems.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – II Semester

DIGITAL IMAGE PROCESSING

OBJECTIVES

The student will be able to
- Learn the fundamental concepts of Digital Image and Various Image Transforms, applications of Digital Image Processing.
- Learn the concepts of Filtering in Spatial Domain and Frequency Domain.
- Understand the concepts of Image restoration and reconstruction.
- Understand the concepts of different color models and Color image processing.
- Understand the concepts of Wavelets and multi-resolution processing, Image compression Techniques
- Watermarking, Morphological image processing, Image segmentation, Representation and description.

UNIT-I
Introduction: Introduction to Image Processing, components of an image processing system, Elements of visual perception, light and electromagnetic spectrum, imaging sensing and acquisition, image sampling and quantization. Some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing
Image Transforms: Need for image transforms, Spatial Frequencies in image processing. Sampling and the Fourier transform of sampled functions, the discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, FFT Algorithm, Discrete Cosine transforms. Walsh Transform. Hadamard transform, Haar Transform. Slant transforms, SVD and KL Transforms.

UNIT-II
Intensity Transformations and Spatial Filtering: Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters, combining spatial enhancement methods, using fuzzy techniques for intensity transformations and spatial filtering
Filtering in the frequency domain: Preliminary concepts, The Basic of filtering in the frequency domain, image smoothing using frequency domain filters, Selective filtering, Implementation

UNIT-III
Image restoration and Reconstruction: A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimation the degradation function, Inverse filtering, Minimum mean square error(Wiener) filtering ,constrained least squares filtering ,geometric mean filtering ,image reconstruction from projections.

Unit-IV
Color image processing: color fundamentals, color models, pseudo color image processing, basic of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images.
Image segmentation: Fundamentals, point, line, edge detection thresholding, region –based segmentation, segmentation using Morphological watersheds, the use of motion in segmentation

Unit-V
Wavelets and Multi-resolution Processing: image pyramids, sub-band coding & Haar transforms multiresolution expressions, wavelet transforms in one dimensions. The fast wavelets transform, wavelet transforms in two dimensions, wavelet packets.
Image compression: Fundamentals, various compression methods, coding techniques, color image compression, Digital image watermarking

Unit-VI
Morphological image processing: preliminaries Erosion and dilation, opening and closing, the Hit-or-miss transformation, some Basic Morphological algorithms, grey –scale morphology, Applications: Feature extraction, Thinning

Text Books
1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.

Reference Books
1. R. C. Gonzalez, R. E. Woods and Steven L. Eddins , Digital Image Processing Using MATLAB, 2rd edition, Prentice Hall, 2009.
2. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th Edition,   Indian Reprint, 2002.
3. Jayaraman, S. Esakkirajan, and T. Veerakumar, Digital Image Processing, Tata McGraw-Hill Education, 2011

OUTCOMES

After going through this course the student will be able to
- Perform different transforms on image useful for image processing applications
- Perform spatial and frequency domain filtering on image and can implement all smoothing and sharpening operations on images
- Perform image restoration operations/techniques on images
- Operate effectively on color images and different color conversions on images and can code images to achieve good compression
- Do wavelet based image processing and image compression using wavelets
- Perform all morphological operations on images and can be able to do image segmentation also.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – II Semester

PRINCIPLES OF SIGNALS, SYSTEMS AND COMMUNICATIONS
(OPEN ELECTIVE)

UNIT – I
Signal Analysis: Introduction, Fourier Series - Trigonometric Fourier Series,Complex Exponential Fourier Series; Complex Fourier Spectrum – Time Domainand Frequency Domain Representation of a Signal; Fourier Transform -Analysis of a Non Periodic Function over entire interval; Fourier TransformInvolving Impulse Function; Properties of Fourier Transform andSignificance- Convolution Integral, Fourier Transform of Periodic Functions.
Linear Systems: Introduction; System Function – Representation of a system and its response, Definition of System Function;Distortion-less Transmission – Bandwidth of a system, Rise Time and System Bandwidth; Energy Signals and Power Signals, Energy and Power SpectralDensities; Correlation – Cross and Auto Correlation and their properties.

UNIT – II
Amplitude Modulation: Introduction to Communication System, Need forModulation, Types of Amplitude Modulations, AM-SC- DSB-SC & SSB-SC,AM- DSB, SSB & VSB, Power and BW requirements, Generation of AM,DSB-SC, SSB-SC; Demodulation of AM-: Diode detectors.
Angle Modulation: Frequency & Phase Modulations, Advantages of FMover AM, Bandwidth consideration, Narrow band and Wide band FM,Comparison of FM & PM, FM Modulators – Direct Method and Indirect orArmstrong method of generations; FM Demodulators- Slope Detection,Balanced Slope, Foster Seeley and Ratio Detectors.

UNIT – III
Pulse Modulations: Sampling Theorem – Nyquist Interval, Aliasing, Signalrecovery from its sampled version; Flat Top and Natural Sampling, PAM: PAMModulation and Demodulation, PWM and PPM, Time DivisionMultiplexing, Frequency Division Multiplexing and Comparison betweenTDM and FDM.

UNIT – IV
Pulse Code Modulations: Digital Representation of Analog Signal-Quantization of Signals, Quantization Error, Pulse Code Modulation- PCMSystem, Line Codes and their properties, Delta Modulation, Adaptive DMand comparisons.

UNIT – V
Digital Modulation: ASK, FSK, PSK and DPSK, QPSK demodulation,Coherent and Non-coherent Reception, Comparison of Binary and QuaternaryModulation Schemes, M-ary modulation techniques.

UNIT – VI

Advanced Communication Systems: Telephone Switching, ComputerCommunication, Optical Communications, Mobile Telephone Communication– The Cellular Concept, Satellite Communications, RADAR Systems.

TEXT BOOKS:
1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 2nd Edition, 2008
2. Principles of Communication Systems- H. Taub and D. Schilling, TMH, 2003.
REFERENCE BOOKS:
1. Modern Digital and Analog Communication Systems – B.P. Lathi, Oxford 3rd Edition
2. Communication Systems – Simon Haykin, John Wiley, 3rd Edition
3. Digital and Analog Communication Systems – K Sam Shanmugam, WSE, 2006
4. Electronic & Communication Systems – Kennedy and Davis, TMH, 4th Edition, 2004.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – II Semester

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

OBJECTIVES

The student will be introduced to

- Static and Dynamic characteristics of instruments
- Designing Principles of various instruments
- various types of analyzers and signal generators
- Concepts of oscilloscopes and its applications.
- Principles of different transducers for measurement of different parameters

UNIT I

Performance characteristics of instruments, Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error. DC Voltmeters-multirange, Range extension/Solid state and differential voltmeters, AC voltmeters- multi range, range extension, shunt. Thermocouple type RF ammeter, Ohmmeters series type, shunt type, Multimeter for Voltage, Current and resistance measurements.

UNIT II

Signal Generator- fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

UNIT III

Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line,sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, . Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO, probes for CRO- Active & Passive, attenuator type.

UNIT IV

AC Bridges Measurement of inductance- Maxwell's bridge, Anderson bridge. Measurement of capacitance -Schearing Bridge. Wheat stone bridge. Wien Bridge, Errors and precautions in using bridges. Q-meter.

UNIT V

Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.

UNIT VI

Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, proximity and displacement. Data acquisition systems.

TEXTBOOKS :

1. Electronic instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 2004.

REFERENCES :

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2nd Edition, 2003.

2. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, Pearson Education, 2nd Ed., 2004.

3. Measurement systems -Doeblin

OUTCOMES

The student will be able to

- Select the instrument to be used based on the requirements.
- Understand and analyze different signal generators and analyzers.
- Understand the design of oscilloscopes for different applications.
- Design different transducers for measurement of different parameters.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – II Semester

MICROPROCESSORS AND MICROCONTROLLERS LAB

The students are required to develop the necessary Algorithm, Flowchart and Assembly Language Program Source Code for executing the following functions using MASM/TASM software and to verify the results with necessary Hardware Kits.

PART-I: MICROPROCESSOR 8086
1. Introduction to MASM/TASM.
2. Arithmetic operation- Multi byte Addition and Subtraction, Multiplication and Division- Signed and unsigned Arithmetic operation, ASCII- Arithmetic operation.
3. Logic operations-Shift and rotate- Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
5. DOS/BIOS programming: Reading keyboard (Buffered with and without echo)- Display characters, Strings.

