ACADEMIC REGULATIONS
COURSE STRUCTURE
and
DETAILED SYLLABUS

ELECTRONICS & COMMUNICATION ENGINEERING

For

B.Tech., FOUR YEAR U.G. COURSE
(Applicable for batches admitted from 2018-2019)

☎:08818-284577, 284355 Ext: 321; Fax: 08818-284577 Visit us at: www.srivasaviengg.ac.in

SRI VASAVI ENGINEERING COLLEGE (Autonomous)

(Sponsored by Sri Vasavi Educational Society)
(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)
(Accredited by NAAC with 'A' Grade ,Recognized by UGC under section 2(f) & 12(B))
Pedatadepalli, **TADEPALLIGUDEM – 534 101.**W.G.Dist**. (A.P)**

Institute Vision and Mission

Vision

- To be a premier technological institute striving for excellence with global perspective and commitment to the nation

Mission

- To produce Engineering graduates of professional quality and global perspective through learner-centric education.
- To establish linkages with government, industry and Research laboratories to promote Rσ&D activities and to disseminate innovations.
- To create an eco-system in the institute that leads to holistic development and ability for life-long learning.

Department Vision and Mission

Vision:

- To develop the department into a center of excellence and produce high quality, technically competent and responsible Electronics and Communication Engineers.

Mission:

- To create a learner centric environment that promotes the intellectual growth of the students.
- To develop linkages with R & D organizations and educational institutions for excellence in teaching, learning and consultancy practices.
- To build the student community with high ethical standards.

Program Educational Objectives (PEOs)

Graduates of this programme will:

PEO 1: Have successful career in the field of Electronics & Communication Engineering.

PEO 2: Design products for societal needs.

PEO 3: Demonstrate their abilities to support service activities with due consideration for ethics and human values.

Programme Specific Outcomes (PSO s):

A graduate of the Electronics and Communication Engineering Program will be able to:

PSO 1: use modern tools to design subsystems for simple applications in Embedded Systems and VLSI. [K3]

PSO 2: apply engineering concepts to find solutions in the fields of Communications, Signal/ Image Processing. [K3]

Program Outcomes (POs):

Electronics & Communication Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and concepts of Electronics & Communication engineering to solve the complex engineering problems.[K3]

2. **Problem analysis:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using mathematics, natural sciences, and electronics and communication engineering principles. [K4]

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.[K5]

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. [K5]

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and Electronics Design Automation tools including prediction and modeling to complex engineering activities with an understanding of the limitations. [K3]

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice. [K3]

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for the sustainable development. [K3]

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice. [K3]

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings. [K6]

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. [K2]

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. [K6]

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.[K1]

ACADEMIC RULES
AND
REGULATIONS

SRI VASAVI ENGINEERING COLLEGE (Autonomous)

Pedatadepalli, Tadepalligudem – 534 101.

Minutes of the 2nd Academic Council meeting on 01/07/2018
Item No: 3
Annexure No: I

Academic Rules and Regulations for B.Tech Programme

(Applicable to the Batches Admitted in 2018 and onwards)

1.0 All the rules and regulations specified hereafter shall be read as a whole for the purpose of interpretation and when any doubt arises, the decision of the Chairman Academic Council of Sri Vasavi Engineering College is final.

As per the norms, the Principal of the college (Autonomous) shall be the Chairman of Academic Council.

2.0 ADMISSIONS:

ELIGIBILITY:

As per the norms of JAHAWARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA, Kakinada

B.TECH – REGULAR:

For Category – A seats (**Filled by the Convener, AP EAMCET),** a pass in Intermediate/10+2 with a rank in Common Entrance Test, AP EAMCET conducted by APSCHE.

For Category – B seats (**Filled by the College),** a pass (**50% Min aggregate**) in Intermediate/10+2 with or without a rank in AP EAMCET.

B.TECH -LATERAL ENTRY:

Admission under lateral entry is governed by the eligibility norms of JNTUK and Government of Andhra Pradesh.

2.1 ADMISSIONS UNDER SPECIAL CASES:

These may arise in the following situations.

1. When a student gets detained due to academic regulations and re-joins the college to complete the programme in a new regulation.
2. When a student discontinues for some time and re-joins the college to complete the programme in a new regulation.
3. When a student seeks transfer from other colleges to SVEC and intends to pursue B.Tech programme in the eligible branch of study.

These admissions may be permitted by the College Academic Council as per the norms stipulated by the statutory bodies and the Government of Andhra Pradesh from time-to-time.

In all such cases for admission if necessary permissions from the statutory bodies are to be obtained and the programme of study at the college will be governed by the transitory regulations stipulated in 9.10.

An undertaking from the students is to be taken at the time of admission stating that they would abide by the transitory regulations specified by the authorities if there is any change in the regulations.

3.0 DURATION OF THE PROGRAM AND MEDIUM OF INSTRUCTION:

The duration of the B.Tech program is four academic years comprising two semesters in each academic year. **The medium of instruction and examination is English**.

S.No	Activity	Description
1	Number of Semesters in an Academic year.	Two
2	Regular Semester duration in Weeks.	21 Weeks

3.1 Academic Activities Schedule:

1	Instruction	Starts from the date commencement of the semester as specified in the academic calendar.
2	Ist Mid Examinations	During the 9th week from the date of commencement of the semester.
3	2nd Mid Examinations	During the 17th week from the date of commencement of the semester
4	Comprehensive Test	During the 18th week from the date of commencement of the semester
5	Practical Examinations	1 Week
6	End Semester Examinations	2 Weeks

3.2 EVALUATION:

For Theory Courses:

Continuous Internal evaluation (CIE) for 40 marks and Semester End Examinations (SEE) for 60 marks of the student's performance.

For Laboratory course:

40 marks for Continuous Internal Evaluation (CIE) and 60 Marks for the Semester End Examinations (SEE).

4.0 PROGRAMS OF STUDY IN B.TECH:

4.1 The four year B.Tech programme is offered in the following branches of study at present:

S.No	Title of the UG Programme	Program Code
1.	Civil Engineering	CE
2.	Electrical and Electronics Engineering	EEE
3.	Mechanical Engineering	ME
4.	Electronics and Communication Engineering	ECE
5.	Computer Science & Engineering	CSE

4.2 Structure of the programme:

4.2.1 Each B.Tech programme of study shall consist of:

1. General courses in Basic Sciences, Basic Engineering Sciences, Social Sciences & Humanities.
2. Interdisciplinary courses in Engineering to impart the fundamentals of Engineering to the student.
3. Program core courses to impart broad based knowledge needed in the branch of study concerned.
4. Program elective courses from the discipline and open elective courses from interdisciplinary areas to be chosen by the student based on his/her interest and specialization preferred.

5. Laboratory courses
6. Projects, seminars and internships.
7. Every programme of study shall be designed to have 45-50 theory courses and 15-20 laboratory courses and the percentage distribution of the credits among different types of courses is as follows.

Humanities, Social Sciences, Basic Sciences and Engineering Science courses	35-40%
Professional core courses	30-40%
Professional and open elective courses	10-15%
Major project, Seminar, Employability skills and etc.,	10-15%

4.2.2 Contact hours:

Depending on the requirements of the programme, the number of contact hours per week is normally between 25 to 30.

4.2.3 Credits:

Credits are assigned to each course as per the norms as shown below:

Theory Course: 1 hour per week - 1 credit

Laboratory Course: 1 hour per week - 0.5 credit

4.3 Curriculum for programme of study:

1. The curriculum of B.Tech programme in any branch of Engineering is formulated based on the guidelines mentioned in **4.2,** (to be recommended by the Board of Studies concerned and approved by the Academic Council).

2. (After getting approval from the Academic Council, a copy of the curriculum along with rules and regulations for the programme shall be made available to all the students.)

The following table shows a typical curriculum frame work for the B.Tech programme.

S.No	Course Area	Typical no of credits for a total of 160 credits

1.	Humanities & Social Sciences	10-15
2.	Basic Sciences	20-25
3.	Engineering Sciences	20-25
4.	Professional Core	45-60
5.	Professional Electives	12-18
6.	Major Project/Seminar, etc.,	10-15
7.	Open Electives	6-12
8.	Mandatory Courses	Non-credit

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.4 Maximum duration permitted to pursue the programme and cancellation of admission:

4.4.1 The maximum duration permitted to successfully complete the four year B.Tech. Programme of study shall be:

1. Eight academic years in sequence from the year of admission for a normal student admitted into the first year of the Programme.
2. Six academic years in sequence from the year of admission for a lateral entry student admitted into the second year of the Programme.

4.4.2 In case, any student fails to meet the applicable conditions for the eligibility of degree in the maximum stipulated period as mentioned in **4.4.1** his/her admission stands cancelled.

5.0 EXAMINATION SYSTEM AND EVALUATION:

5.1. The performance of the students in each semester shall be assessed course wise. All assessments will be done on absolute marks basis. However, for the purpose of reporting the performance of candidate, letter grades and grade points will be awarded. The performance of the student in each theory course is assessed through

1. Mid Semester Examinations
2. Comprehensive tests and
3. End Semester Examinations

For each theory/design and/or drawing course there shall be a Semester End Examination of three hours duration at the end of each semester, except where stated otherwise in the detailed scheme of instruction.

5.2. The distribution of marks between continuous internal evaluation (CIE) and semester end examination (SEE) will be as follows:

Nature of the course	**CIE**	**SEE**
Theory Courses	40	60
Drawing	40	60
Practical	40	60
Seminar Presentation/Comprehensive Viva	50	-
Project work Part-A	50	
Project work Part-B	50	150
Mandatory course	40	60

5.3. **Continuous Internal Evaluation (CIE) in Theory and Drawing Courses:**

For theory Courses the distribution for 40 marks under CIE will be as follows:

Two Mid semester examinations - 25 marks each

Comprehensive test - 10 marks

Assessment through

Alternate assessment tool (AAT)

2 times in a Semester - 05 marks each

CIE is computed as follows.

Two Mid Semester Examinations will be conducted, each for 25 marks. In order to encourage the students to appear for both examinations, weighted average of both exams will be taken as follows:

CIE= 0.8 X Best performance in MID exam +0.2 X Next best performance in MID exam +$\frac{(\mathbf{AAT1+AAT2})}{\mathbf{2}}$+ Performance in comprehensive test

Comprehensive test in the total syllabus will be conducted at the end of the instruction.

The alternate assessment tool with detailed modality of evaluation for each course shall be specified by the teacher concerned at the beginning of the course with the permission of HOD concerned and the Principal.

The Mid Semester Examination is conducted in the regular mode according to a schedule which will be specified in the academic calendar.

The said examination consists of Part-A and Part-B, Part-A being objective type for 10 marks and Part-B being a written examination for 15 marks.

Engineering Graphics:

The internal evaluation for 40 marks will be done as follows:

1. Each student has to submit 6 drawing assignments - 6 x 5 = 30 marks
2. Two mid examinations each for 10 marks with weighted average as specified above =10 marks

Total- 40 marks

5.4. Semester End Examination Evaluation:

5.4.1 For each theory, design and/or the drawing course there shall be a semester end examination of three hours duration at the end of each semester for 60 marks unless stated otherwise in the detailed scheme of instructions.

The end semester examination is conducted for 60 marks covering the total syllabus.

There will be 6 questions with internal choice (One from each Unit). The student has to answer all the 6 questions which carry a weightage of 10 marks each.

5.4.2 For practical Courses there shall be continuous evaluation during the semester for 40 internal marks and semester end examination for 60 marks. The 40 marks under CIE shall be awarded as follows:

Day to day work -15 marks, Record-10 marks and internal laboratory test (to be conducted towards the end of the semester)-15 marks.

The Semester end examination in practical course shall be conducted by the teacher concerned and an external examiner.

5.4.3 For the seminar, the student shall collect the information on a specified topic and prepare a technical report and has to make an oral presentation showing his understanding over the topic to 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.

Project Part-A: The student will make literature survey, identify a problem and prepare a plan for the execution of the proposed project work. Evaluation will be done by the departmental committee consisting of Head of the Department, Project In-charge and a senior faculty member. The evaluation will be done for 50 marks based on the report submitted and a seminar/viva-voce.

P**roject Part-B:** Out of a total of 200 marks for the project work-Part B, 50 marks shall be for Internal Evaluation and 150 marks for the Semester End Examination. The Semester End Examination (Viva – Voce) shall be conducted by a committee consisting 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 VIII semester. 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.

5.4.4 A minimum of 21 marks (35%) are to be secured exclusively in the semester end examination of theory/drawing course and a minimum total of 40 marks in SEE and CIE put together (40%) in a theory/drawing course is to be secured in order to be declared as passed in that course and for award of the grade in that course.

6.0 ATTENDANCE REQUIREMENTS:

A student is eligible to write the semester end examinations (SEE) if he/she acquires a minimum of 75% of attendance in aggregate of all the courses of that semester put together.

6.1 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a given semester may be granted by the College Academic Committee on medical grounds provided the student has submitted the application for medical leave along with medical certificate from a Registered medical practitioner within three days form reporting to the class work after the expiry of the medical leave.