PART-II: INTERFACING WITH MICROPROCESSOR
1. 8259 – Interrupt Controller-Generate an interrupt using 8259 timer.
2. 8279 – Keyboard Display- Write a program to display a string of characters.
3. 8255 – PPI-Write ALP to generate sinusoidal wave using PPI.
4. 8251 – USART-Write a program in ALP to establish Communication between two processors.

PART-III: MICROCONTROLLER 8051
1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.

PART-IV: INTERFACING WITH MICROCONTROLLER
Write C programs to interface 8051 chip to Interfacing modules to Develop single chip solutions.

1. Simple Calculator using 6 digit seven segment display and Hex Keyboard interface to 8051.
2. Alphanumeric LCD panel and Hex keypad input interface to 8051.
3. External ADC and Temperature control interface to 8051.
4. Generate different waveforms Sine, Square, Triangular, and Rampetc. using DAC interface to 8051; change the frequency and Amplitude.

EQUIPMENT REQUIRED FOR LABORATORY
1.   MASM/TASM software
2.   8086 Microprocessor Kits
1.   8051 Micro Controller kits
2.   Interfaces/peripheral subsystems
        i) 8259 PIC
        ii) 8279-KB/Display
        iii) 8255 PPI
        iv) 8251 USART
3.   A/D and D/AC Interface

                              ***

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – II Semester

DIGITAL COMMUNICATIONS LAB

1.   Pulse Amplitude Modulation and demodulation.

2.   Pulse Width Modulation and demodulation.

3.   Pulse Position Modulation and demodulation.

4.   Sampling Theorem – verification.

5.   Time division multiplexing.

6.   Pulse code modulation.

7.   Differential pulse code modulation.

8.   Delta modulation.

9.   Frequency shift keying.

10.   Phase shift keying .

11.   Differential phase shift keying.

12.   Companding

Equipment required for Laboratories:

1.   RPS - 0 – 30 V
2.   CRO - 0 – 20 M Hz.
3.   Function Generators - 0 – 1 M Hz
4.   RF Generators - 0 – 1000 M Hz./0 – 100 M Hz.
5.   Multimeters
6.   Lab Experimental kits for Digital Communication
7.   Components
8.   Radio Receiver/TV Receiver Demo kits or Trainees.

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UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
III Year B. Tech Electronics and Communication Engineering – II Semester

DIGITAL SIGNAL PROCESSING LAB

LIST OF EXPERIMENTS:
Part-I (DSP using MATLAB)

1. Generation of Basic discrete and continuous time signals and basic operations on them.

2. To generate sum of two sinusoidal signals using MATLAB.

3. Linear and circular convolution of two sequences.

4. Calculation of DFT,IDFT and verifying the properties.

5. Realization of filter structures (a) ladder form (b) Parallel form.

6. Design of IIR filters using Bilinear and backward transforms.

7. Design of FIR filters using rectangular, triangular, Kaiser, hamming, hanning windows.

8. Finding the frequency response of filters for a given transformation.

9. Finding Discrete Fourier series of a given sequence and verifying the properties.

Part-II (DSP Processors)

1. Study of basic architecture of TMS320C6713.

2. To generate sinusoidal signal using DSP processors.

3. Implementation of linear convolution, circular convolution on DSP processors.

4. Implementation of IIR Filters on DSP Processors.

5. Implementation of FIR filters on DSP Processors.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

VLSI DESIGN

OBJECTIVES

The student will be introduced to

- Use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnects.
- Learn the various fabrication steps of IC and come across basic electrical properties of MOSFET.
- Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect and to verify the functionality, timing, power and parasitic effects.
- The concepts and techniques of modern integrated circuit design and testing (CMOS VLSI).
- Design static CMOS combinational and sequential logic at the transistor level, including mask layout.

Unit-I:
Introduction : Introduction to IC Technology, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, IC production process, MOS and CMOS Fabrication processes, BiCMOS Technology, Comparison between CMOS and Bipolar technologies.

Basic Electrical Properties Of MOS and Bi-CMOS Circuits: I_{ds} versus V_{ds} Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. The Pass transistor, NMOS Inverter, Pull-up to Pull-down Ratio for NMOS inverter driven by another NMOS inverter. Alternative forms of pull-up, The CMOS Inverter, MOS transistor circuit model, Bi-CMOS Inverter, Latch-up in CMOS circuits and BiCMOS Latch-up Susceptibility.

Unit-II:
MOS and Bi-CMOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2µm Double Metal, Double Poly, CMOS/BiCMOS rules, 1.2µm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams-Translation to Mask Form.

Unit-III:
Basic Circuit Concepts: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, The Delay Unit, Inverter Delays, Propagation Delays, Wiring Capacitances, Fan-in and fan-out

characteristics, Choice of layers, Transistor switches, Realization of gates using NMOS, PMOS and CMOS technologies.

Scaling Of MOS Circuits: Scaling models, Scaling factors for device parameters, Limits due to sub threshold currents, current density limits on logic levels and supply voltage due to noise. Introduction to Switch Logic and Gate Logic.

Unit-IV:

Subsystem Design: Architectural issues, switch logic, Gate logic, examples of structured design, clocked sequential circuits, system considerations, general considerations of subsystem design processes, an illustration of design processes.

Unit-V:

Vlsi Design Issues: VLSI Design issues and design trends, design process, design for testability, technology options, power calculations, package selection, clock mechanisms, mixed signal design, introduction to SoC design.

Unit-VI:

FPGA Design: Basic FPGA architecture, , FPGA configuration, configuration modes, FPGA design process- FPGA design flow, FPGA families, FPGA design examples, step-by-step approach of FPGA design process on Xilinx environment, ASIC design flow.

Text Books:
1. Essentials of VLSI Circuits and Systems - Kamran Eshraghian, Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of India Private Limited, 2005 Edition.
2. VLSI Design-Black Book By Dr. K.V.K.K. Prasad, Kattula Shyamala, Kogent Learning Solutions Inc.2012 Edition.

References:

1. VLSI Design By A.Albert Raj & T.Latha,PHI Learning Private Limited,2010.
2. VLSI Design-A.Shanthi and A.Kavita, New Age International Private Limited, 2006 First Edition.

OUTCOMES

After going through this course the student will be able to

- Apply the Concept of design rules during the layout of a circuit.
- Model and simulate digital VLSI systems using hardware design language.
- Synthesize digital VLSI systems from register-transfer or higher level descriptions
- Understand current trends in semiconductor technology, and how it impacts scaling and performance.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

COMPUTER NETWORKS

Objectives
The aim of this course is to introduce key concepts and principles of computer networks. The course will use a top-down approach to study the Internet and its protocol stack. Instances of architecture, protocol, application-examples will include email, web and media-streaming. We will cover communications services (e.g., TCP/IP) required to support such network applications. The implementation and deployment of communications services in practical networks: including wired and wireless LAN environments, will be followed by a discussion of issues of network-security and network-management, throughout the course, the Internet's architecture and protocols will be used as the primary examples to illustrate the fundamental principles of computer networking.

UNIT I
INTRODUCTION
OSI, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies Wireless Area Network (WAN), Local Area Network (LAN), MAN.

UNIT II
PHYSICAL LAYER
Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications; Narrow band, broad band ISDN and ATM.

UNIT III
DATA LINK LAYER
Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window. Medium Access Sub Layer: ALOHA, MAC addresses, Carrier sense multiple access, IEEE 802.X Standard Ethernet, wireless LANS, Bridges.

UNIT IV
NETWORK LAYER
Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing. **DYNAMIC ROUTING:** Broadcast routing. Rotary for mobility, Congestion, Control Algorithms – General Principles of Congestion prevention policies. Internetworking: The Network layer in the internet and in the ATM Networks.

UNIT V
TRANSPORT LAYER
Transport Services, Connection management, TCP and UDP protocols; ATM AAL Layer Protocol.Application layer: Network Security, Domain name system, SNMP, Electronic Mail; the World WEB, Multi Media.

UNIT VI
APPLICATION LAYER
 Network Security, Domain name system, SNMP, Electronic Mail; the World WEB, Multi Media.

TEXT BOOKS
1. Computer Networks – Tenanbaum, Pearson Education, IV Edition.
2. Data Communications and Networking – Behrouz A. Forouzan.Third Edition, TMH.

REFERENCES
1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition,Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson
3. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI

Outcomes:

- Be able to analyse a communication system by separating out the different functions provided by the network and some example networks
- Understand various network topologies required for communication
- Understand that there are fundamental limits to any communications system
- Understand the general principles behind, addressing, routing, reliable transmission and other stateful protocols as well as specific examples of each
- Have an informed view of both the internal workings of the Internet and of a number of common Internet applications and protocols

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

DIGITAL IMAGE PROCESSING

OBJECTIVES
The student will be able to
- Learn the fundamental concepts of Digital Image and Various Image Transforms, applications of Digital Image Processing.
- Learn the concepts of Filtering in Spatial Domain and Frequency Domain.
- Understand the concepts of Image restoration and reconstruction.
- Understand the concepts of different color models and Color image processing.
- Understand the concepts of Wavelets and multi-resolution processing, Image compression Techniques
- Watermarking, Morphological image processing, Image segmentation, Representation and description.

UNIT-I
Introduction: Introduction to Image Processing, components of an image processing system, Elements of visual perception, light and electromagnetic spectrum, imaging sensing and acquisition, image sampling and quantization. Some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing
Image Transforms: Need for image transforms, Spatial Frequencies in image processing. Sampling and the Fourier transform of sampled functions, the discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, FFT Algorithm, Discrete Cosine transforms. Walsh Transform. Hadamard transform, Haar Transform. Slant transforms, SVD and KL Transforms.

UNIT-II
Intensity Transformations and Spatial Filtering: Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters, combining spatial enhancement methods, using fuzzy techniques for intensity transformations and spatial filtering
Filtering in the frequency domain: Preliminary concepts, The Basic of filtering in the frequency domain, image smoothing using frequency domain filters, Selective filtering, Implementation

UNIT-III
Image restoration and Reconstruction: A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimation the degradation function, Inverse filtering, Minimum mean square error(Wiener) filtering ,constrained least squares filtering ,geometric mean filtering ,image reconstruction from projections.

Unit-IV
Color image processing: color fundamentals, color models, pseudo color image processing, basic of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images.
Image segmentation: Fundamentals, point, line, edge detection thresholding, region –based segmentation, segmentation using Morphological watersheds, the use of motion in segmentation

Unit-V
Wavelets and Multi-resolution Processing: image pyramids, sub-band coding & Haar transforms multiresolution expressions, wavelet transforms in one dimensions. The fast wavelets transform, wavelet transforms in two dimensions, wavelet packets.
Image compression: Fundamentals, various compression methods, coding techniques, color image compression, Digital image watermarking

Unit-VI
Morphological image processing: preliminaries Erosion and dilation, opening and closing, the Hit-or-miss transformation, some Basic Morphological algorithms, grey –scale morphology, Applications: Feature extraction, Thinning

Text Books
2. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.

Reference Books
1. R. C. Gonzalez, R. E. Woods and Steven L. Eddins , Digital Image Processing Using MATLAB, 2rd edition, Prentice Hall, 2009.
2. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th Edition,   Indian Reprint, 2002
3. Jayaraman, S. Esakkirajan, and T. Veerakumar, Digital Image Processing, Tata McGraw-Hill Education, 2011

OUTCOMES
After going through this course the student will be able to
  • Perform different transforms on image useful for image processing applications
  • Perform spatial and frequency domain filtering on image and can implement all smoothing and sharpening operations on images
  • Perform image restoration operations/techniques on images
  • Operate effectively on color images and different color conversions on images and can code images to achieve good compression
  • Do wavelet based image processing and image compression using wavelets
  • Perform all morphological operations on images and can be able to do image segmentation also.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

COMPUTER ARCHITECTURE AND ORGANIZATION

Objectives

The aim of this course is to provide a comprehensive coverage of computer architecture and organization. It discusses the main components of the computer and the basic principles of its operation. It demonstrates the relationship between the software and the hardware and focuses on the foundational concepts that are the basis for current computer design. The course is based on the MIPS processor, a simple clean RISC processor whose architecture is easy to learn and understand.

UNIT-I
BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data types, Complements, Data Representation, Fixed Point Representation, Floating–Point Representation, Error Detection codes.
COMPUTER ARITHMETIC: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT-II
REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language. Register transfer, Bus and memory transfer, Arithmetic mircrooperatiaons, logic micro operations, shift mircrooperatiaons, Arithmetic logic shift unit, Instruction codes, Computer Registers, Computer instructions –Instruction cycle, Memory Reference Instructions, Input Output and Interrupt. **CENTRAL PROCESSING UNIT -** Stack organization. Instruction formats, addressing modes, data transfer and manipulation, Program control, Reduced Instruction set computer

UNIT-III
MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, micro program example, Design of control unit-Hard wired control. Micro programmed control

UNIT-IV
THE MEMORY SYSTEM: Memory Hierarchy, Main memory, Auxiliary memory, Associative
memory, Cache memory, Virtual memory, Memory management hardware

UNIT-V
INPUT-OUTPUT ORGANIZATION: Peripheral Devices, Input-Output Interface, Asynchronous data transfer modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP), Serial communication;

UNIT-VI
PIPELINE AND VECTOR PROCESSING: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.
Multi processors: Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration. Interprocessor Communication and Synchronization, Cache Coherence.

TEXT BOOKS:
1. Computer Organization and Architecture – William Stallings, Seventh Edition, PHI/Pearson, 2006.
2. Computer Organization – Car Hamacher, Zvonks Vranesic, Safwat Zaky, V Edition, Mc.Graw Hill, 2002.

REFERENCE:
1. Computer System Architecture – M.Moris Mano, IIIrd Edition, PHI / Pearson, 2006.
2. Computer Architecture and Organization – John P. Hayes, Mc Graw Hill International Editions, 1998.

Outcomes
- Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
- Understand the principles and the implementation of computer arithmetic and ALU.
- Understand the memory system, I/O organization
- Understand the operation of modern CPUs including interfacing, pipelining, memory systems and busses.
- Understand the principles of operation of multiprocessor systems.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

ELECTRONIC SWITHCHING SYSTEMS

OBJECTIVES

The student will
- Understand the means of measuring traffic.
- Understand the implication of the traffic level on system design.

UNIT -I:
Introduction: Evolution of Telecommunications, Simple Telephone Communication, Basics of Switching System, Manual Switching System, Major Telecommunication Networks.
Crossbar Switching: Principles of Common Control, Touch Tone Dial Telephone, Principles of Crossbar Switching, Crossbar Switch Configurations, Cross point Technology, Crossbar Exchange Organization.

UNIT -II:
Electronic Space Division Switching: Stored Program Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-Stage Networks, Three-Stage Networks, n- Stage Networks.
Time Division Switching: Basic Time Division Space Switching, Basic Time Division Time Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching, Three-Stage Combination Switching, n- Stage Combination Switching.

UNIT -III:
Telephone Networks: Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signaling Techniques, In-channel Signaling, Common Channel Signaling, Cellular Mobile Telephony
Signaling: Customer Line Signaling, Audio- Frequency Junctions and Trunk Circuits, FDM Carrier Systems, PCM Signaling, Inter- Register Signaling, Common- Channel Signaling Principles, CCITT Signaling System no.6, CCITT Signaling System no.7,Digital Customer Line Signaling.

UNIT -IV:
Packet Switching: Statistical Multiplexing, Local- Area and Wide- Area Networks, Large-scale Networks, Broadband Networks.
Switching Networks: Single- Stage Networks, Grading, Link Systems, Grades of service of link systems, Application of Graph Theory to link Systems, Use of Expansion, Call Packing, Rearrange-able Networks, Strict- Sense non-blocking Networks, Sectionalized Switching Networks

UNIT -V:

Telecommunications Traffic: The Unit of Traffic, Congestion, Traffic Measurement, A Mathematical Model, Lost-call Systems, Queuing Systems.

Integrated Services Digital Network: Motivation for ISDN, New Services, Network and Protocol Architecture, Transmission Channels, User- Network Interfaces, Signaling, Numbering and Addressing, Service Characterization, Interworking, ISDN Standards, Expert Systems in ISDN, Broadband ISDN, Voice Data Integration.

TEXT BOOKS:
1. Telecommunication Switching Systems and Networks- Thiagarajan Viswanathan, 2000, PHI.