6.2 A student representing the college in approved extracurricular activities such as sports, games, cultural meets, seminars, workshops and conferences shall be considered as on duty provided he/she has obtained prior written permission from the head of the department concerned and also submitted the certification of participation from the organizer of the event within three days after the completion of the event. However,

this period of absence shall be counted as present for the purpose of computation of attendance only.

6.3 A stipulated fee shall be payable towards condonation of shortage of attendance.

6.4 Attendance below 65% in aggregate shall not be condoned under any circumstances.

6.5 Students whose shortage of attendance is not condoned in any semester are not eligible to write their semester end examinations.

6.6 A student who is short of attendance in a semester may seek re-admission into that semester when offered again, within 1 week from the date of the commencement of class work.

6.7 A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester and the credit requirements specified under **7.0.**

6.8 If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

6.9 A student is permitted to avail the condonation of shortage of attendance as mentioned above for a maximum of three times only during the total duration of the programme.

7.0 CONDITIONS FOR PROMOTION:

Minimum academic requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in **item no.6.0.**

7.1 A student is deemed to have satisfied the minimum academic requirements if he/she has earned the credits allotted to each theory/practical/design/drawing/laboratory course/project and secures not less than 35% of marks in the semester end examination and minimum 40% of marks in the sum total of the internal marks and semester end examination marks.

7.2 A student shall be promoted from first year to second year if he/she fulfills the minimum attendance requirement.

7.3 A student shall be promoted from II year to III year if he/she earns 50% of the total credits specified up to and including II year II semester.

7.4 A student shall be promoted from III year to IV year only if he earns 50 % of the credits specified up to and including III year I semester

8.0 GRADING SYSYTEM:

8.1 Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester for each course. The letter grades and the corresponding grade points are as given in the table.

TABLE: GRADES & GRADE POINTS

Grade	Grade Points	% of marks
S	10	≥ 90
A	9	≥ 80 – < 90
B	8	≥ 70 – < 80
C	7	≥ 60 – < 70
D	6	≥ 50 – < 60
E	5	≥ 40 – < 50
F	0 (Failed)	< 40
	0 (Absent)	–––

8.2 A student who earns a minimum of 5 grade points (E grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course.

However, it should be noted that a pass in any course/term paper/project shall be governed by the rules mentioned in 5.0.

8.3 For Mandatory Courses: The evaluation will be done based on CIE and SEE with weightage as given in 5.2. These courses will not carry any credits. The performance will be graded as pass/fail. The grades obtained in these courses will not affect the grade point average; however, they will appear on the grade sheet.

8.4 Award of Degree

A student shall register and put up minimum attendance in all 160 credits and earn all 160 credits and also should secure a pass in all the mandatory courses to become eligible for the award of the degree.

A student who fails to satisfy the above criteria as indicated in the course structure within eight academic years from the year of his/her admission, shall forfeit his/her seat in B.Tech. programme and his/her admission stands cancelled.

9.0 GRADE POINT AVERAGE:

9.1 Computation of SGPA and CGPA:

The following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e

$$\textbf{SGPA } (Si) = \sum(Ci \times Gi) / \sum Ci$$

where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th} course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\textbf{CGPA} = \sum(Ci \times Si) / \sum Ci$$

where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester.

The SGPA and CGPA shall be rounded off to 2 decimal places and reported in the transcripts.

Illustration for Computation of SGPA and CGPA:

Computation of SGPA at the end of 1st Semester

Illustration No.1:

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	9	3 x 9 = 27

Course 2	3	C	7	3 x 7 = 21
Course 3	3	B	8	3 x 8 = 24
Course 4	3	S	10	3 x 10 = 30
Course 5	3	D	6	3 x 6 = 18
Course 6	3	C	7	3 x 7 = 21
Course 7	2	A	9	2 x 9 = 18
Course 8	2	C	7	2 x 7 = 14
Total	**22**			**173**

Thus, **SGPA at the end of 1st Semester= 173/22=7.86**

Illustration No.2 (with one failure)

Course	**Credit**	**Grade letter**	**Grade point**	**Credit Point (Credit x Grade)**
Course 1	3	A	9	3 x 9 = 27
Course 2	3	C	7	3 x 7 = 21
Course 3	3	B	8	3 x 8 = 24
Course 4	3	S	10	3 x 10 = 30
Course 5	3	F	0	3 x 0 = 00
Course 6	3	C	7	3 x 7 = 21
Course 7	2	A	9	2 x 9 = 18
Course 8	2	C	7	2 x 7 = 14
Total	**22**			**155**

Thus, **SGPA= 155/22=7.04**

Illustration No.2 (a)

Course	**Credit**	**Grade letter**	**Grade point**	**Credit Point (Credit x Grade)**
Course 5	3	D	6	3 x 6 =18
Total Credits of the	**22**			Ci (First Attempt)155 + Ci (subsequent attempt) 18= **173**

Thus, re-calculated **SGPA** after clearing the course**= 173/22=7.86**

Illustration No.3

Course	**Credit**	**Grade letter**	**Grade point**	**Credit Point (Credit x Grade)**

Course 1	3	A	9	3 x 9 = 27
Course 2	3	C	7	3 x 7 = 21
Course 3	3	B	8	3 x 8 = 24
Course 4	3	S	10	3 x 10 =30
Course 5	3	A	9	3 x 9 = 27
Course 6	3	C	7	3 x 7 =21
Course 7	2	A	9	2 x 9 =18
Course 8	2	C	7	2 x 7 =14
Total	**22**			**182**

Performance in Second semester

SGPA of 2nd Semester= 182/22=8.27

Thus, CGPA at the end of II semester: $CGPA = \frac{22*7.86+22*8.27}{44} = 8.06$

CGPA calculation after Final Semester:

Sem-1	*Sem-2*	*Sem-3*	*Sem-4*	*Sem-5*	*Sem-6*	*Sem-7*	*Sem-8*
Credit : 16 SGPA: 7	Credit: 20 SGPA: 8.5	Credit : 22 SGPA: 9.2	Credit : 22 SGPA: 6.86	Credit : 20 SGPA: 8.18	Credit : 20 SGPA: 7.73	Credit : 20 SGPA: 8.68	Credit : 20 SGPA: 9.4

Thus, overall CGPA= $\frac{16*7+20*8.5+22*9.2+22*6.86+20*8.18+20*7.73+20*8.68+20*9.4}{160} = 8.21$

9.2 Eligibility for Award of B.Tech. Degree:

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

1. Registered and successfully completed all the components prescribed in the Programme of study to which he/she is admitted.
2. Obtained CGPA greater than or equal to 5 (Minimum requirements for Pass), Has no dues to the Institute, hostels, Libraries etc., and
3. No disciplinary action is pending against him/her.

9.3 Award of Class:

A candidate who becomes eligible for the award of B.Tech degree shall be placed in one of the following classes based on CGPA.

TABLE: CGPA REQUIRED FOR AWARD OF DEGREE

Distinction	≥7.75*
First Class	≥6.75
Second Class	≥5.75
Pass	≥5.00

*In addition to the required CGPA of 7.75, the student must have necessarily passed all the courses of every semester **in the minimum stipulated period for the programme.**

9.4 Improvement of Class:

A candidate, after becoming eligible for the award of the degree, may reappear for the Semester End Examination in any two (maximum) of the theory courses as and when conducted, for the purpose of improving the aggregate and the class. But this reappearance shall be within a period of one academic year after becoming eligible for the award of the Degree.

However, this facility shall not be availed of by a candidate who has taken the Provisional Certificate. Such candidates shall not be permitted to reappear either for CIE in any course or for Semester End Examination (SEE) in laboratory courses (including project Viva-voce) for the purpose of improvement.

9.5 Supplementary Examination:

In addition to the Regular End Examinations held at the end of each semester, Supplementary End Examinations will be conducted during the Semester break. A Student can appear for any number of supplementary examinations till he clears all courses which he could not clear in the first attempt. However, the maximum stipulated period shall not be relaxed under any circumstances.

9.6 Malpractices:

The Principal shall refer the cases of malpractices in Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) to an Enquiry Committee constituted by him. The committee will submit a report on the malpractice allegedly committed by the student to the Principal.

Rules pertaining to the punishments in the case of Malpractice are given in Annexure-I

9.7 Additional Academic Regulations:

i. Any Attempt to impress upon the teachers, examiners, faculty and staff of examinations, bribing for either marks or attendance will be treated as malpractice.

ii. When a student is absent for final examination, he is treated as to have appeared and obtained zero marks in that component and Grade is awarded accordingly.

iii. When a component of Continuous Internal Evaluation (CIE) or Semester End Examination (SEE) is cancelled as a penalty, he is awarded zero marks in that component.

iv. **Grade Sheet:** A grade sheet (memorandum) will be issued to each student indicating his/her performance in all courses taken in that semester and also indicating the grades and SGPA.

v. **Transcripts**: After successful completion of the total programme of study, a Transcript containing performance of all academic years will be issued as a final record. Candidates shall be permitted to apply for recounting/revaluation within the stipulated period with payment of prescribed fee.

vi. **The Academic Council has to approve and recommend to the JNTUK, Kakinada for the award of a degree to any student.**

9.8 Withholding of Results:

If the Student has not paid the dues, if any, 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.

9.9 Transitory Regulations:

For students admitted under special cases (mentioned in 2.1) these transitory regulations will provide the modus operandi.

At the time of such admission, based on the Programme pursued (case by case):

1. Equivalent courses completed by the student are established by the BOS concerned.
2. Marks/Credits are transferred for all such equivalent courses and treated as successfully cleared in the Programme of study prescribed by SVEC.

3. A Programme chart of residual courses not cleared will be derived and a Programme of study with duration specified will be prescribed for pursuit at SVEC.
4. Marks obtained in the previous system if the case be, are converted to grades and CGPA is calculated accordingly.

All other modalities and regulations governing shall be the same as those applicable to the stream of students with whom such a candidate is included into.

Regarding the students who were admitted under JNTU, Kakinada regulations for affiliated colleges:

If they happen to join and study along with their juniors at SVEC, the transitory regulations to be specified by JNTU, Kakinada for such students have to be followed.

10.0 GENERAL:

a) Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".
b) The Academic regulations should be read as a whole for the purpose of any interpretation.
c) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman of the Academic Council is final.
d) The Academic Council reserves the right to revise, amend, change or nullify the Regulations, Schemes of Examinations and/or Syllabi or any other matter depending on the needs of the students, society and industry.

11.0 B.Tech - LATERAL ENTRY SCHEME:

The B.Tech Degree of Sri Vasavi Engineering College (Autonomous), Pedatadepalli, Tadepalligudem under Jawaharlal Nehru Technological University Kakinada, Kakinada shall be conferred on candidates who are admitted into the second year of the programme and fulfill the requirements for the award of the Degree.

Applicable for the students admitted into II year B. Tech. (LES) from the Academic Year 2019-20 and onwards.

AWARD OF B. Tech. DEGREE – LES

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

- Having admitted into the second year of the programme, a student shall be declared eligible for the award of the B. Tech Degree (LES), if he/she pursues a course of study in not less than three academic years and not more than six academic years.
- The candidate shall register for all the courses as specified for the program of study from second year to fourth year. (As per the present curriculum, the candidate shall register for 124 credits and secure all the 124 credits to become eligible for the award of the degree).
- All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

Annexure-I

MALPRACTICES

S.No	Nature of Malpractices/Improper Conduct	Punishment
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.

COURSE STRUCTURE

&

SYLLABUS

(B.Tech ECE & ECT –V18 Regulation)

Course Structure

III Semester

S. No	Course Code	Course Name	L	T	P	Credits
1	V18ECT01	Electronic Devices & Circuits	3	1	-	4
2	V18ECT02	Digital System Design	3	-	-	3
3	V18ECT03	Signals & Systems	3	1	-	4
4	V18ECT 04	Network Theory	3	-	-	3
5	V18MBT51	Managerial Economics & Financial Analysis	3	-	-	3
6	V18ECL01	Electronic Devices & Circuits LAB	-	-	2	1
7	V18ECL02	Digital System Design LAB	-	-	2	1
8	V18ENT03	Professional Comm. Skills- I	3	-	-	MNC
9	V18ENT11	Constitution of India	2	-	-	MNC
		TOTAL	**20**	**2**	**4**	**19**

Total Contact Hours: 26 **Total Credits: 19**

IV Semester

S. No	Course Code	Course Name	L	T	P	Credits
1	V18ECT07	Analog & Digital Communications	3	1	-	4
2	V18ECT08	Analog Circuits	3	1	-	4
3	V18ECT09	Probability Theory & Stochastic Process	3	1	-	4
4	V18ECT10	Electromagnetic Waves & Transmission Lines	3	1	-	4
5	V18MAT03	Mathematics-III	3	-	-	3
6	V18ECL 05	Communications Lab	-	-	2	1
7	V18CSL32	Object Oriented Programming Through Java Lab	-	-	2	1
8	V18ECL06	Analog Circuits Lab	-	-	2	1
9	V18ENT04	Professional Communication Skills- II	3	-	-	MNC
		TOTAL	**18**	**4**	**6**	**22**

Total Contact Hours: 28 **Total Credits: 22**

V Semester

S. No	CourseCode	Course Name	L	T	P	Course-Category	Credits
1	V18CST81	Data structures & Algorithms	3	-	-	Professional Core	3
2	V18ECT11	VLSI design	3	-	-	ProfessionalCore	3
3	V18ECT12	Microprocessors & Microcontrollers	3	-	-	Professional Core	3
4	V18EET15	Control Systems	3	-	-	ProfessionalCore	3
5	V18ECT13 V18ECT14	**Professional Elective-I** • Antenna &Wave Propagation • Telecommunication SwitchingSystems & Networks	3	1	-	Professional Elective	4
6	V18ECT15	Engineer & Society	2	-	-	Mandatory & Non Credit	-
7	V18CSL34	Data Structures& Algorithms lab(BOS of CSE)	-	-	2	ProfessionalCore	1
8	V18ECL07	Microprocessor & Microprocontrollers Lab	-	-	2	Professional Core	1
9	V18ECL08	VLSI Design Lab	-	-	2	ProfessionalCore	1
10	V18ECMOOCs	MOOCs Course (Any Course in Engg. with Min 8 weeks)				Mandatory Course	2
11	V18ENT05	Professional Comm. skills(Eng+aptitude) –III (BOS of English)	4	-	-	Mandatory &Non Credit	MC
		TOTAL	**21**	**01**	**06**		**21**

VI Semester

S. No	Course Code	Course Name	L	T	P	Course-Category	Credits
1	V18CST11	Computer Networks	3	-	-	Professional Core	3
2	V18ECT16	Digital Signal Processing	3	-	-	Professional Core	3
3	V18ECT17	Microwave Engineering	3	-	-	Professional Core	3
4	V18ECT18 V18ECT19	**Professional Elective-II** • Embedded Systems-1 • CMOS Digital IC Design	3	-	-	Professional Elective	3
5	V18MBET52	Management Science	3	-	-	Humanities course	3
6		**Open Elective-I**	3			Open Elective	3
7	V18ECL09	Digital Signal ProcessingLab	-	-	2	Professional Core	1
8	V18CSL35	Computer Networks Lab	-	-	2	Professional Core	1
9	V18ENT06	Professional Comm. Skills (Eng+ aptitude) (MNC)- IV	4	-	-	Mandatory & Non Credit	--
		TOTAL	**22**	**-**	**04**		**20**

VII Semester

Sl. No	Course Code	Category	Course Title	Hours per week			Credits
				L	T	P	C
1	V18ECT20	Professional Core Courses	Radar Engineering	3	0	0	3
2	V18ECT21	Professional Core Courses	Optical Communication	3	0	0	3
3	V18ECT22	Professional CoreCourses	Digital Image Processing	3	0	0	3
4	V18ECT24 V18ECT25 V18ECT26	Prof. Elective Course	**Prof. Elective 3:** • IOT: Use Cases • CMOS Analog IC Design • Digital TV Engg.	3	0	0	3
5	V18ECT27 V18ECT28 V18ECT29	Prof. Elective Course	**Prof. Elective 4:** • Low Power IC Design • System On Chip • System Design ThroughVerilog	3	0	0	3
6	V18ECTOE4 V18ECTOE5 V18ECTOE6	Open Elective Course	**Open Elective-2:** • Principles of Wireless Comm. • Medical Electronics • Concepts of Embedded Systems	3	0	0	3
7	V18ECL11	Professional Core Course Lab	Microwave & Optical Comm. Lab	0	0	2	1
8	V18ECPR01	Project	Project	0	0	6	3
			Total	**18**	**0**	**8**	**22**

VIII Semester

Sl. No	CourseCode	Category	Course Title	Hours per week			Credits
				L	T	P	C
1	V18ECT30	Professional CoreCourse	Cellular Mobile Communication	3	0	0	3
2	V18ECT31 V18ECT32 V18ECT33	Professional ElectiveCourse	**Prof. Elective 5:** • Electronics Measurements & Instrumentation • FPGA Architecture • Principles of Modern Wireless Communication Systems	3	0	0	3
3	V18ECT34 V18ECT35 V18ECT36	Professional ElectiveCourse	**Prof. Elective 6:** • Satellite Communication • Biomedical Instrumentation. • Wireless Sensor Networks	3	0	0	3
4	V18ECTOE7 V18ECTOE8 V18ECTOE9	Open Elective Course	**Open Elective-3:** • Fundamentals of Digital Image & Video Processing • Embedded RTOS • Principles of Digital TV Engg.	3	0	0	3
5	V18ECPR02	Project	Project Contd.	0	0	16	8
			TOTAL	**12**	**0**	**16**	**20**

List of Open Elective Courses in the VI SEM

S. No	Course Code	Name of the Course	Department Offered
1	V18ECTOE1	Internet of Things	Electronics & Communication Engineering
2	V18ECTOE2	Introduction to Communication Systems	
3	V18ECTOE3	Introduction to VLSI Design	
4	V18CSTOE01	Data Base Management Systems	Computer Science Engineering.
5	V18CSTOE02	Software Engineering	
6	V18CSTOE03	Python Programming	
7	V18EEOE1	Energy Audit & Conservation	Electrical & Electronics Engineering
8	V18EEOE2	Electrical Measuring Instruments	
9	V18EEOE3	Industrial safety	
10	V18MEOE1	Basic Mechanical Engineering	Mechanical Engineering
11	V18MEOE2	Green Engineering	
12	V18MEOE3	Introduction to Robotics	

List of Open Elective- II Courses VII Semester

S. No	Course Code	Name of the Course	Department Offered
1	V18ECTOE4	Principles of Wireless Comm.	Electronics & Communication Engineering
2	V18ECTOE5	Medical Electronics	
3	V18ECTOE6	Concepts of Embedded Systems	
4	V18CSTOE04	Operating Systems	Computer Science Engineering.
5	V18CSTOE05	Artificial Intelligence	
6	V18CSTOE06	Java Programming	
7	V18EEOE4	Non-Conventional Energy Sources	Electrical & Electronics Engineering
8	V18EEOE5	Electrical Engineering Materials	
9	V18EEOE6	Servicing of Electrical Appliances	
10	V18MEOE4	Computer Aided Design	Mechanical Engineering
11	V18MEOE5	Condition Monitoring & Machine learning	
12	V18CEOE03	Environmental Pollution and Control	Civil Engineering
13	V18CEOE04	Disaster Management	

List of Open Elective- III Courses VIII Semester

S.No	Course Code	Name of the Course	Department Offered
1	V18ECTOE7	Fundamentals of Digital Image & Video Processing	Electronics & Communication Engineering
2	V18ECTOE8	Embedded RTOS	
3	V18ECTOE9	Principles of Digital TV Engg	
4	V18CSTOE07	Software Testing Methodologies	Computer Science Engineering.
5	V18CSTOE08	Cyber Security	
6	V18CSTOE09	Computer Graphics	
7	V18EEOE7	Energy Storage Systems	Electrical & Electronics Engineering
8	V18EEOE8	Basics of Electrical Power Generation	
9	V18EEOE9	Industrial Automation	
10	V18MEOE6	Power Plant Engineering	Mechanical Engineering
11	V18MEOE7	Mechatronics	
12	V18CEOE05	Solid Waste Management	Civil Engineering
13	V18CEOE06	Water Quality and Conservation	

III Semester Syllabus

III SEM	Electronic Devices And Circuits	Course Code: V18ECT01	L	T	P	C
			3	1	-	4

Syllabus

Course outcomes:

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

CO1: Explain the basic concepts of semiconductor physics and explain the formation of p-n Junction. **[K2]**

CO2: Discuss special semiconductor diodes. **[K2]**

CO3: Construct and working principle of rectifiers with and without filters with relevant expressions and necessary comparisons. **[K3]**

CO4: Describe the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations. **[K2]**

CO5: Explain the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions. [K2]

CO6: Analyze small signal low frequency transistor amplifier circuits using BJT and FET in different configurations. **[K4]**

Syllabus:

UNIT-I: Semi-Conductor Physics & Junction diode characteristics: Review of semiconductor physics, continuity equation, law of junction, p-n junction diode, current components in PN junction Diode, derivation of diode equation, V-I Characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

UNIT- II: Special Semiconductor Diodes: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, LCD, LDR, Photo diode, Photo transistor, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT, Construction, operation and characteristics of all the diodes are 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 π-section filter, derivation for ripple factor in each case.

UNIT- IV: Transistor Characteristics: BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/ reach through, 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 VBE, Ic, and β**,** Stability factors**,** (S**,** S'**,** S'')**,** Bias compensation**,** Thermal runaway**,** Thermal stability. FET Biasing.

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. Generalized analysis of FET amplifier small signal model, analysis of CS amplifier.

Text Books:

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill,Second Edition.
2. Integrated Electronics- Jacob Millman, C. Halkies, C.D.Parikh, Tata Mc-GrawHill, 2009.
3. Electronic Devices and Circuits – R.L Boylestad and Louis Nashelsky, Pearson publications

References:

1. Electronic Devices and Circuits-K. Satya Prasad, VGS Book Links.
2. Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-GrawHill, Second Edition
3. Electronic Devices and Circuits – Bell, Oxford
4. Electronic Devices and Circuits-A.P Godse,U.A.Bakshi , Technical publications.

III SEM	Digital System Design	Course Code: V18ECT02	L	T	P	C
			3	-	-	3

Syllabus

Course outcomes:

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

CO1: Explain the various types of number systems and their conversions,and logic Gates. **(K2)**

CO2: Apply the minimization techniques to simplify the hardware requirements of digital circuits. **(K3)**

CO3: Develop basic digital circuits with combinational logic using IEEE Standard1076 Hardware Description Language (VHDL). **(K3)**

CO4: Develop basic digital circuits with sequential logic using IEEE Standard1076 Hardware Description Language (VHDL). **(K3)**

CO5: Apply the knowledge of flip flops to construct different finite state machines. **(K3)**

CO6: Explain the concepts of different programmable logic devices. **(K2)**

UNIT – I: **NUMBER SYSTEMS & CODES**

i) Representation of numbers of different radix, conversion from one radix to another radix**,** r-1"s and r"s complements of signed members**,** problem solving**.**

ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 code etc.,

iii) Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX- NOR - Gates, Standard SOP and POS forms, Gray code, error detection and correction codes, 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 to 4 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

COMBINATIONAL LOGIC CIRCUITS DESIGN - I

Design of half adder, full adder, half subtractor, full subtractor, 4-bit adder- subtractor circuit, BCD adder circuit, Look-a-head adder circuit.

UNIT – III: COMBINATIONAL LOGIC CIRCUITS DESIGN -II

Design of decoder, encoder, priority encoder, multiplexer and demultiplexer, 4-bit digital comparator, Higher order multiplexing and demultiplexing, Realization of Boolean functions using decoders and multiplexers, Modeling of combinational logic circuits using VHDL.

UNIT – IV: SEQUENTIAL CIRCUITS-I

Classification of sequential circuits, basic flip-flops, truth tables and excitation tables, Conversion from one flip-flop to another flip-flop.

Design of registers: shift register, bi-directional shift register and universal shift register. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Modeling of sequential circuits using VHDL

UNIT – V: 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. Mealy to Moore conversion and vice- versa.

UNIT-VI: INTRODUCTION TO PLDs

PROM, PAL, PLA-Basics structures, merits & demerits, comparison, realization of Boolean functions and programming tables using PROM, PAL, PLA.

TEXT BOOKS:

1. Switching and finite automata theory-Zvi Kohavi,TMH, 2nd edition, 2008
2. Switching Theory and Logic Design - A. Anand Kumar, PHI Learning Pvt. Ltd, 3rd edition, 2016.
3. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd edition, 2005.
4. Digital Design - M.Morris Mano, Michael D Ciletti, Pearson Education Asia, 4th edition.
5. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

REFERENCES:

1. Modern Digital Electronics - RP Jain, TMH Education Pvt., Ltd.,, 4th edition, 2010.
2. Fundamentals of Logic Design - Charles H. Roth Jr, Jaico Publishers.
   Fundamentals of Digital Logic with VHDL Design- Stephen Brown,ZvonkoVranesic, McGraw-Hill, 3rd Edition.

III SEM	Signals & Systems	Course Code: V18ECT03	L	T	P	C
			3	1	-	4

Syllabus

Prerequisite: Fundamentals of Electrical Circuits, Linear Algebra andEquations, Ordinary Differential Equations.

Course Outcomes:

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

CO1: Apply the knowledge of linear algebra to vector space& analogy, orthogonality and basic signals. **(K3)**

CO2: Classify systems based on their properties and determine the response of LTI system using convolution. **(K2)**

CO3: Analyze the spectral characteristics of continuous-time signals and systemsusing Fourier analysis. **(K4)**

CO4: Apply sampling theorem concept to convert continuous time signals to discrete time signal and reconstruct. **(K3)**

CO5: Apply Laplacetransform and inverse Laplace transform to analyze continuous time signals and systems with respect to ROC. **(K3)**

CO6: Apply Z transform to analyze discrete time signals and systems with respect to ROC. **(K3)**

UNIT-I

BASIC SIGNALS: Introduction to signal and system, Classification of Signals, Elementary signals, Signal properties and operations, Orthogonal signal space, Signal approximation using orthogonal functions.