2. Telecommunications Switching, Traffic and Networks- J. E. Flood, 2006, Pearson Education.

REFERENCE BOOKS:

1. Digital Telephony- J. Bellamy, 2nd Edition, 2001, John Wiley.
2. Data Communications and Networks- Achyut S. Godbole, 2004, TMH.
3. Principles of Communication Ststems- H. Taub & D. Schilling, 2nd Edition, 2003, TMH.
4. Data Communication & Networking- B. A. Forouzan, 3rd Edition, 2004, TMH.
5. Telecommunication System Engineering – Roger L. Freeman, 4th Ed., Wiley-Inter Science,
John Wiley & Sons, 2004.

OUTCOMES

The student will be able to

- Evaluate the time and space parameters of a switched signal

- Establish the digital signal path in time and space, between two terminals
- Evaluate the inherent facilities within the system to test some of the SLIC, CODEC and digital switch functions.
- Investigate the traffic capacity of the system.
- Evaluate methods of collecting traffic data.
- Evaluate the method of interconnecting two separate digital switches.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

ANALOG IC DESIGN

OBJECTIVES

The student will be introduced to

- The student will be able to understand the behavior of MOS Devices and Small-Signal & Large-Signal Modeling of MOS Transistor and Analog Sub-Circuits.

- In this course, students can study CMOS Amplifiers like Differential Amplifiers, Cascode Amplifiers, Output Amplifiers, and Operational Amplifiers.

- Another main object of this course is to motivate the graduate students to design and to develop the Analog CMOS Circuits for different Analog operations.

- The concepts of Open-Loop Comparators and Different Types of Oscillators like Ring Oscillator, LC Oscillator etc.

UNIT -I:

MOS Devices and Modeling: The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

UNIT -II:

Analog CMOS Sub-Circuits: MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT -III:

CMOS Amplifiers: Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

UNIT -IV: CMOS Operational Amplifiers: Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp.

UNIT -V:

Comparators: Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.

UNIT -VI

Oscillators & Phase-Locked Loops: General Considerations, Ring Oscillators, LC Oscillators, Voltage Controlled Oscillators.

Simple PLL, Charge Pump PLLs, Non-Ideal Effects in PLLs, Delay Locked Loops, Applications.

Text Books:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition.
2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

Reference Books:

1. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, Fifth Edition, 2010.
2. Analog Integrated Circuit Design- David A.Johns, Ken Martin, Wiley Student Edn, 2013.

OUTCOMES

After going through this course the student will be able to

- Understand the concepts of MOS Devices and Modeling.

- Design and analyze any Analog Circuits in real time applications.

- Extend the Analog Circuit Design to Different Applications in Real Time.

- Understand of Open-Loop Comparators and Different Types of Oscillators.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

OBJECT ORIENTED PROGRAMMING & OS

OBJECTIVES

By the end of the course student will
- Describe the general architecture of computers
- Describe object oriented concepts
- Describe, contrast and compare differing structures for operating Systems
- Understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files

UNIT-I:
Introduction to OOP
Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP

UNIT-II:
Computer System and Operating System Overview: Overview of computer operating systems, operating systems functions, protection and security, distributed systems, special purpose systems, operating systems structures and systems calls, operating systems generation.

UNIT-III:
Process Management – Process concept- process scheduling, operations, Inter process communication. Multi Thread programming models. Process scheduling criteria and algorithms, and their evaluation.

UNIT-IV:
Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation

UNIT-V:
Virtual Memory Management:
Virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing

UNIT-VI:
File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, and file sharing, protection.

TEXT BOOKS:
1. The Complete Reference Java, 8ed, Herbert Schildt, TMH
2. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
3. Operating Systems' – Internal and Design Principles Stallings, Sixth Edition–2005, Pearson education

REFERENCE BOOKS:
1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/Operating%20Systems/New_index1.html
2. Operating systems- A Concept based Approach-D.M.Dhamdhere, 2nd Edition, and TMH
3. Operating System a Design Approach-Crowley, TMH.
4. Modern Operating Systems, Andrew S Tanenbaum 3rd edition PHI.

OUTCOMES

By the end of the course student will be able to
- describe the general architecture of computers
- describe object oriented concepts
- describe, contrast and compare differing structures for operating Systems
- understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

RADAR SYSTEMS
(Elective-I)

OBJECTIVES

The student will be introduced to

- The Basic Principles of RADAR operation.
- Different parameters of Transmitter and Receiver of RADAR
- Different types of RADARS and their applications.

UNIT–I:
Basics of Radar : Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, Illustrative Problems.
Radar Equation : SNR, Envelope Detector – False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Creeping Wave, Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

UNIT–II:
CW and Frequency Modulated Radar : Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar. Illustrative Problems
FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics, FM-CW altimeter, Multiple Frequency CW Radar.

UNIT-III:
MTI and Pulse Doppler Radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, N^{th} Cancellation Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler Radar.

UNIT –IV:
Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT –V:
Detection of Radar Signals in Noise : Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

UNIT –VI:

Radar Receivers – Noise Figure and Noise Temperature, Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers.

Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus parallel feeds, Applications, Advantages and Limitations. Radomes.

TEXT BOOKS:

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd Ed., 2007.

REFERENCE BOOKS:

1. Introduction to Radar Systems, 3rd edition – M.I. Skolnik, TMH Ed., 2005
2. Radar: Principles, Technology, Applications – Byron Edde, Pearson Education, 2004.
3. Radar Principles – Peebles, Jr., P.Z., Wiley, New York, 1998.
4. Principles of Modern Radar: Basic Principles – Mark A. Richards, James A. Scheer, William A. Holm, Yesdee, 2013

OUTCOMES

After going through this course the student will be able to

*   Acquire the knowledge about RADAR system.
*   Understand the Various RADAR Parameters.
*   Apply the techniques learned, to choose suitable RADAR from the available, for the required application.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – ISemester

EMI / EMC

Objectives:

- Student shall be able to understand the root causes for Electromagnetic Noise (EMI), its sources.

- Shall be able to understand the effects of EMI and the required precautions to be taken/to be discussed with his peer group.

- Shall be able to understand the different measurement techniques of EMI (for conducted and normal) and their influences in detail.

- Shall be able to understand different compatibility techniques (EMC) to reduce/suppress EMI.

- Shall be able to understand different standards being followed across the world in the fields of EMI/EMC.

UNIT-I:

Natural and Nuclear sources of EMI / EMC: Introduction,   Electromagnetic environment, History, Concepts, Practical experiences and concerns, frequency spectrum conservations. An overview of EMI / EMC, Natural and Nuclear sources of EMI.

UNIT-II:

EMI from apparatus, circuits and open area test sites: Electromagnetic emissions, noise from relays and switches, non-linearities in circuits, passive intermodulation, cross talk in transmission lines, transients in power supply lines, electromagnetic interference (EMI). Open area test sites and measurements.

UNIT-III:

Radiated and conducted interference measurements: Anechoic chamber, TEM cell, GH TEM Cell, characterization of conduction currents / voltages, conducted EM noise on power lines, conducted EMI from equipment, Immunity to conducted EMI detectors and measurements.

UNIT-IV:

ESD, Grounding, shielding, bonding and EMI filters: Principles and types of grounding, shielding and bonding, characterization of filters, power lines filter design. ESD, Electrical fast transients / bursts, electrical surges.

UNIT-V:

Cables, connectors, components: Introduction, EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, optoisolators, Transient and Surge Suppression Devices.

UNIT-VI:

EMC standards- National / International: Introduction, Standards for EMI and EMC, MIL-Standards, IEEE/ANSI standards, CISPR/IEC standards, FCC regulations, Euro norms, British Standards, EMI/EMC standards in JAPAN, Conclusions.

Text Books:

1.   Engineering Electromagnetic Compatibility by **Dr. V.P. Kodali, IEEE Publication**, Printed in India by *S. Chand & Co. Ltd., New Delhi, 2000*.

References:

1. Introduction to Electromagnetic Compatibility, NY, **John Wiley, 1992, by C.R. Pal.**

2. Electromagnetic Interference and Compatibility **IMPACT series, IIT – Delhi,**

    Modules 1 – 9.

<u>**Outcomes**</u>

At the end of this Course,

- o Students shall be able to distinguish effects of EMI and counter measures by EMC-techniques.

- o Students shall apply the knowledge gained in selecting proper gadget/device/appliance/system, as per EMC- norms specified by regulating authorities.

- o Students shall choose career in the fields of EMI/EMC as an Engineer/Researcher/Entrepreneur in India/abroad.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

<u>OPTICAL COMMUNICATIONS</u>

OBJECTIVES

The student will be introduced to

- the functionality of each of the components that comprise a fiber-optic communication system

- the properties of optical fiber that affect the performance of a communication link and types of fiber materials with their properties and the losses occur in fibers.