UNIT-II

LINEAR-TIME INVARIANT SYSTEMS: Properties of Systems, Continuous-Time LTI Systems: The Convolution Integral; Properties of Linear Time-Invariant Systems; Causal LTI Systems Described by Differential and Difference Equations.

UNIT III

FOURIER SERIES REPRESENTATION OF PERIODIC SIGNALS: Trigonometric and Exponential fourier series, Fourier Series Representation of Continuous-Time Periodic Signals(Sinusoidal, triangular and square); Convergence of the FourierSeries.

Fourier Transforms: Representation of Aperiodic Signals; The Continuous-Time Fourier Transform; The Fourier Transform for Periodic Signals; Properties of Continuous-Time Fourier Transform.

UNIT-IV

Representation of a Continuous-Time Signal by its Samples; The Sampling Theorem; Reconstruction of a Signal From its Samples; The Effect of Under Sampling; Aliasing; Discrete-Time Processing of Continuous Time Signals; Sampling of Discrete-Time Signals.

UNIT-V

Laplace Transforms: The Laplace transform; The Region of Convergence for Laplace Transforms; The Inverse Laplace Transform; Properties of the Laplace Transform; Laplace Transform Pairs; Analysis and Characterization of LTI Systems Using the Laplace Transform.

UNIT-VI

Z-Transforms: The Region of Convergence for the Z-Transform; Properties of the Z-Transform; Z-Transform Pairs; Analysis and Characterization of LTI Systems using Z-Transforms.

TEXT BOOKS:

1. Signals and Systems, A.V. Oppenheim and A.S. Willsky with S. H. Nawab, Second Edition, PHI Private limited.
2. Signals and Systems, Second Edition, S. Haykin and B. Van Veen, John Wiley & Sons.
3. B. P. Lathi, "Principles of Linear Systems and Signals", Second Edition, Oxford, 2009.

REFERENCES:

1. R.E.Zeimer, W.H.Tranter and R.D.Fannin, "Signals & Systems - Continuous and Discrete", Pearson, 2007.
2. John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007. 40
3. M.J.Roberts, "Signals & Systems Analysis using Transform Methods & MATLAB", Tata McGraw Hill, 2007.
4. ocw.mit.edu › Supplemental Resources › Signals and Systems
5. www.satishkashyap.com/2012/04/iit-video-lectures-on-signals-and.html
6. nptel.ac.in/courses/117104074/1
7. www.cdeep.iitb.ac.in/nptel/.../Signals%20and%20System/TOC-M1.htm freevideolectures.com/Subject/Signals-Systems

III SEM	Network Theory	Course Code: V18ECT04	L	T	P	C
			3	-	-	3

Syllabus

Course Outcomes:

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

CO1: Solve the electrical network using mesh and nodal analysis. **(K3)**

CO2: Apply network theorems to analyze the Electric circuits. **(K3)**

CO3: Explain RLC transient circuits and Filters. **(K2)**

CO4: Describe the steady state analysis of RLC circuits. **(K2)**

CO5: Analyze the resonance circuits. **(K4)**

CO6: Solve the two port network parameters. **(K3)**

UNIT – I

Introduction to Electrical Circuits : Network elements classification, Electric charge and current, Electric energy and potential, Resistance parameter – series and parallel combination, Inductance parameter – series and parallel combination, Capacitance parameter – series and parallel combination. Energy sources: Ideal, Non-ideal, Independent and dependent sources, Source transformation, Kirchoff's laws, Mesh analysis and Nodal analysis problem solving with resistances only including dependent sources.

Unit-II

Network theorems: Thevinin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, - problem solving using dependent sources also.

UNIT – III

Transients: Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, problem solving using R-L-C elements with DC excitation. Solutions using Laplace transform method.

UNIT – IV

Steady State Analysis of A.C Circuits: Response to sinusoidal excitation - pure resistance, pure inductance, pure capacitance, impedance concept, phase angle, series R-L, R-C, R-L-C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, problem solving.

UNIT – V

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, anti resonance at all frequencies.

UNIT – VI

Two-port networks: Relationship of two port networks, Z-parameters, Y- parameters, Transmission parameters, h-parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascade connection of two port networks, series connection of two port networks, problem solving.

TEXT BOOKS:

1. Electric Circuit Analysis by Hayt and Kimmarle, TMH Eigth Edition , 2012.
2. Network Analysis by Van-Valkenberg.

REFERENCES:

1. Circuit Theory (Analysis and Synthesis) By ABHIJIT Chakrabarti 7th Revised Edition,Dhanpat Rai &Co.
2. Basic Circuit Analysis by DR Cunninghan, Jaico Publishers.
3. Network Analysis and Filter Design by Chadha, Umesh Publications.
4. Circuits & Network Analysis & Synthesis - A.Sudhakar & Shyam Mohan S.Pillai Tata McGraw Hill, 2nd Edition, 1994.

III SEM	Managerial Economics and Financial Analysis	Course Code: V18MBT51	L	T	P	C
			3	-	-	3

Syllabus

Course Outcomes:

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

CO1: Understand the basic concepts of managerial economics, demand, and elasticity of demand and methods of demand forecasting. **[K2]**

CO2: Estimate the production function with one, two and infinite variables. Understand various cost concepts and calculating breakeven point. **[K2]**

CO3: Understand and showing a price output determination in different types of market structures and knowing various pricing methods. **[K2]**

CO4: Understand various forms of business organizations. **[K2]**

CO5: Prepare financial statements and its analysis. **[K3]**

CO6: Appraise the projects by using various capital budgeting methods. **[K4]**

UNIT-I Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting..

UNIT – II Production and Cost Analyses: Concept of Production function- Cobb- Douglas Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale- Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total cost –Cost–Volume-Profit analysis- Determination of Breakeven point(simple problems)Managerial significance and limitations of Breakeven point.

UNIT – III Introduction to Markets, & Pricing Policies: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing, Flat Rate Pricing, Usage sensitive pricing and Priority Pricing.

UNIT – IV 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.

UNIT – V Introduction to Accounting & Financing Analysis: Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis

UNIT – VI Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods and modern methods (simple problems)

TEXT BOOKS

1. Dr. N. AppaRao, 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.Prabhakararao, Prof. P. Venkatarao. „Managerial Economics and Financial Analysis", Ravindra Publication.

REFERENCES:

1. Shailaja Gajjala and Usha Munipalle, Univerties press, 201 Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand.2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.
4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui&A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
8. Ramesh Singh, Indian Economy, 7th Edn., TMH2015
9. Pankaj Tandon A Text Book of Microeconomic Theory, Sage Publishers, 2015.

III SEM	Electronic Devices and Circuits Lab	Course Code: V18ECL01	L	T	P	C
			-	-	2	1

Syllabus

Course Outcomes:

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

CO1: Identify, Test and describe the specifications of various components. **[K2]**

CO2: Find the unknown Frequency using Cathode Ray Oscilloscope. **[K1]**

CO3: Interpret the Characteristics of various semiconductor devices. **[K2]**

CO4: Sketch the Regulation Characteristics of Zener Diode. **[K3]**

CO5: Examine the Performance of Rectifiers with and without Filters. **[K3]**

CO6: Sketch the Frequency Response of Amplifiers and Compute Bandwidth. **[K3]**

Electronic Workshop Practice:

1. Identification, Specifications, and Testing of R, L, C Components (Colour Codes),Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices like Diodes, BJTs,JFETs, LEDs, UJT.
3. Study and operation of Ammeters, Voltmeters, Transformers, Analog and DigitalMultimeter, Function Generator, Regulated Power Supply and CRO..

List of Experiments:

1. P-N Junction Diode Characteristics
Part A: Germanium Diode (Forward bias only)
Part B: Silicon Diode (Forward & Reverse bias)

2. Rectifiers (without and with c-filter)
Part A: Half-wave Rectifier
Part B: Full-wave Rectifier

3. Zener Diode Characteristics
Part A: V-I Characteristics
Part B: Zener Diode as Voltage Regulator

4. BJT Characteristics (CB Configuration)
Part A: Input Characteristics
Part B: Output Characteristics

5. BJT Characteristics (CE Configuration)
Part A: Input Characteristics
Part B: Output Characteristics

6. FET Characteristics (CS Configuration)
Part A: Drain Characteristics
Part B: Transfer Characteristics

7. UJT Characteristics

8. BJT-CE Amplifier

9. Emitter Follower-CC Amplifier

10. FET-CS Amplifier

III SEM	Digital System Design Lab	Course Code: V18ECL02	L	T	P	C
			-	-	2	1

Syllabus

Course Outcomes:

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

CO1: Examine the logic behavior of various IC gates. **(K3)**

CO2: Construct and test combination logic circuits. **(K3)**

CO3: Construct and test synchronous Asynchronous sequential circuits. **(K3)**

CO4: Develop and Simulate Combinational logic circuit and validate its functionality using VHDL on Xilinx Software Package. **(K3)**

CO5: Develop and Simulate Sequential logic circuit and validate its functionalityusing VHDL on Xilinx Software Package. **(K3)**

LIST OF EXPERIMENTS

Part A: USING HARDWARE (Minimum of 5 Experiments to be done)

1. Verification of Basic Logic Gates and implementing all individual gates with Universal Gates.
2. Construct Half Adder and Full Adder using Half Adder and verify the truth table.
3. Design a Combinational Logic circuit for 3X8 Decoder and verify the truth table.
4. Design a Combinational Logic circuit for 4x1 MUX, 1X4 De-MUX and verify the truth table.
5. Verification of truth tables of the basic Flip- Flops with Synchronous and Asynchronous modes.
6. Design a Decade Counter and verify the truth table.

Part B: USING XILINX Tool (Minimum of 5 Experiments to be done)

Note: The students are required to design and draw the internal logical structure of the following Digital Circuits and to develop VHDL/Verilog HDL Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.

1. Design of Full Adder using 3 modeling systems.
2. 8 to 3 Encoder (with and without parity).
3. 4- Bit comparator-IC 7485.
4. Flip-Flops (D/SR/JK Flip-Flops).
5. 4 bit binary up/down counter-IC74193.
6. Shift registers-IC 7495.

IV Semester Syllabus

IV SEM	Analog & Digital Communications	Course Code: V18ECT07	L	T	P	C
			3	1	-	4

Syllabus

Pre requisites: Signals and systems, Mathematics.

Course outcomes:

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

CO1: Explain the spectral characteristics, generation and detection techniques of Amplitude modulation techniques. **(K2)**

CO2: Explain the spectral characteristics, generation and detection techniques of angle modulation techniques. **(K2)**

CO3: Illustrate different types of noise and predict its effect on analog communication Systems. **(K3)**

CO4: Describe the generation and detection methods of various digital modulation schemes. **(K2)**

CO5: Analyze Optimal Reception of Digital Signal and explain various multipleaccess techniques. **(K4)**

CO6: Describe the concepts of error control coding. **(K4)**

UNIT I

Analog Modulation: Need for modulation, Frequency Division Multiplexing, **Linear Modulation Techniques** - AM, DSB-SC, SSB, VSB - Time domain and frequency domain description, single tone modulation, power relations - Generation & Detection. Applications, AM Transmitters, AM Receivers - Super-heterodyne receiver, IF, AGC.

UNIT II

Angle Modulation: Phase and Frequency Modulation, Narrow band and Wide band FM, Carsons rule, Indirect and direct method of FM generation, Detection of FM, Applications, Phase locked loop, Comparison of FM and AM. FM Transmitters, FM Receivers.

UNIT III

Noise in Analog Communication system: Noise in DSB &SSB system, Noise in AM system, Noise in Angle Modulation system, Pre-emphasis and de-emphasis.

Pulse Modulation: Time Division Multiplexing, PAM, PWM, PPM-Generation and Detection.

UNIT IV

Digital Modulation Systems: Pulse Modulation: Baseband signals. Sampling process; Quantization Process; Quantization Noise; Pulse-Code Modulation; Noise Considerations in PCM Systems; Differential Pulse-Code Modulation, Delta modulation, adaptive delta modulation, Amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK), M-array modulation schemes.

UNIT V

Optimal Reception of Digital Signal: Matched filter receivers, optimum receiver - bandwidth consideration and probability of error calculations for these schemes.
Multiple Access Techniques: TDMA, FDMA and CDMA

UNIT VI

Information theory and Error control Coding: Measure of information – Entropy, Information rate– Source coding theorem – Channel capacity – Shannon- Hartley law – Shannon's limit-Error, control Codes – Linear codes, Cyclic codes, Convolution Coding.

TEXT BOOKS:

1. Simon Haykin and Michael Moher, "An Introduction to Analog & Digital Communications", 2nd Ed., Wiley, (2007).H Taub& D. Schilling, GautamSahe, "Principles of Communication Systems",TMH, 3rd Edition, (2007).
2. Tomasi, Wayne, "Electronics Communication Systems- Fundamentals through advanced", 5th Edition, Pearson Education, 2009
3. Lathi, "Modern Digital & Analog Communications Systems", 2e, Oxford University Press

REFERENCE BOOKS:

1. Loen W. Couch, "Modern Communication Systems: Principles & Applications", Prentice Hall, (P621.382/84), (1995)
2. Bruce Carlson, Paul B. Crilly and Janet C. Rutledge, "Communication Systems: An Introduction to Signals and Noise in Electrical Communications", 4th Edition, McGraw-Hill, (2002).
3. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, (2001).
4. NevioBenvenuto, Roberto Corvaja, Tomaso Erseghe, and Nicola Laurenti, "Communication Systems: Fundamentals and Design Methods", John Wiley & Sons, (2006).
5. Andrew J. Viterbi & Jim K. O, "Principles of Digital Communication and Coding", McGraw-Hill Book Company.
6. Bernard Sklar, "Digital Communications - Fundamentals and Applications", 2E, Prentice Hall.
7. Sam Shanmugam, K, "Digital and Analog Communication Systems", Wiley publisher (2006).

IV SEM	Analog Circuits	Course Code: V18ECT08	L	T	P	C
			3	1	-	4

Syllabus

Course outcomes:

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

CO1: Construct wave shaping circuits for various applications. **(K3**)

CO2: Analyze transistor amplifier circuits at low and high frequencies. **(K4)**

CO3: Explain the operation of feedback and Power amplifiers. **(K2)**

CO4: Explain the operation of sinusoidal and non-sinusoidal oscillators. **(K2)**

CO5: Construct circuits for different applications using ICs. **(K3)**

CO6: Explain the operation of Active filters and Data Converters. **(K2)**

UNIT I

Wave shaping circuits: Response of high pass and low pass RC circuits to step, pulse inputs. High pass RC circuit as differentiator, low pass RC circuit as integrator. Series and shunt clippers, clipping at two independent levels, Positive and Negative Clampers.

UNIT II

Transistor at High frequencies: Hybrid π CE transistor model, CE short circuit current gain, Current gain with resistive load, Gain bandwidth product.

Multistage amplifiers: Low frequency analysis of cascade and cascode amplifiers.

UNIT III

Feedback and Power amplifiers: Voltage series, current series, voltage shunt, current shunt feedback amplifiers, effect of negative feedback. Various classes of operation (Class A, B, AB, C), power efficiency calculations.

UNIT IV

Oscillators: Oscillators: Basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge), LC oscillators (Hartley, Colpitts) Non-sinusoidal oscillators: Bistable, Monostable and Astable Multivibrators.

UNIT V

Integrated Circuits and applications: Op-amp Block Diagram, Ideal Op-amp, Equivalent Circuit, Power supplies, Ideal voltage transfer curve, open loop op-amp configurations. Inverting and non-inverting amplifiers, summing, scaling, averaging amplifier, integrator and differentiator, 555 timer functional block diagram, Astable and Monostable multivibrators.

UNIT VI

Active filters and Data Converters: First order Low pass, high pass, band pass and band stop filters, All pass filter design guidelines. Weighted resistor DAC, R- 2R ladder DAC. Dual slope ADC, Successive approximation ADC, flash ADC.

Text Books:

1. Integrated Electronics- J. Millman and C.C. Halkias, TMH
2. Electronic Devices and Circuits- Salivahanan, N.Suresh Kumar, A. Vallavaraj, TMH
3. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, TMH
4. Pulse and Digital Circuits – A. Anand Kumar, PHI
5. Linear Integrated Circuits – D. Roy Choudhury, 4th edition, New Age International (p) Ltd.
6. Op-Amps & Linear Integrated Circuits - Ramakanth A. Gayakwad,3rd edition, PHI.

References :

1. Electronic Devices and Circuits Theory – Robert L. Boylestad and LouisNashelsky, Pearson/Prentice Hall.
2. Electronic Circuit Analysis - B.V.Rao, K.R.Rajeswari, P.C.R.Pantulu, K.B.R.Murthy, Pearson Publications.
3. Pulse & Digital Circuits-BN Yoga Narasimhan, 2000,Sri Maruthi Publishers, Bangalore.
4. Operational Amplifiers & Linear Integrated Circuits–Sanjay Sharma ;SKKataria &Sons;2nd Edition,2010.

IV SEM	Probability Theory & Stochastic Processes	Course Code: V18ECT09	L	T	P	C
			3	1	-	4

Syllabus

Course outcomes:

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

CO1: Explain basic concepts of probability theory through Sets and Relative Frequency. **[K2]**

CO2: Explain the concept of a random variable, functions based on randomvariable like distribution and density functions. **[K2]**

CO3: Compute the expected value, moments on one random variable. **[K3]**

CO4: Illustrate the concepts of joint distribution & density functions onmultiple random variables and their transformations with examples**. [K3]**

CO5: Compute the statistical characteristics of stochastic processes like auto correlation & cross correlationfunctions. **[K3]**

CO6: Calculate the power density spectrum and cross power- density spectrum of signals. **[K3]**

UNIT I: PROBABILITY : Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability**,** Total Probability**,** Bayes" Theorem, Independent Events

UNIT II: **THE RANDOM VARIABLE**: Definition of a random variable, Discrete, continuous and mixed random Variables. Distribution & density functions and its properties of a random variable. Binomial, Poisson, Uniform, Gaussian, Exponential and Rayleigh random variables. Conditional distribution and density functions and its properties.

UNIT III: 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, characteristic function, moment generating function, transformations of a random variable: Monotonic transformations for a continuous random variable

UNIT IV: 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 variables case

UNIT V: 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, nth-order and strict-sense Stationarity, time averages and Ergodicity, autocorrelation function and its properties, cross-correlation function and its properties, covariance functions

UNIT VI: RANDOM PROCESSES – SPECTRAL CHARACTERISTICS: The power density spectrum: properties, relationship between power density spectrum and autocorrelation function, the cross-power density spectrum, properties, relationship between cross-power density spectrum and cross-correlation function.

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.Unnikrishna Pillai, PHI, 4th Edition, 2002.
3. Probability Theory and Stochastic Processes, Y. Mallikarjuna Reddy, 4th Edition, Universities Press,

REFERENCE BOOKS:

1. Probability Theory and Stochastic Processes – B. Prabhakara Rao, BS Publications
2. Probability and Random Processes with Applications to Signal Processing, Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
3. Schaum's Outline of Probability, Random Variables, and Random Processes.
4. An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook, 1968.
5. Random Process – Ludeman , John Wiley
6. Probability Theory and Random Processes, P. Ramesh Babu, McGrawHill, 2015.

IV SEM	Electro Magnetic Waves & Transmission Lines	Course Code: V18ECT10	L	T	P	C
			3	1	-	4

Syllabus

Course outcomes:

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

CO1: Use various laws of static electric field to determine E. **(K3**)

CO2: Use Various laws of magneto static field to determine H and Apply Maxwell"s equations to analyze the time varying behavior of EM waves. **(K3)**

CO3: Compute the Propagation Characteristics of the EM Waves in different mediums. **(K3)**

CO4: Calculate Brewster angle, critical angle and total internal reflection. **(K3)**

CO5: Compute Primary and Secondary constants for a given transmission line. **(K3)**

CO6: Calculate reflection coefficient, VSWR etc. using smith chart. **(K3)**

UNIT I: Review of Co-ordinate Systems, **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; Types of Capacitance Illustrative Problems.

UNIT II: Magneto Statics : Biot-Savart Law, Ampere"s Circuital Law and Applications, Magnetic Flux Density, Maxwell"s Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, 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. Introduction to Boundary conditions. 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 Lossless and Conducting Media. Wave Propagation in Good Conductors and Good Dielectrics. Polarization. Illustrative Problems.

UNIT IV: EM Wave Characteristics – II: Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance. Poynting Theorem – Applications, 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, Infinite Line Concepts, Lossless line. Condition for Distortionless Line. Illustrative Problems. **UNIT VI: Transmission Lines – II :** Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines – Impedance Transformations. Smith Chart – Configuration and Applications, Single 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.
3. Electromagnetic field theory and Transmission Lines – G.SasibhusanaRao,Wiley India Pvt.L

REFERENCES:

1. Electromagnetic Fields and Wave Theory –GSN Raju, Pearson Education 2006
2. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.
3. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech. India Publications), New Delhi, 2001.
4. Electromagnetic waves & Radiating Systems, Prentice Hall, India 3. Narayana Rao, N: Engineering Electromagnetics, 3rd ed., Prentice Hall, 1997.
5. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.

IV SEM	Analog Circuits Lab	Course Code: V18ECL06	L	T	P	C
			-	-	2	1

Syllabus

Course outcomes:

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

CO1- Construct circuit for linear wave shaping circuits. **[K3]**

CO2- Construct feedback amplifiers and obtain their characteristics **[K3]**

CO3- Construct different RC and LC oscillators using BJT based on the frequencyrange. **[K3]**

CO4- Construct circuit and analyze different multivibrator circuits. [**K4]**

CO5- Construct circuits for verifying linear and nonlinear applications using IC741 op-amp and IC 555 timer. [**K3]**

CO6- Sketch the Frequency Response Characteristics of Active filters. **[K3]**

Minimum Ten Experiments to be conducted:

1. Linear wave shaping
2. Non Linear wave shaping
3. Voltage-Series Feedback Amplifier
4. Class B Push-Pull Power Amplifier
5. RC Phase Shift/Wien Bridge Oscillator
6. Hartley/Colpitt"s Oscillator
7. B istable Multi vibrator.
8. Summing, Scaling, Averaging amplifiers using IC 741.
9. Integrator and Differentiator Circuits using IC 741.
10. A stable Multi vibrator using IC 555.
11. Active Filters – LPF, HPF (first order)
12. 4 bit Digital to Analog Converter

IV SEM	Communications Lab	Course Code: V18ECL05	L	T	P	C
			-	-	2	1

Syllabus

Course outcomes:

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

CO-1- Demonstrate the operation of various pulse modulation and demodulation techniques. **[K3]**

CO-2 -Construct the pre-emphasis and de-emphasis circuits and verify its frequency response. **[K3]**

CO-3 -Demonstrate the spectrum analysis of modulated signal using spectrum analyzer, operation of AGC and PLL. **[K3]**

CO-4- Understand the Time division multiplexing and Demultiplexing, Pulse digital modulation techniques, such as PCM, DPCM, and DM, Companding theorem. **[K2]**

CO-5- Understand generation and detection of digital modulation techniques, such as ASK, PSK, FSK and DPSK. **[K2]**

CO-6- Verify the Source encoding and decoding (Huffman Coding) technique and channel encoding and decoding techniques. **[K3]**

List of Experiments (Twelve experiments to be done)

A. Analog Communications

1. Amplitude Modulation - Mod. & Demod.
2. AM - DSB SC - Mod. & Demod.
3. Spectrum Analysis of Modulated signal using Spectrum Analyser
4. Pre-emphasis & De-emphasis
5. Frequency Modulation - Mod. & Demod, PLL.
6. Sampling Theorem - Pulse Amplitude Modulation - Mod. & Demod.
7. PWM , PPM - Mod. & Demod.

B. Digital Communications

1. Pulse code modulation, Differential pulse code modulation.
2. Delta modulation, Companding.
3. ASK, FSK, PSK.
4. Differential phase shift keying.
5. Source Encoder and Decoder
6. Channel coding-
   i. Linear Block Code-Encoder and Decoder
   ii. Binary Cyclic Code – Encoder and Decoder
   iii. Convolution Code – Encoder and Decoder

V Semester Syllabus

V Sem.	Data Structures and Algorithms	Course Code: V18CST81	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student willbe able to:

CO1: Explain Sorting and searching techniques. **(K2)**
CO2: Demonstrate algorithm notations. **(K2)**
CO3: Develop Singly Linked Lists, Double Linked List. **(K3)**
CO4: Interpret the Basic Concepts in Data Structures, Stacks and Queues **(K3)CO5:** Develop Binary trees and BST **(K3)**
CO6: Develop various graph algorithms. **(K3**)

UNIT I: Sorting: bubble sort, insertion sort, selection sort, quick sort, merge sort, heap sort, radix sort.
Searching: linear search, binary search. Introduction to hashing, hash functions.

UNIT II: Introduction to data structures – Basic terminology, classification of data structures, operation on data structures, ADT, time and space complexity, Big O,Omega and Theta notation.
Arrays: Representation of arrays - polynomial representation, addition of two polynomials, sparse representation, transpose of sparse matrix. (**Refer Reference Text book 1**)

UNIT III: Linked list: Introduction, **single linked list** Representation of node, operations on single linked list, reverses the linked list. **Double linked list**: operations (insert delete and display). **Circular linked List** and its operations (create and display single circular linked list).

UNIT IV: Stacks introduction, array representation, operations, linked list representation, operation on linked stacks, infix to postfix conversion, evolution of arithmetic expression. **Queues** Introduction, Array representation, operations linked list representation, linked queue operations, circular queues.

UNIT V: Trees: Introduction, Terminology, Representation of Trees, types of trees, Binary Trees: Properties of Binary Tress, creating a binary tree from general tree, Tree Traversals. **Binary Search Tree:** introduction, creation, insertion, delete, display and search operations.

UNIT – VI: Graphs: introduction, Terminology, directed graphs, Graph Representation, **Graph Traversal techniques**: Depth First Search, Breadth First Search. **Spanning Trees**: Krushkal's Algorithm, Prim's algorithm. Single source shortest Paths and all pair shortest path algorithm.

TEXT BOOKS:

1. Data Structures using C by ReemaThareja, Second Edition, oxford publications.
2. Data Structures, algorithms and applications in C++, SartajSahni, Universities press, Second Edition.