- the principles of single and multi-mode optical fibers and their characteristics

- working of semiconductor lasers, and differentiate between direct modulation and external electro-optic modulation.

- Analyze the operation of LEDs, laser diodes, and PIN photo detectors (spectral properties, bandwidth, and circuits) and apply in optical systems.

- Analyze and design optical communication and fiber optic sensor systems.

- the models of analog and digital receivers.

UNIT I
Overview of optical fiber communication - Historical development, the general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Related problems.

UNIT II
Fiber materials: - Glass, Halide, Active glass, chalcogenide glass, Plastic optical fibers. Signal distortion in optical fibers-Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses, Information capacity determination, Group delay, Types of Dispersion:- Material dispersion, Wave-guide dispersion, Polarization-Mode dispersion, Intermodal dispersion, Pulse broadening in Graded index fiber, Related problems.

UNIT III
Optical fiber Connectors-Connector types, Single mode fiber connectors, Connector return loss, Fiber Splicing- Splicing techniques, Splicing single mode fibers, Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

UNIT IV

Optical sources- LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies, Reliability of LED&ILD, Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors, Related problems.

UNIT V

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling, Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantum limit, Analog receivers.

UNIT VI

Optical system design - Point-to- point links- Component choice and considerations, Link power budget,Rise time budget with examples, Line coding in Optical links, WDM, Necessity, Principles, Measurement of Attenuation and Dispersion, Eye pattern.

TEXT BOOKS:

1. Optical Fiber Communications – Gerd Keiser, Mc Graw-Hill International edition, 3rd Edition, 2000.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

RERFERENCES:

1. Fiber Optic Communications – D.K. Mynbaev, S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fiber Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal, John Wiley, 3rd Ediition, 2004.
4. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

OUTCOMES

After going through this course the student will be able to

- Decide upon the necessary components required in modern optical communications systems.

- Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers.

- Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems.

- Decide the optical cables for better communication with minimum losses

- Design, build, and demonstrate optical fiber experiments in the laboratory.

- Locate, read, and discuss current technical literature dealing with optical fiber systems.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

DIGITAL IC DESIGN

OBJECTIVES

- The student will be able to understand the MOS Design.

- In this course, students can study Combinational MOS Logic Circuits and Sequential MOS Logic Circuits.

- Another main object of this course is to motivate the graduate students to design and to develop the Digital Integreated Circuits for different Applications.

- The concepts of Semiconductor Memories, Flash Memory, and RAM array organization.

UNIT-I:

MOS Design: Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II:

Combinational MOS Logic Circuits: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates , AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III:

Sequential MOS Logic Circuits: Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-IV:

Dynamic Logic Circuits: Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

UNIT-V:

Interconnect: Capacitive Parasitics, Resistive Parasitics, and Inductive Parasitics, Advanced Interconncet Techniques.

UNIT-VI:

Semiconductor Memories: MemoryTypes, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory- NOR flash and NAND flash.

Text Books:

1. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, 2nd Ed., PHI.

2. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.

Reference Books:

1. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.

2. CMOS VLSI Design – Neil H.E Weste, David harris, Ayan Banerjee 3rd Edition, Pearson

OUTCOMES
After going through this course the student will be able to

- Understand the concepts of MOS Design.

- Design and analysis of Combinational and Sequential MOS Circuits.

- Extend the Digital IC Design to Different Applications.

- Understand the Concepts of Semiconductor Memories, Flash Memory, RAM array organization.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

SPEECH PROCESSING
(ELECTIVE – II)

UNIT –I:
Fundamentals of Digital Speech Processing:
Anatomy & Physiology of Speech Organs, The process of Speech Production, Acoustic Phonetics, Articulatory Phonetics, The Acoustic Theory of Speech Production- Uniform lossless tube model, effect of losses in vocal tract, effect of radiation at lips, Digital models for speech signals.

UNIT –II:
Time Domain Models for Speech Processing:
Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate, Speech Vs Silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT –III:
Linear Predictive Coding (LPC) Analysis:
Basic principles of Linear Predictive Analysis: The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution for the Autocorrelation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection using LPC Parameters, Formant Analysis using LPC Parameters.

UNIT –IV:
Homomorphic Speech Processing:
Introduction, Homomorphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations, the Complex Cepstrum of Speech, Pitch Detection, Formant Estimation, the Homomorphic Vocoder.
Speech Enhancement:
Nature of interfering sounds, Speech enhancement techniques: Single Microphone Approach: spectral subtraction, Enhancement by re-synthesis, Comb filter, Wiener filter, Multi microphone Approach.

UNIT-V:
Automatic Speech & Speaker Recognition:
Basic pattern recognition approaches, parametric representation of speech, Evaluating the similarity of speech patterns, Isolated digit Recognition System, Continuous digit Recognition System
Hidden Markov Model (HMM) for Speech:
Hidden Markov Model (HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMS.

UNIT-VI:
Speaker Recognition:
Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System.

TEXT BOOKS:
1. Digital Processing of Speech Signals - L.R. Rabiner and S. W. Schafer. Pearson Education.
2. Fundamentals of Speech recognition. L.R Rabinar and R W Jhaung, 1978, Pearson Education.

REFERENCE BOOKS:
1. Discrete Time Speech Signal Processing: Principles and Practice - Thomas F. Quateri, 1st Ed., PE.
2. Speech & Audio Signal Processing- Ben Gold & Nelson Morgan, 1st Ed., Wiley.

3. Speech Communications: Human & Machine - Douglas O'Shaughnessy, 2nd Ed., Wiley India, 2000.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

ARTIFICIAL NEURAL NETWORK & FUZZY LOGIC

UNIT-I:

Introduction Biological Neural Networks, Characteristics of Neural Networks, Models of Neuron, Basic Learning Rules, Stability & Convergence

UNIT-II:

Supervised Learning Neural Networks Adaptive networks, Adaline and madaline, Single layer and multi-layer perceptrons Radial basis function networks, Modular neural networks

UNIT-III:

Feedback Neural Networks Analysis of linear auto adaptive feed forward networks, Analysis of pattern storage Networks, Stochastic Networks & Stimulated Annealing, Boltzman machine

UNIT-IV:

Unsupervised Learning Networks Competitive learning, Kohonen self-organizing maps, learning vector quantization Principal component analysis of Hebbian Learning, Adaptive Resonance Theory

UNIT-V:

Architectures for Pattern Recognition Associative memory, Pattern mapping, Stability – Plasticity dilemma, ART, temporal patterns, Pattern visibility: Neocognitron

UNIT-VI:

Applications of Neural Networks Pattern classification, Associative memories, Optimization, Applications in Image Processing, Applications in decision making
Fuzzy Set Theory Introduction to Fuzzy Set with Properties, Fuzzy Relations, Fuzzy Arithmetic, Fuzzy Logic, Applications and Fuzzy Control

Text Books

1. B. Yegnanarayana, "Artificial Neural Networks", PHI

2. James A Freeman, David M Skapura, "Neural Networks-Algorithms, Applications and Programming Techniques," Person Education B.E._ETC09.doc - 20 – 20

Ref. Books

1. Anderson, "An introduction to Artificial Neural Networks", Prentice Hall

2. William J Palm III, "Introduction to MATLAB 7 for Engineers," TMH

3. G. J. KLIR, B. Yuan, "Fuzzy Set Theory", 1997 PHI.

4. W. Petryez "Fuzzy Sets Engineering", CRL Press 1995.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

NETWORK SECURITY & CRYPTOGRAPHY
(Elective-II)

UNIT-I: Introduction
Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security. Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.

UNIT-II:

Modern Techniques:
Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

Algorithms:

Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2, Characteristics of Advanced Symmetric block cifers.

Conventional Encryption:

Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

Public Key Cryptography:

Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography.

UNIT-III:

Number Theory:
Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

Message authentication and Hash Functions:

Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

UNIT-IV:

Hash and Mac Algorithms: MD File, Message digest Algorithm, Secure Hash Algorithm, RIPEMD-160, and HMAC.

Digital signatures and Authentication Protocols: Digital signatures, Authentication Protocols, Digital signature standards.

Authentication Applications: Kerberos, X.509 directory Authentication service.Electronic Mail Security: Pretty Good Privacy, S/MIME.

UNIT-V:

IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations, Key Management.

Web Security: Web Security requirements, secure sockets layer and Transport layer security, Secure Electronic Transaction.

UNIT-VI:

Intruders, Viruses and Worms: Intruders, Viruses and Related threats.

Fire Walls: Fire wall Design Principles, Trusted systems.

TEXT BOOKS:

1. Cryptography and Network Security: Principles and Practice - William Stallings, 2000, PE.

REFERENCE BOOKS:

1. Principles of Network and Systems Administration, Mark Burgess,John Wiey.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

VLSI LAB

1. Design Entry and simulation of combinational logic circuits (8 bit adders, 4 bit multipliers, address decoders, multiplexers), Test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.

2. Design Entry and simulation of sequential logic circuits (counters, PRBS generators, accumulators). Test bench creation, functional verification, and concepts of concurrent and sequential execution to be highlighted.

3. Synthesis, P&R and Post P&R simulation for all the blocks/codes developed in Expt. No. 1 and No. 2 given above. Concepts of FPGA floor plan, critical path, design gate count, I/O configuration and pin assignment to be taught in this experiment.

4. Generation of configuration/fuse files for all the blocks/codes developed as part of Expt.1. and Expt. 2. FPGA devices must be configured and hardware tested for the blocks/codes developed as part of Expt. 1. and Expt. 2. The correctness of the inputs and outputs for each of the blocks must be demonstrated atleast on oscilloscopes (logic analyzer preferred).

5. Schematic Entry and SPICE simulation of MOS differential amplifier. Determination of gain, bandwidth, output impedance and CMRR.

6. Layout of a simple CMOS inverter, parasitic extraction and simulation.

7. Design of a 10 bit number controlled oscillator using standard cell approach, simulation followed by study of synthesis reports.

8. Automatic layout generation followed by post layout extraction and simulation of the circuit studied in Expt. No.7

Note 1. For Expt. 1 To 4 can be carried out using Altera (Quartus) / Xilinx (Alliance) / ACTEL (Libero) tools.
Note 2. For expt. 5-8 introduce the student to basics of IC design. These have to be carried out using atleast 0.5u CMOS technology libraries. The S/W tools needed Cadence / MAGMA / Tanner.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – I Semester

<u>MICROWAVE ENGINEERING LAB</u>

1.   Reflex Klystron Characteristics.

2.   Gunn Diode Characteristics.

3.   Attenuation Measurement.

4.   Directional Coupler Characteristics.

5.   VSWR Measurement.

6.   Impedance Measurement.

7.   Frequency Measurement

8.   Waveguide parameters measurement.

9.   Scattering parameters of Circulator.

10.   Scattering parameters of Magic Tee.

Equipment required for Laboratories:
1.   Regulated Klystron Power Supply
2.   VSWR Meter -
3.   Micro Ammeter - 0 – 500 μA
4.   Multi meter
5.   CRO
6.   GUNN Power Supply, Pin Modulator
7.   Reflex Klystron
8.   Microwave components (Attenuation)
9.   Frequency Meter
10.   Slotted line carriage
11.   Probe detector
12.   Wave guide shorts
13.   Pyramidal Horn Antennas
14.   Directional Coupler
15.   E, H, Magic Tees
16.   Circulators, Isolator
17.   Matched Loads

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – II Semester

CELLULAR AND MOBILE COMMUNICATIONS

UNIT I

CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN : General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of Cellular system.

UNIT II

INTERFERENCE : Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-cochannel interference-different types. **CELL COVERAGE FOR SIGNAL AND TRAFFIC:** Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, and general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

UNIT III

CELL SITE AND MOBILE ANTENNAS : Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

UNIT IV

FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile

units, channel sharing and borrowing, sectorization, overlaid cells, non-fixed channel assignment.

UNIT V

Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

UNIT VI

DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

TEXTBOOKS:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006.

2. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition,

   2007.

REFERENCES:

1. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.

2. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006.

3. Wireless Communication and Networking – Jon W. Mark and Weihua Zhqung, PHI, 2005.

4. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – II Sem

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

OBJECTIVES

The student will be introduced to

- Static and Dynamic characteristics of instruments
- Designing Principles of various instruments
- various types of analyzers and signal generators
- Concepts of oscilloscopes and its applications.
- Principles of different transducers for measurement of different parameters

UNIT I

Performance characteristics of instruments, Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error. DC Voltmeters-multirange, Range extension/Solid state and differential voltmeters, AC voltmeters- multi range, range extension, shunt. Thermocouple type RF ammeter, Ohmmeters series type, and shunt type, Multimeter for Voltage, Current and resistance measurements.

UNIT II

Signal Generator- fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

UNIT III

Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line,sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, . Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO, probes for CRO- Active & Passive, attenuator type.

UNIT IV

AC Bridges Measurement of inductance- Maxwell's bridge, Anderson Bridge. Measurement of capacitance -Schearing Bridge. Wheat stone bridge. Wien Bridge, Errors and precautions in using bridges. Q-meter.

UNIT V

Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.

UNIT VI

Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, proximity and displacement. Data acquisition systems.

TEXTBOOKS:

1. Electronic instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 2004.

REFERENCES:

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2nd Edition, 2003.

2. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, Pearson Education, 2nd Ed., 2004.

3. Measurement systems -Doeblin

OUTCOMES

The student will be able to

- Select the instrument to be used based on the requirements.
- Understand and analyze different signal generators and analyzers.
- Understand the design of oscilloscopes for different applications.
- Design different transducers for measurement of different parameters.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – II Semester

TV and SATELLITE COMMUNICATIONS
(ELECTIVE – III)

UNIT I
TV transmitter and receivers, synchronization, Television Pictures: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution, Composite video signal, TV transmitter, TV signal propagation, interface, TV broadcast channels, TV transmission antennas.

UNIT II
TV Cameras: Camera tube types, vidicon, silicon diode array vidicon, monochrome tv camera, CCD image sensors.

UNIT III
Monochrome TV Receiver: RF tuner, IF sub system, video amplifier, sound section, sync separation and processing, deflection circuits, scanning circuits. PAL-D colour receiver: Electron tuners, IF sub systems, Y signal channel, chroma decoder, separation of U&V colour phasors, synchronous de-modulators, subcarrier generation, raster circuits.

UNIT IV
INTRODUCTION : Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.
ORBITAL MECHANICS AND LAUNCHERS: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT V
SATELLITE LINK DESIGN: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.
MULTIPLE ACCESS: Frequency division multiple Access (FDMA) Inter-modulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple access (CDMA), Spread spectrum transmission and reception.

UNIT VI
EARTH STATION: Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power, test methods.
LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS: Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs

SATELLITE NAVIGATION AND THE GLOBAL POSITIONING SYSTEM: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

TEXT BOOKS:
1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley   Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.
3. Television and Video Engineering – A.M. Dhake, Second Edition.
4. Monochrome and Colour TV – R.R. Gulati, New Age Internation Publications, 2002.

REFERENCES:
1. Satellite Communications: Design Principles – M. Richharia, BS Publications, 2nd Edition,
   2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.
4. Colour Television Theory and Practice – S.P. Bali, TMH, 1994.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – II Semester

MIXED SIGNAL DESIGN

OBJECTIVES

The student will be introduced to

- Understand the Switched capacitors Circuits and Operation and Analysis, PLLS.

- In this course, students can study Data Converter Fundamentals, Nyquist Rate A/D Converters.

- Another main object of this course is to motivate the graduate students to study and to analyze the Oversampling Converters and Continuous-Time Filters.

- The concepts of Continuous-Time Filters, CMOS Transconductors Using Triode and Active Transistors and MOSFET-C Filters.

UNIT-I:

Switched Capacitor Circuits: Introduction to Switched Capacitor circuits- basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, biquad filters.

UNIT-II:

Phased Lock Loop (PLL): Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non-idealities, Jitter in PLLs, Delay locked loops, applications.

UNIT-III:

Data Converter Fundamentals: DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters

UNIT-IV:

Nyquist Rate A/D Converters: Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.

UNIT-V:

Oversampling Converters: Noise shaping modulators, Decimating filters and interpolating filters, Higher order modulators, Delta sigma modulators with multi-bit quantizers, Delta sigma D/A

UNIT-VI:

Continuous-Time Filters: Introduction to Gm-C Filters, Bipolar Transconductors, CMOS transconductors Using Triode and Active Transistors, BiCMOS Transconductors, MOSFET-C Filters.