REFERENCE BOOKS:

1. Fundamentals of Data Structures and algorithms by C V Sastry, RakeshNayak, Ch. Raja Ramesh, Distributed by Wiley publications, new Delhi.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, SartajSahni andDinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.
3. An Introduction to Data Structures with Application, Jean-Paul Tremblay ,Paul Sorenson, Second Edition.
4. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
5. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

V Sem.	VLSI Design	Course Code: V18ECT11	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student willbe able to:

CO1: Understand different IC technologies and basic electrical properties of MOS, CMOS and Bi-CMOS Circuits. **(K2)**

CO2: Develop layouts for MOS & Bi-CMOS circuits using design rules. **(K3)**

CO3: Calculate the parameters of MOS circuits and assess the effects of scaling. **(K3)**

CO4: Analyze the concept of Combinational and arithmetic circuits. **(K4)**

CO5: Describe the fundamentals of low power VLSI design. **(K2)**

UNIT-I

Review of Microelectronics and An Introduction to MOS technology: Introduction to IC technology, Basic MOS transistors, Enhancement mode MOS transistorAction, Depletion mode MOS transistor Action, NMOS, PMOS fabrication, CMOS fabrication and Bi-CMOS technology, Comparison between CMOS and Bi-CMOStechnology.

UNIT-II

Basic Electrical Properties of MOS and BICMOS Circuits: I_{ds} versus V_{ds} relationships, Aspects of MOS transistor threshold voltage V_t, Trans conductance g_m, Output conductance g_{ds} and Figure of merit, NMOS inverter, Pull-up to pull- down ratio for NMOS inverter driven by another NMOS inverter and through oneor more pass transistors, Alternative forms of pull-up, CMOS inverter, BICMOS inverters, Latch-up in CMOS circuits.

UNIT-III:

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/Bi-CMOS 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-IV:

Basic Circuit Concepts: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit, Inverter

Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances,Choice of layers.

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling.

UNIT-V:

Subsystem design and layout: Architectural issues, Switch logic, Gate Logic Examples of Structured Design (Combinational Logic): A Parity Generator, Bus Arbitration Logic for n-line-Bus

An Illustration of Design Process: Multiplier, Design of an ALU Subsystem, Ripple Carry Adder, and Carry look ahead adder.

UNIT-VI:

Introduction to Low Power VLSI Design: Need for Low Power VLSI chips, Sources of Power dissipation, Short circuit power dissipation Switching power dissipation and Short channel Effects. Low Power design through Voltage Scaling: VTCMOS, MTCMOS.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems by Kamran Eshraghian, Douglas and A. Pucknell and SholehEshraghian, Prentice-Hall of India Private Limited, 2005Edition
2. CMOS Digital Integrated Circuits Analysis and Design by Sung-Mo Kang, Yusuf Leblebici, Tata McGraw- Hill Education, 2003.

REFERENCE BOOKS:

1. Practical Low Power Digital VLSI Design|| by Gary K. Yeap, , KAP, 2002
2. Low Power CMOS VLSI Circuit Design||by Kaushik Roy, Sharat Prasad,Willey, 2000.

V Sem.	Microprocessor & Microcontrollers	CourseCode: V18ECT12	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student willbe able to:

CO1: Describe the basic architecture and Modes of 8086 microprocessor. **(K2)**
CO2: Construct assembly language programs for arithmetic and Logical Operations **(K3)**
CO3: Describe the Hardware and software requirements in interfacing. **(K2)**
CO4: Describe Architecture and features of Intel 8051 microcontroller. **(K2)**
CO5: Construct assembly language programs for 8051 microcontroller. **(K3)**
CO6: Identify latest technology in microcontroller environment**. (K2)**

UNIT-1: **Introduction to Microprocessors**: Evolution of Microprocessors, features, Intel Microprocessor families, Architecture of 8086 microprocessor, pin/signal description, Physical address formation, I/O Addressing capability. Minimum Mode Maximum mode of 8086, General bus operation, Description of Minimum mode pins, Timing diagrams.
Interrupts, Available interrupts, Interrupt Cycle, ISR (Interrupt service Routine), and subroutines, Interrupt programming.

UNIT-II: **Programming with 8086 Microprocessor**: Various addressing modes of 8086, Instruction set and Classification, Assembler Directives of 8086.Program development steps, assembly language program development tools, Machine level programming, and writing programs with an assembler, writing Assembly language program using procedures and assembler macros. Sample Programs using various types of instructions.

UNIT – III: **Interfacing with Basic Peripherals**: Semiconductor memories interfacing (RAM, ROM), Interfacing Microprocessor to keyboards, interfacing to ADC/DAC , Interfacing 8255(PPI-Parallel I/O port), 8254(programmable Interval Timer/counter), 8259(Programmable interrupt controller), 8251(serial communication UART), DMA - 8237 data transfer, Stepper motor interfacing and programming.

UNIT – IV:**8051 Microcontroller**: Intel 8051 Microcontroller, Microprocessor vs. Microcontroller, 8051 Microcontroller Architecture, Microcontroller 8051 pin diagram, Internal and External Memory, Counters and Timers, Serial Communication in 8051, interrupts in 8051.
Addressing Modes, Data Transfer Instructions, Data and Bit-Manipulation Instructions, Arithmetic Instructions, simple programs using microcontroller 8051.

UNIT – V: PIC Microcontroller: Introduction, characteristics of PIC microcontroller, PIC microcontroller families, memory organization, parallel and serial input and output, timers, Interrupts, PIC 16F877 architecture, instruction set of the PIC 16F877.

UNIT – VI: **Atmega328 Microcontroller**: Architecture and PIN Description of Atmega328 Arduino microcontroller. Arduino Language reference program structure, data types, variables & constants, operators, control statements and loops.

TEXT BOOKS:

1. Advanced microprocessor and Peripherals by A.K.Ray and K.M.Bhurchandi, TMH, 2000.
2. Microprocessors and Interfacing by Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGrawHill Education Private Limited, 3rd Edition.

REFERENCE BOOKS:

1. The Intel Microprocessors-Architecture, Programming, and Interfacing by Barry B.Brey,Pearson, Eighth Edition-2012.

2. Beginning Arduino Programming by Brian Evans.

V Sem.	Antenna & Wave Propagation Professional Elective-1	CourseCode: V18ECT13	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student willbe able to:

CO1: Understand the radiation mechanism and fundamental parameters of antenna **(K2)**

CO2: Solve the field components of dipole, quarter monopole antenna and their characteristics. **(K3)**

CO3: Solve array factor for N element linear array and directivity **(K3)**

CO4: Design basic micro strip antennas such as rectangular and circular andexplain the concepts of modern antennas **(K3)**

CO5: Design Microwave antennas and explain the procedure for antenna gain and Radiation pattern measurement **(K3)**

CO6: Explain concept of propagation methods and fading in wave propagation. **(K2)**

UNIT I

ANTENNA FUNDAMENTALS: Introduction, Radiation Mechanism – single wire, two wires, Current Distribution on a thin wire antenna. Antenna Parameters –Near and far field regions, Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beam width, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, Reciprocity Theorem applicable to antenna Simple Problems.

UNIT II

WIRE ANTENNAS: Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Electric and magnetic Field Components, Radiation Resistance, Beam width, Directivity Loop Antennas: Small Loops - Concept of short magnetic dipole -Field Components, Comparison of far fields of small loop and short dipole, Helical Antennas – Significance, Geometry, basic properties; Design considerations for mono filer helical antennas in Axial Mode and Normal Modes.

UNIT III

ANTENNA ARRAYS : Two element arrays – N element Uniform Linear Arrays – Broadside, End-fire Arrays, Array factor, EFA with Increased Directivity, Derivation of their characteristics and comparison, Principle of Pattern Multiplication, Non – Uniform arrays- Binomial arrays , Phased Arrays concept- Beam scanning- Applications – Antenna synthesis-Binomial method.

UNIT IV

MICROWAVE ANTENNAS AND ANTENNA MEASUREMENTS Parabolic Reflectors – Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds, Cassegrain Feeds. Horn Antennas – Types-Design Characteristics of Pyramidal Horns. **Antenna Measurements** – Block diagram of radiation pattern measurement setup and measurement procedure, Distance Criterion, Indoor and outdoor measurement- Far field measurement – Anechoic chamber-Advantages-Block diagram of Gain Measurements and measurement procedure (Comparison, Absolute and 3-Antenna Methods).

UNIT V

MODERN ANTENNAS: Micro strip Antennas-Geometry, Features, Advantages and Limitations, Rectangular and Circular Patch Antennas –Radiation mechanism-Design –Simple design problems of MSA- Smart antennas- Block diagram- concept- switched beam and adaptive array concept –MIMO antenna-Wearable antenna.

UNIT VI

WAVE PROPAGATION AND TRENDS IN WIRELESS COMMUNICATION: Concepts of Propagation – frequency ranges and types of propagations. Concept of Ground Wave Propagation - Sky Wave Propagation –Mechanism of Reflection and Refraction – Concept of Tropospheric propagation . Fading, Types of fading, Multipath propagation.

TEXT BOOKS

1. Antennas for All Applications by John D. Kraus and Ronald J. Marhefka, 3rd Edition, TMH, 2003.
2. Electromagnetic Waves and Radiating Systems by E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
3. Broadband Microstrip Antenna by Girish Kumar, Artech house Publishers

REFERENCES

1. Antenna Theory by C.A. Balanis, John Wiley and Sons, 2nd Edition, 2001.
2. Antennas and Wave Propagation by K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3. Antennas and Wave Propagation by SisirK.Das and Annapurna Das – TataMcGrawHill
4. Electronic and Radio Engineering by F.E. Terman, McGraw-Hill, 4th Edition, 1955.
5. Antennas – John D. Kraus, McGraw-Hill, 2nd Edition, 1988.

V Sem.	Electronic Switching Systems Professional Elective-1	CourseCode: V18ECT14	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student willbe able to:

CO1: Explain functioning of Manual and cross bar automatic switching systems **(K2)**

CO2: Explain the stored program control concept involved in electronic switching systems. **(K2)**

CO3: Describe the inherent facilities with time division switching, Combinational switching. **(K2)**

CO4: Analyze the various CCITT signaling models, Various Plans. **(K4)**

CO5: Investigate the methods of collecting& measuring traffic data. **(K3)**

CO6: Explain the architecture and services of ISDN. **(K2)**

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 pointTechnology, Crossbar Exchange Organization.

UNIT -II:

Electronic Space Division Switching: Stored Program Control, Centralized SPC: Standby mode, Synchronous duplex mode, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-Stage Networks, Three-Stage Networks, n- Stage Networks.

UNIT -III

Time Division Switching: Basic Time Division Space Switching, Basic Time Division Time Switching, Generalized time division Space switch, Basic Time division time switching: modes of operation, simple problems, Time Multiplexed Space Switching, Time Multiplexed Time division space Switch, Time Multiplexed Time Switching, Combination Switching: Time Space (TS) Switching, Space-time (ST) Switching **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, CCITT Signaling System no.6.**Packet Switching: C**oncepts of Packet switching, Local- Area and Wide- Area Networks, Large-scale Networks.

UNIT -V:

Switching Networks: Single- Stage Networks, Grading, Link Systems, and Grades of service of link systems, Application of Graph Theory to link Systems, Use of Expansion, and Call Packing.

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

UNIT -VI:

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

Text Books:

1. Telecommunication Switching Systems and Networks by Thiagarajan Viswanathan, 2000, PHI.
2. Telecommunications Switching, Traffic and Networks by J. E. Flood, 2006, Pearson Education.

References:

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

V Sem.	Engineer and Society	CourseCode: V18ECT15	L	T	P	C
			3	0	0	-

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student willbe able to:

CO-1: Comprehend different moral perspectives an done's own Ethical standards. **(K2)**
CO-2: Understand the concept of safety and risk. **(K2)**
CO-3: Explain different initiativest op rotect nature. **(K2)**
CO-4: Identify the role of Information Technology. **(K2)**
CO-5: Understand different types of infringement of Intellectual Property Rights. **(K2)**
CO-6: Understand the importance of Entrepreneurship. **(K2)**

UNIT–I: Human Values

What is engineering – who is an engineer - Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue -Value time – Co-operation – Commitment – Empathy–Self-confidence –Character.

UNIT–II: Engineer's Responsibilities and Rights

Safety and risk –Types of risks – Voluntary vs. Involuntary risk –Short Term vs. LongTermConsequences–ExpectedProbability–ReversibleEffects–Threshold Levels for Risk – Delayed vs. Immediate Risk – Collegiality – Techniques for achieving Collegiality-Two senses of Loyalty– Rights– Professional Responsibilities – Confidential and Proprietary information.

UNIT–III: Global climatic issues and mitigation strategies

Greenhouse effect –global warming – acid rain – ozone layer depletion – International efforts-key initiatives of Montreal protocol, Rio declaration, Kyoto protocol, Johannesburg summit.

UNIT–IV: Future challenges to society

Sustainable development – Measures for sustainable development – Water conservation practices–Rain water harvesting methods-Water shed management Resettlements and Rehabilitation of people-waste and reclamation–Role of information technology-Role of an engineering mitigating societal problems.

UNIT –V: Patent law, Trade Marks and Copyrights

Introduction, Types of IPR – Patent requirements - Application process – Ownership–Transfer–Infringement–Litigation.

Trade Mark and Copyrights: Introduction – Registration Process – Transfer – Infringement.

UNIT–VI: Entrepreneurship Meaning, definition& concept of Entrepreneurship, characteristics &skills of entrepreneur, Role of an entrepreneur in economic development.

TEXT BOOKS

1. Professional ethics and human values by Ddharani kota Suyodana, Maruti publications (unit1,2).
2. Environmental studies|| by Deeksha Dave, P. Udaya Bhaskar, Cengage Learning. (unit3, 4).

REFERENCE BOOKS

1. Professional Ethics and Human Values, by A. Alavudeen, R. Kalil Rahman and M. Jayakumaran- University Science Press.
2. Environmental Studies by R.Rajagopalan 2nd Edition 2011, Oxford University Press.
3. Intellectual Property Rights by R.Radha Krishnan, S.Balasubramanian ExcelBooks, NewDelhi.
4. Intellectual Property Rights by PrabhuddhaGanguli. Tata McGrawHill, NewDelhi.
5. Fundamentals of Entrepreneurship by PH.Nandan, PHILearning, NewDelhi.

V Sem.	Data Structures and Algorithms Lab	CourseCode: V18CSL34	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student willbe able to:

CO1: Construct Sorting and searching methods. **(K3)**
CO2: Construct hash table **(K3)**
CO3: Implement programs using Singly Linked Lists, Double Linked List. **(K3)**
CO3: Construct Basic Data Structures, Stacks, Queues and Applications. **(K3)**
CO4: construct Binary search tree. **(K3)**
CO5: Implement various graph operations and shortest path algorithm. **(K3)**

List of Experiments

1. Programs to implement the following sorting techniques Selection sort, Quick sort,Merge sort
2. Programs to implement the following searching methods
   (a)Linear search (b) Binary search.
3. A Program to Implement hash table and its operations.(Note: Use at least one collisionresolution technique)
4. A Program to implement addition of two polynomials. (Using arrays).
5. A Program to implement single linked list and its operations. (create, insert, delete,display, reverse list)
6. A Program to implement double linked list and its operations.
7. A Program to implement stack operations using arrays.
8. A Program to implement queue operations using arrays.
9. A Program to convert infix expression to postfix expression.
10. A Program to implement Binary search Tree and its operations.
11. A Program to implement graph traversal algorithms (BFS & DFS).
12. A Program to implement minimum spanning tree algorithms (Prims & Krushkal)
13. A Program to implement single source shortest path algorithm.

TEXT BOOKS:

1. Data Structures, algorithms and applications in C++, SartajSahni, Universities press, Second Edition.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, SartajSahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

REFERENCE BOOKS:

1. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
2. Fundamentals of Data Structures and algorithms by C V Sastry, RakeshNayak, Ch.Raja Ramesh, IK Publications, new Delhi.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
   Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

V Sem.	Microprocessor &Microcontrollers Lab	CourseCode: V18ECL07	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student willbe able to:

CO-1: Develop algorithm and logic for different operations using 8086 Instructions. **(K3)**

CO-2: Construct simple programs for 8086 using Assembler directives (MASM)/Machine control Instructions. **(K3)**

CO-3: Develop ALP to perform arithmetic and logical operations using various instructions. **(K3)**

CO-4: Develop ALP to perform conversions, finding squares of a numbers by using Loop, Jump instructions. . **(K3)**

CO-5: Develop Assembly language programs for 8051 Micro controller . **(K3)**

CO-6: Perform some applications using ARDUINO BOARD **(K3)**

LIST OF EXPERIMENTS

PART- A:

8086 Assembly Language Programming using Assembler Directives

Introduction to MASM/TASM

1. Basic Arithmetical operations –Unsigned Addition, Subtraction, Multiplication and Division.

(Machine programming and Assembler programs)

2. Multi byte addition/subtraction
3. Sorting of given array of elements (Ascending order /descending order)
4. Sum of squares/cubes of a given n-numbers
5. Shift and rotate operations for given number.

PART- B:

8051 Assembly Language Programming

6. Write an Assembly Language program to find average of n numbers by 8051 microcontroller.
7. Write an Assembly Language program to find the no of 1's and 0's in a givennumber by 8051 Microcontroller.
8. Write an Assembly Language program to interface stepper motor to 8051 microcontroller(Both directions)

PART C: ARDUINO programming:

9. Blinking a LED using ARDUINO board and provide some delay.
10. Interfacing different sensors to ARDUINO board and observe their operation.
11. 2 to 3 week Mini Project

Requirements:

PC installed with TASM/MASM, Keil Micro visionRegulated
power supplies (12v)
Interfacing modules (Study Cards),FRC, USB (RS232) Cables.
ARDUINO Boards.

V Sem.	VLSI Design lab	CourseCode: V18ECL08	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student willbe able to:

CO1: Explain the VLSI Design Methodologies using Mentor Graphics Tools. **(K2)**
CO2: Demonstrate significance of various CMOS Analog and Digital circuits in Full-custom IC Design flow. **(K2)**
CO3: Explain the Physical Verification in Layout Design. **(K2)**
CO4: Design and analyze of Analog and mixed signal simulation. **(K2)**
CO5: Analyze the Significance of Pre-Layout Simulation and Post-Layout Simulation. **(K2)**

PART-A

List of Experiments:

Design the following experiments using 130nm CMOS technology and extract parasitics.

1. CMOS Inverter
2. Universal Logic gates
3. Full Adder
4. RS-Latch & D- latch
5. JK-Flip Flop
6. Ripple Carry Adder
7. Asynchronous Counter
8. Ring Oscillator
9. R-2R Ladder Type DAC
10. Differential Amplifier
11. 2-3 week Mini Project.

Lab Requirements:

Software:

Mentor Graphics – Pyxis Schematic, IC Station, Calibre, ELDO Simulator

VI Semester Syllabus

VI Sem.	Computer Networks	CourseCode: V18CST11	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student willbe able to:

CO1: Discuss fundamentals of network concepts and Reference Models. **(K2)**

CO2: Discuss Communication media and switching techniques. **(K2)**

CO3: Demonstrate Error control and protocols. **(K3)**

CO4: Apply Routing algorithms and congestion control algorithms. **(K3)**

CO5: Discuss Transport layer services and protocols. **(K2)**

CO6: Describe Application layer protocols. **(K2)**

UNIT-I: Introduction: Reference models: The OSI Reference Model- the TCP/IP Reference Model, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT– II: Physical Layer: Transmission Media, Multiplexing: FDM, WDM and TDM- LAN Technologies, introduction to switching: Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT–III: Data link layer: Design issues, Framing, Flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, MAC: ALOHA, CSMA. Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. Sliding window protocol: One bit, go back N, Selective repeat-Stop and wait protocol, HDLC, point to point protocol (PPP).Piggybacking.

UNIT-IV : Network Layer : Network layer design issues- Algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast Routing algorithms- Congestion control and algorithms, Internet Protocol (IP) Addresses, Subnet masking

UNIT–V :Transport Layer: Services, Primitives and sockets, Elements of transport protocols, Internet Transport protocols(TCP,UDP,RPC,RTTP/RTP,RTCP) Segmentheaders, Primitives, Control, Congestion control, Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT–VI: Application Layer: DNS, SMTP, POP, And FTP HTTP Presentationformatting. Network security: Introduction to Cryptography, Authentication, Basics of Public key and private key cryptography, digital signatures and certificates firewalls and wireless security.

TEXT BOOKS:

1. Computer Networks by Andrew S Tanenbaum, 4th Edition. PearsonEducation/PHI
2. Data Communications and Networks by Behrouz A. Forouzan.Third Edition TMH

REFERENCES:

1. An Engineering Approach to Computer Networks by S.Keshav, 2nd Edition, Pearson Education
2. Understanding Communications and Networks, 3rd Edition by W.A. Shay,Thomson

VI Sem.	Digital Signal Processing	CourseCode: V18ECT16	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student willbe able to:

CO1: Classify Discrete Time Signals, systems, estimate the response of various Systems **(K2)**

CO2: Compute DFT for discrete time signals using FFT Algorithm. **(K3)**

CO3: Describe the various implementations of digital filter structures. **(K2)**

CO4: Analyze and design a Digital filter (FIR&IIR) from the given specifications. **(K4)**

CO5: Use the Multi-rate Processing concepts in various applications. **(K2)**

CO6: Describe the concepts of DSP Processor. **(K3)**

UNIT I INTRODUCTION: Review of Signals and systems, Digital Signal Processing: Discrete time signals & sequences, Classification of Discrete time Systems, stabilityof LTI systems. Response of LTI systems to arbitrary inputs. Solution of Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

UNIT II DISCRETE FOURIER TRANSFORMS: Introduction to DTFT**,** Discrete Fourier transforms, Properties of DFT, Introduction to Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, InverseFFT.

UNIT III REALIZATION OF DIGITAL FILTER: Review of Z-transform, digital filters, Block diagram representation of linear constant coefficient difference equations, Basic structures of IIR systems, Transposed forms. Basic structures of FIR systems.

UNIT IV DESIGN OF IIR and FIR DIGITAL FILTERS: Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital filters from Analog filters, Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques and Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING: Introduction, Decimation, Interpolation Sampling rate conversion, Implementation of sampling rate converters**,**Applications – Sub-band Coding of Speech Signals.

UNIT VI INTRODUCTION TO DSP PROCESSORS: Introduction to programmable DSPs, Multiplier and Multiplier Accumulator, Modified bus structures and memory access schemes in P-DSPs, Multiple Access Memory, Multi ported memory, VLIW architecture, Pipelining, Special addressing modes, On-Chip Peripherals. Introduction to Software Defined Radio.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications by John G.Proakis, Dimitris G.Manolakis,Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing by A.V.Oppenheim and R.W. Schaffer, PHI

REFERENCE BOOKS:

1. Digital Signal Processing by Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing by MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
3. Digital Signal Processing by Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006
4. Digital Signal Processing by Ramesh babu, Sci Tech publications
5. Digital Signal Processing by A.NagoorKani, RBA Publications.

VI Sem.	Embedded Systems-1	CourseCode: V18ECT17	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student willbe able to:

CO1: Describe the Basic Concepts of embedded systems. **(K2)**

CO2: Describe the characteristics of Application & Domain-Specific Embedded Systems. **(K2)**
CO3: Discuss various hardware, software design approaches in embedded environment. **(K2)**
CO4: Develop programming and interfacing of 8051 using development tools. **(K3)**
CO5: Explain the fundamental concepts of ARM Architecture. **(K2)**
CO6: Develop ALP programs using ARM/Thumb instruction set. **(K3)**

UNIT I - INTRODUCTION TO EMBEDDED SYSTEMS

Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas, purpose of embedded systems, typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, embedded firmware.

UNIT II: APPLICATION AND DOMAIN-SPECIFIC EMBEDDED SYSTEMS

Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT-III: EMBEDDED HARDWARE / FIRMWARE DESIGN:

Analog and digital electronic components, I/O types and examples, Serial communication devices, Wireless devices, Embedded Firmware design approaches, Embedded Firmware development languages, DMA, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT IV- PROGRAMMING AND INTERFACING OF 8051

Interfacing: LEDs & switches interfacing, keypad is interfacing, Seven Segment Display interfacing, 16X2 LCD interfacing, stepper motor interfacing, serial port interfacing using Embedded C.

UNIT – V: ARM ARCHITECTURE

ARM Design Philosophy, ARM Core Data Flow Model, Registers, PSR, Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families.

UNIT – VI: ARM PROGRAMMING MODEL

Instruction Set: Data Processing Instructions, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions

Text Books:

1. Embedded systems|| by Shibu K.V Tata McGraw Hill Education Pvt. Ltd.2013
2. Microcontrollers: Theory and Applications|| by AJAY V Deshmukh TATA McGraw Hill publications2012
3. ARM System Developer's Guide – Designing and Optimizing System Software||by Andrew Sloss, Dominic Symes, Chris Wright, , ELSEVIER

References:

1. The8051Microcontroller:Architecture,Programming,andApplications‖ by Kenneth J.Ayala, West Publishing
2. 8051Microcontrollers&EmbeddedSystems|| by Muhammad Ali Mazdi Pearson Education
3. ARM System on chip Architecture|| by Steve Furber 2nd Edition | Pearson

VI Sem.	Microwave Engineering Professional Elective- II	CourseCode: V18ECT18	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student willbe able to:

CO1: Derive TE/TM modes in Rectangular waveguide and characteristics.**(K4)**

CO2: Illustrate the construction, operation and, Derive Power output and efficiency of Two cavity Klystron and Reflex klystron**(K4)**

CO3: Illustrate the construction and operation of Travelling wave tube, cylindrical cavity magnetron and derive Hull cut off condition **(K4)**

CO4: Explain operation of various passive waveguide components and calculate Scattering matrix for them **(K3)**

CO5: Explain the operation of Microwave Solid State Devices and Understand basics of Microwave Integrated circuits and Materials for MIC**(K2)**

CO6: Explain the procedure for measuring various microwave parameters using a Microwave test bench **(K2)**

UNIT I

MICROWAVE TRANSMISSION LINES: Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides(RWG) – Solution of TE and TM wave equation in RWG- Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relation & Characteristics

- Cavity resonators – Rectangular cavity resonator – Dominant mode – Resonant frequency – related problems.