Text Books:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, 2002
2. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition, 2013

Reference Books:

1. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009.
2. CMOS Analog Circuit Design –Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

OUTCOMES
After going through this course the student will be able to

- Understand the concepts of Switched Capacitor circuits.

- Design and analysis of Nyquist Rate A/D Converters.

- Extend the Mixed Signal Design to Different Applications.

- Concepts of Oversampling Converters and Continuous-Time Filters.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – II Semester

EMBEDDED SYSTEMS

OBJECTIVES

After going through this course the student will be able to

- Understand the building blocks of typical embedded system and different memory technology and memory types.

- Learn the characteristics of an embedded system, quality attributes of embedded systems, application specific and domain specific embedded system,

- Learn about communication devices and basics about VLSI and integrated circuit design and learn concept of firmware design approaches, ISR concept. Interrupt sources, interrupt servicing mechanism, multiple interrupts,

- Understand the concepts of c versus embedded c and compiler versus cross-compiler.

- Learn about the integrated development environment,software utility tool. Also learn about quality assurance and testing of the design, testing on host machine, simulators.

Unit-I:
Introduction: Embedded System-Definition, History, Classification, application areas and purpose of embedded systems, The typical embedded system-Core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, PCB and passive components. Characteristics, Quality attributes of an Embedded systems, Application-specific and Domain-Specific examples of an embedded system.

Unit-II:
Embedded Hardware Design: Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

Unit-III:
Embedded Firmware Design: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

Unit-IV:
Real Time Operating System: Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Threads, Processes and Scheduling,

Task Scheduling, Communication, Synchronization, Device Drivers, How to choose an RTOS.

Hardware Software Co-Design: Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.

Unit-V:
Embedded System Development: The integrated development environment, Types of files generated on cross-compilation, Deassembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools.

Unit-VI:
Embedded System Implementation And Testing: The main software utility tool, CAD and the hardware, Translation tools-Pre-processors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

Text Books:

1. Embedded Systems Architecture By Tammy Noergaard, Elsevier Publications, 2005
2. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications.

.
References:

1. Embedded Systems, Raj Kamal-Tata McGraw Hill Education Private Limited, Second Edition, 2008
2. Embedding system building blocks By Labrosse, CMP publishers.

OUTCOMES

After going through this course the student will be able to

- Know basics of embedded system, classification, memories, different communication interface and what embedded firmware is and its role in embedded system, different system components.

- Distinguish all communication devices in embedded system, other peripheral device.

- Distinguish concepts of C versus embedded C and compiler versus cross-compiler.

- Choose an operating system, and learn how to choose an RTOS

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – II Semester

RF CIRCUIT DESIGN

OBJECTIVES

- To provide students with the basic principles of radio frequency (RF) circuit design.

- To introduce the students to topics such as fundamental transmission line theory, HF circuit behavior, designing matching networks, amplifiers, filters etc.

- To prepare the students for careers in the communication domain.

UNIT -I:
Introduction to RF Electronics:
The Electromagnetic Spectrum, units and Physical Constants, Microwave bands – RF behavior of Passive components: Tuned resonant circuits, Vectors, Inductors and Capacitors - Voltage and Current in capacitor circuits – Tuned RF / IF Transformers.

UNIT -II:
Transmission Line Analysis: Examples of transmission lines- Transmission line equations and Biasing- Micro Strip Transmission Lines- Special Termination Conditions- sourced and Loaded Transmission Lines. **Single And Multiport Networks:** The Smith Chart, Interconnectivity networks, Network properties and Applications, Scattering Parameters.

UNIT -III:
Matching and Biasing Networks:
Impedance matching using discrete components – Micro strip line matching networks, Amplifier classes of Operation and Biasing networks. **RF Passive & Active Components:** Filter Basics – Lumped filter design – Distributed Filter Design – Diplexer Filters- Crystal and Saw filters- Active Filters - Tunable filters – Power Combiners / Dividers – Directional Couplers – Hybrid Couplers – Isolators. RF Diodes – BJTs- FETs- HEMTs and Models.

UNIT -IV:
RF Transistor Amplifier Design: Characteristics of Amplifiers - Amplifier Circuit Configurations, Amplifier Matching Basics, Distortion and noise products, Stability Considerations, Small Signal amplifier design, Power amplifier design, MMIC amplifiers, Broadband High Power multistage amplifiers, Low noise amplifiers, VGA Amplifiers.

UNIT -V:
Oscillators: Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Crystal Oscillators, PLL Synthesizer, and Direct Digital Synthesizer.

UNIT -VI:
RF Mixers: Basic characteristics of a mixer - Active mixers- Image Reject and Harmonic mixers, Frequency domain considerations.

TEXT BOOKS:
1. RF Circuit design: Theory and applications by Reinhold Ludwing, Pavel Bretchko. Pearson Education Asia Publication,   New Delhi 2001.
2. Radio Frequency and Microwave Communication Circuits – Analysis and Design – Devendra K. Misra, Wiley Student Edition, John Wiley & Sons

REFERENCE BOOKS:
1. Radio frequency and Microwave Electronics - Mathew M.Radmangh, 2001, PE Asia Publ.
2. RF Circuit Design – Christopher Bowick, Cheryl Aljuni and John Biyler, Elsevier Science, 2008.
3. Secrets of RF Design - Joseph Carr., 3rd Edition, Tab Electronics.
4. Complete Wireless Design - Cotter W. Sawyer, 2nd Edition, Mc-Graw Hill.
5. Practical RF Circuit Design for Modem Wireless Systems Vol.2 -Less Besser and Rowan Gilmore.

OUTCOMES

- The students will gain the basic knowledge of RF circuit design.

- The students will become competent to work in the field of communication.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – II Semester

CLOUD COMPUTING

OBJECTIVES

The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud based software applications on top of cloud platforms.

UNIT I: Systems modeling, Clustering and virtualization:

Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency

UNIT II:Virtual Machines and Virtualization of Clusters and Data Centers:

Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

UNIT III: Cloud Platform Architecture:

Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

UNIT IV: Cloud Programming and Software Environments:

Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

UNIT V: Cloud Resource Management and Scheduling:

Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control

Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling Map Reduce Applications Subject to Deadlines.

UNIT VI:

Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore, Amazon Simple Storage Service(S3)

TEXT BOOKS:
1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press

REFERNCE BOOK:
1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

OUTCOMES

1. Understanding the key dimensions of the challenge of Cloud Computing
2. Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization
3. Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
4. Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – II Semester

WIRELESS SENSOR NETWORKS

OBJECTIVES

- To understand the concepts of sensor networks and study the architecture of WSN.
- To understand applications of WSN.
- To discuss the challenges in designing MAC and routing protocols for wireless sensor networks.
- To study different operating systems and look at performance issues.
- To understand WSN Standards and future trends in WSN.
- To study Challenges of Security in Wireless Sensor Networks and Protocols and Mechanisms for Security.

UNIT -I:
The Cellular Concept-System Design Fundamentals:
Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference , Power Control for Reducing interference, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring .

UNIT –II:
Mobile Radio Propagation: Large-Scale Path Loss:
Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection-Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, Diffraction-Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knife-edge Diffraction, Scattering, Outdoor Propagation Models- Longley-Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

UNIT –III:
Mobile Radio Propagation: Small –Scale Fading and Multipath
Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT -IV:
Equalization
Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non-linear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm.

UNIT -V:
Diversity
Diversity Techniques-Derivation of selection Diversity improvement, Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver.

UNIT -VI:
Wireless Networks
Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11,IEEE 802.11 Medium Access Control, Comparision of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, Hiper Lan, WLL.

TEXT BOOKS:
      1. Wireless sensor Networks-Feng Zhao and L Guibas, Elsevier

REFERENCE BOOKS:
Wireless Sensor Networks –Ananth Ramu, Wiley

OUTCOMES

- Students shall be able to understand and study the functionalities, applications and architecture of WSN. Students shall be able to describe the challenges in designing various protocols for wireless sensor networks.

- Students shall be able to understand the current technology trends for the implementation and deployment of wireless sensor networks.

- Students shall gain an understanding of WSN Standards and future trends in WSN.

- Students shall be able to understand security aspects like Privacy issues, attacks and countermeasures.

UNIVERSITY COLLEGE OF ENGINEERING KAKINADA
IV Year B. Tech Electronics and Communication Engineering – II Semester

SYSTEM ON CHIP

OBJECTIVES

After going through this course the student will be able to

- Understand the System Architecture and Processor Architecture, approach for a SOC Design.

- Learn the, Basic concepts in Processor Micro Architecture, and Learn Different Types of Processors like VLIW Processors, Superscalar Processors etc.

- Learn about SOC external memory, Scratchpads and Cache memory and Multilevel Caches.

- Learn the SOC Design approach, Design and evaluation, Applications Like Image compression etc.

UNIT-I:
Introduction to the System Approach: System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, an approach for SOC Design, System Architecture and Complexity.

UNIT-II:
Processors : Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT-III:
Memory Design for SOC: Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

UNIT-IV:
Interconnect Customization and Configuration: Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor

UNIT-V:
Interconnect Configuration: Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

UNIT-VI:
Application Studies / Case Studies: SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression.

Text Books:

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
2. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer

Reference Books:

1. ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional.

2. System on Chip Verification – Methodologies and Techniques –Prakash Rashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

OUTCOMES

After going through this course the student will be able to

- Know basics of System Architecture and Processor Architecture.

- Know different Types of Processors like VLIW Processors, Superscalar Processors etc. and Basic concepts in Processor Micro Architecture.

- Distinguish Cache memory and Multilevel Caches, SOC external memory.

- Know the Concept of Inter Connect Architectures, SOC Standard Buses and Reconfiguration Technologies.

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LOW POWER VLSI DESIGN

OBJECTIVES

- The student will be able to understand the Fundamentals of Low Power VLSI Design.

- In this course, students can study low-Power Design Approaches, Power estimation and analysis.

- Another main object of this course is to motivate the graduate students to study and to analyze the Low-Voltage Low-Power Adders, Multipliers.

- The concepts of Low-Voltage Low-Power Memories andFuture Trend and Development of DRAM.

UNIT-I:
Fundamentals of Low Power VLSI Design: Need for Low Power Circuit Design, Sources of Power Dissipation – Switching Power Dissipation, Short Circuit Power Dissipation, Leakage Power Dissipation, Glitching Power Dissipation, Short Channel Effects –Drain Induced Barrier Lowering and Punch Through, Surface Scattering, Velocity Saturation, Impact Ionization, Hot Electron Effect.

UNIT-II:
Low-Power Design Approaches:
Low-Power Design through Voltage Scaling: VTCMOS circuits, MTCMOS circuits, Architectural Level Approach –Pipelining and Parallel Processing Approaches.
Switched Capacitance Minimization Approaches: System Level Measures, Circuit Level Measures, Mask level Measures.

UNIT-III:
Power estimation and analysis:SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power and gate level capacitance estimation.

UNIT-IV:
Low-Voltage Low-Power Adders: Introduction, Standard Adder Cells, CMOS Adder's Architectures – Ripple Carry Adders, Carry Look-Ahead Adders, Carry Select Adders, Carry Save Adders, Low-Voltage Low-Power Design Techniques –Trends of Technology and Power Supply Voltage, Low-Voltage Low-Power Logic Styles.

UNIT-V:
Low-Voltage Low-Power Multipliers Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, Baugh-Wooley Multiplier, Booth Multiplier, Introduction to Wallace Tree Multiplier.

UNIT-VI:
Low-Voltage Low-Power Memories: Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Precharge and Equalization Circuit, Low-Power SRAM Technologies, Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

Text Books:

1. Low-Voltage, Low-Power VLSI Subsystems – Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering.

Reference Books:

1. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C. Prasad, John Wiley & Sons, 2000.
2. Practical Low Power Digital VLSI Design – Gary K. Yeap, Kluwer Academic Press, 2002.

OUTCOMES
After going through this course the student will be able to

- Understand the concepts of Low-Power Design Approaches.

- Design and analysis of Low-Voltage Low-Power Circuits.

- Extend the Low Power Design to Different Applications.

- Understand of Low-Voltage Low-Power Memories and Basics of DRAM.

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BIO-MEDICAL INSTRUMENTATION

OBJECTIVES

- With widespread use and requirements of medical instruments, this course gives knowledge of the principle of operation and use of biomedical instruments.
- It attempts to render a broad and modern account of biomedical instruments.
- It gives the introductory idea about human physiology system which is very important with respect to usage and design consideration of biomedical instruments.

UNIT-I
Sources of Bioelectric potentials and Electrodes: Resisting and Action Potentials, Propagation of Action Potentials, The Bioelectric Potentials. Electrodes: Electrode theory, Bio Potential Electrodes, Biochemical Transducers, introduction to bio-medical signals.

UNIT-II
The Cardiovascular System: The Heart and Cardiovascular System, The Heart, Blood Pressure, Characteristics of Blood Flow, Heart Sounds, Cardio Vascular Measurements, Electrocardiography, Measurement of Blood Pressure, Measurement of Blood Flow and Cardiac output, Plethysmography, Measurement of Heart Sounds, Event detection, PQRS & T-Waves in ECG, the first & second Heart beats, ECG rhythm analysis, the di-crotic notch in the carotid pulse detection of events and waves, analysis of exercise ECG, analysis of event related potentials, correlation analysis of EEG channels, correlation of muscular contraction.

UNIT- III
Patient Care & Monitory and Measurements in Respiratory System: The elements of Intensive Care Monitory, Diagnosis, Calibration and reparability of Patient Monitoring equipment, other instrumentation for monitoring patients, pace makers, defibrillators, the physiology of respiratory system, tests and instrumentation for mechanics of breathing, respiratory theory equipment, analysis of respiration.

UNIT-IV
Bio telemetry and Instrumentation for the clinical laboratory Introduction to bio telemetry, Physiological parameters adaptable to bio telemetry, the components of bio telemetry system, implantable units, applications of telemetry in patient care – The blood, tests on blood cells, chemical test, automation of chemical tests.

UNIT-V
X-ray and radioisotope instrumentation Generation of Ionizing radiation, instrumentation for diagnostic X-rays, special techniques, instrumentation for the medical use of radioisotopes, radiation therapy - Physiological effects of electrical current

UNIT-VI
Electrical safety of medical equipment:

Shock Hazards from electrical equipment, Methods of accident prevention, Modern Imaging Systems: Tomography, Magnetic resonance Imaging System, Ultrasonic Imaging System, Medical Thermography.

TEXT BOOK:
1. Biomedical Instrumentation and Measurements – C. Cromwell, F.J. Weibell, E.A.Pfeiffer – PHI.
2. Biomedical Instruments Theory and Design-Welkowitz, Elseiver

Reference:
1. Biomedical instrumentation systems- Shakthi Chattarjee, Aubert Miller Cenage Learning
2. Hand Book of Bio-Medical Instrumentation – R.S. Khandpur, (TMH)

OUTCOMES
- Students will have a clear knowledge about human physiology system.
- They will have knowledge of the principle of operation and the background knowledge of biomedical instruments and specific applications of biomedical engineering.

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ADVANCED COMPUTER ARCHITECTURE

UNIT -I:
Fundamentals of Computer Design:
Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, Measuring and reporting performance, Quantitative principles of computer design, Amdahl's law.
Instruction set principles and examples- Introduction, Classifying instruction set- Memory addressing- type and size of operands, Operations in the instruction set.

UNIT –II:
Pipelines:
Introduction, Basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties.

Memory Hierarchy Design:
Introduction, Review of ABC of cache, Cache performance, reducing cache miss penalty, Virtual memory.

UNIT -III:
Instruction Level Parallelism the Hardware Approach:
Instruction-Level parallelism, dynamic scheduling, dynamic scheduling using Tomasulo's approach, Branch prediction, high performance instruction delivery- hardware based speculation.

ILP Software Approach
Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues -Hardware verses Software.

UNIT –IV:
Multi Processors and Thread Level Parallelism:
Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – memory architecture, Synchronization.

UNIT –V
Inter Connection and Networks:
Introduction, Interconnection network media, Practical issues in interconnecting networks, examples of inter connection, Cluster, Designing of clusters.
Intel Architecture: Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

TEXT BOOKS:
1. Computer Architecture and Parallel Processing - Kai Hwang, Faye A.Brigs., MC Graw Hill.
2. John L. Hennessy, David A. Patterson - Computer Architecture: A Quantitative Approach, 3rd Edition, an Imprint of Elsevier.

REFERENCE BOOKS:
1. John P. Shen and Miikko H. Lipasti - Modern Processor Design : Fundamentals of Super Scalar Processors

2. Advanced Computer Architecture - A Design Space Approach - Dezso Sima, Terence Fountain, Peter Kacsuk , Pearson Ed.