UNIT II

MICROWAVE TUBES (O type) : Limitations and Losses of conventional tubes at microwave frequencies. Re-entrant Cavities, Microwave tubes – O type and M type classifications. O-type tubes :2 Cavity Klystrons – Structure, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for o/p Power and Efficiency, Applications, Reflex Klystrons – Structure, Applegate Diagram and Principle of working,

Bunching Process, Power Output, Efficiency, Applications, Related Problems.

UNIT III

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

UNIT IV

MICROWAVE PASSIVE COMPONENTS : Waveguide Attenuators- Waveguide phase shifters - Scattering Matrix-Significance, Formulation and Properties-Directional coupler –Magic Tee-operation and Scattering Matrix Calculation of E plane Tee, H plane Tee and Magic Tee and Directional coupler - Ferrite Components- Faraday rotation - Gyrator -Isolator and Circulator

UNIT V

MICROWAVE SOLID STATE DEVICES: TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Oscillation Modes
- Avalanche Transit Time Devices – IMPATT Diodes – Principle of Operation and characteristics, Detector Diode, PIN Diode applications, Introduction to MMIC- Monolithic Microwave Integrated circuits – Materials - Related Problems.

UNIT VI

MICROWAVE MEASUREMENTS: Description of Microwave Bench – Different Blocks and their Features, Precautions; Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Impedance, Measurement of Dielectric constant.

TEXT BOOKS:

1. Microwave Devices and Circuits by Samuel Y. Liao, PHI, 3rd Edition,1994.
2. Foundations for Microwave Engineering by R.E. Collin, IEEE Press, John Wiley,2nd Edition, 2002.
3. Microwave Engineering|| by David M. Pozar , Fourth Edition, Wiley, India 2012.

REFERENCES:

1. Microwave Principles by Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004
2. Microwave Engineering by Annapurna Das and Sisir K.Das, Mc Graw Hill Education, 3rd Edition.
3. Microwave and Radar Engineering by M. Kulkarni, Umesh Publications, 3rd Edition.
4. Microwave Engineering by G S N Raju , I K International
5. Microwave and Radar Engineering by G Sasibhushana Rao Pearson

VI Sem.	CMOS Digital IC Design	CourseCode: V18ECT19	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student willbe able to:

CO1: Understand the concepts of NMOS and Pseudo NMOS designs. **(K2)**

CO2: Describe the combinational MOS Logic Circuits. **(K2)**

CO3: Explain the Principle and Performance of dynamic CMOS Circuits. **(K2)**

CO4: Apply the concepts of Combinational MOS Logic Circuits in Designingthe Transmission Gates. **(K2)**

CO5: Demonstrate the behavior of Bi-stable Elements and Flip flops. **(K2)**

CO6: Calculate Leakage Currents in various semiconductor memories. **(K2)**

UNIT-I: MOS Design

NMOS & Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low Voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time; CMOS logic - Inverter, logic gates.

UNIT-II: Combinational MOS Logic Circuits:-I

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,

UNIT-III: Combinational MOS Logic Circuits-II:

AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-IV: Sequential MOS Logic Circuits

Behavior of bitable elements, Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-V: Dynamic Logic Circuits

Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits – Domino logic, NORA logic.

UNIT-VI: Semiconductor Memories

Types, 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 Circuit Design by Ken Martin, Oxford University Press, 2011.
2. CMOS Digital Integrated Circuits Analysis and Design by Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective by Ming-BO Lin,CRC Press, 2011
2. Digital Integrated Circuits – A Design Perspective, by Jan M. Rabaey, Anantha Chandrakasan, BorivojeNikolic, 2nd Ed., PHI.

VI Sem.	Digital signal Processing Lab	CourseCode: V18ECL09	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student willbe able to:

CO1: Design and simulate Digital IIR and FIR filter. **(K3)**
CO2: Develop and simulate Interpolator and Decimator. **(K3)**
CO3: Apply DSP algorithms for audio applications. **(K3)**
CO4: Apply DSP algorithms on a DSP processor for real time applications. **(K3)**

List of Experiments:

PART - A

1. **Convolution**
   (a) To perform linear convolution of two signals(b)To perform circular convolution of two signals

2. **Discrete Fourier Transform and Fast Fourier Transform**
   (a) To obtain a N-point DFT of a signal using recursive algorithm.(b)To determine the FFT of a 1-D signal.

3. **Digital IIR Filter Design**
   To design and simulate Infinite Impulse Response (IIR) filters and analyze their Responses

4. **Digital FIR Filter Design**
   To design and simulate Finite Impulse Response (FIR) filters and analyze their Responses

5. **Interpolator and Decimator Design**
   To design and simulate an Interpolator and Decimator.

6. **Audio application**
   (a) Read a .wav file and plot time domain waveform of a speech signal
   (b) Read a .wav file and Plot spectrograms with different window sizes and shapes

List of Experiments using CC Studio:

PART – B

7. TMS320C6713 Architecture

To study the architecture of TMS320C6713 DSP processor.

8. Fast Fourier Transform

To determine the FFT of a 1-D signal

9. Digital IIR Filter Design

To design Infinite Impulse Response (IIR) filters and analyze their responses in real time.

10. Digital FIR Filter Design

To design Finite Impulse Response (FIR) filters and analyze their responses in real time.

11. Power Spectral Density

To obtain the Power Spectral Density of a periodic signal in real time.

11 2 to 3 week Mini Project.

VI Sem.	Computer Networks Lab	CourseCode: V18CSL35	L	T	P	C
			0	0	3	1.5

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student willbe able to:

CO1: Implement Error detection techniques. **[K3]**

CO2: Implement Routing Algorithms. **[K3]**

CO3: Implement Congestion Algorithms. **[K3]**

CO4: Implement Sliding Window Algorithms. **[K3]**

CO5: Implement socket programming. **[K3]**

List of Experiments:

From 1-4 simulation and 5-11 implement using C/C++/Java/Python

1. Study of basic network commands and Network configuration commands.
2. Implementation of Bit Stuffing
3. Implementation of Character Stuffing
4. Implementation of Dijkstra's algorithm
5. Implementation Distance vector algorithm
6. Construct Detecting error using CRC-CCITT
7. Implementation of stop and wait protocol
8. Implementation of Congestion control using leaky bucket algorithms
9. Implementation using Socket TCP both client and server programs.
10. Implementation using Socket UDP both client and server programs

TEXT BOOKS:

1. Computer Networks Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH

REFERENCES:

1. An Engineering Approach to Computer Networks by S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks by 3rd Edition, W.A. Shay, Thomson

VI Sem.	Internet of Things Open Elective- I	CourseCode: V18ECTOE1	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student willbe able to:

CO- 1: Describe M2M and IOT Technologies. **(K2)**

CO- 2: Identify the layers and protocols in IOT. **(K2)**

CO- 3: Describe various communication technologies used in IOT**. (K2)**
CO- 4: Demonstrate various hardware components required for IOT applications. **(K2)**
CO- 5: Identify the cloud technologies**. (K2**)
CO- 6: Explain the applications of IoT. **(K2)**

UNIT I – INTRODUCTION

Introduction from M2M to IoT - An Architectural Overview, building architecture, Main design principles and needed capabilities, An IoT architecture outline, M2M and IoT Technology Fundamentals - Devices and gateways

UNIT II – IOT PROTOCOLS

Functionality of Layers in IoT –Study of protocols - Wireless HART, Z-Wave, 6LoWPAN, RPL, CoAP, MQTT.

UNIT III - COMMUNICATION TECHNOLOGIES IN IOT

IoT Connectivity-IEEE 802.15.4, Wi-Fi, Bluetooth, Zigbee, LPWAN, 5G Era.

UNIT IV - SYSTEM HARDWARE

Sensors, Actuators, Radio Frequency Identification, Introduction to Embedded Devices for IoT - RASPBERRY PI.

UNIT V – Cloud Computing
Data Collection, Storage and Computing Using a Cloud Platform for IoTApplications/Services.

UNIT VI - IOT APPLICATIONS

Real time applications of IoT - Smart and Connected Cities,Public Safety, Irrigation.

TEXTBOOKS:

1. From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence‖, 1st Edition, by Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, DavidBoyle, Academic Press, 2014.

2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things by David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, Cisco Press 800 East 96th Street Indianapolis, Indiana 46240 USA.

REFERENCE BOOKS:

1. From Internet of Things to Smart Cities: Enabling Technologies - edited by Hongjian Sun, Chao Wang, Bashar I. Ahmad, CRC Press -2018.
2. Architecting the Internet of Things|| by Bernd Scholz-Reiter, Florian Michahelles, , ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer.
3. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT byDavidEtter.
4. Internet of Things (A Hands-on-Approach)|| by Vijay Madisetti and Arshdeep Bahga, 1st Edition, VPT, 2014.
5. Internet of Things by Raj Kamal, McGraw-Hill Education. Copyright.

VI Sem.	Principles of CommunicationSystems (Open Elective- I)	CourseCode: V18ECTOE2	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student willbe able to:

CO1: Demonstrate the fundamentals of communication systems. **(K2)**

CO2: Compare the various analog modulation and demodulation schemes. **(K2)**

CO3: Compare the various digital modulation and demodulation schemes. **(K2)**

CO4: Explain the wireless communication system concepts. **(K2)**

CO5: outline the satellite communication system principles. **(K2)**

CO6: outline the Optical communication system principles. **(K2)**

UNIT-I

Fundamentals of Communication systems: Block diagram of communication system; types of communications-analog and digital; Noise–types of noise, sources of noise, and calculation of noise in linear systems, and noise figure.

UNIT-II

Fundamentals of Analog Communication: Need for modulation; Types of modulation, generation and detection of AM, Angle modulation: frequency & phase modulations, comparison of AM, FM & PM. Sampling theorem, NY Quist criteria, introduction to PAM, PWM and PPM.

UNIT-III

Fundamentals of Digital Communication: Advantages; Working principle of PCM; comparison of PCM, DM; introduction to digital modulation techniques-ASK, FSK,PSK.

UNIT-IV:

Fundamentals of Wireless Communication : Evolution of mobile communications, Mobile Radio System around the world, Types of Wireless communication System, Comparison of Common wireless system, Concepts of 2G, 3G, 4G. Wireless LocalLoop(WLL),Wireless Local Area network(WLAN), Bluetooth and Personal Area Networks. Introduction to 5G.

UNIT-V

Fundamentals of Satellite communication: Brief history of Satellite systems; Principles, architecture, advantages, disadvantages, applications and frequency bands used for satellite communication.

UNIT VI:

Fundamentals of Optical Communication: Evolution of fiber optic system- Element of an Optical Fiber Transmission link and Reception link- Total internal reflection- Acceptance angle –Numerical aperture Optical Fiber Modes and Configurations - Linearly Polarized Modes -Single Mode Fibers-Graded Index fiber structure.

TEXT BOOKS:

1. Principles of Communications by H. Taub and D. Schilling, TMH, 2003.
2. Wireless Networks: Applications and Protocols by T. S. Rappaport, Pearson Education
3. Satellite Communications by Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
4. Optical Fiber Communication by John M. Senior (Pearson)

REFERENCES:

1. Electronic Communication Systems by Kennedy and Davis, TMH, 4th edition,2004.
2. Wireless Communication and Networks: 3G and Beyond by I. Saha Misra, TMHEducation.
3. Satellite Communications: Design Principles by M. Richharia, B S publications,2nd Edition, 2003.
4. Optical Fibre Communication by Gerd Kaiser (TMH)

VI Sem.	Introduction to VLSI Design (Open Elective- I)	CourseCode: V18ECTOE3	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student willbe able to:

CO1: Demonstrate the fundamentals of IC technology such as various MOSfabrication technologies**. (K2)**

CO2: Compute electrical properties of MOS circuits such as Ids – Vds relationship,And MOS circuit parameters. **(K3)**

CO3: Develop stick diagrams, layouts using design rules of various MOSTechnologies**. (K3)**

CO4: Compute the sheet resistance, area capacitance of various MOS layersAnd inverter delays. **(K3)**

CO5: Explain the various MOS circuit parameters scaling and assess theEffects of scaling. **(K2)**

CO6: Demonstrate VHDL synthesis, simulation, design capture tools design Verification tools. **(K2)**

UNIT –I Introduction

Introduction to IC technology – The IC era – MOS and related VLSI technology – Basic MOS transistors – Enhancement and depletion modes of transistor action – IC production process – MOS and CMOS fabrication process – BiCMOS technology – Comparison between CMOS and bipolar technologies.

UNIT – II

Basic electrical properties of MOS and BiCMOS circuits Ids–Vds relationships – Aspects of MOS transistor threshold voltage – MOS Trans– conductance and output conductance – MOS Transistor – Figure of merit – The pMOS transistor – The nMOS inverter – Determination of pull– up to pull– down ratio for nMOS inverter driven by another nMOS inverter for an nMOS inverter driven through one or more pass Transistors – Alternative forms of pull up – The CMOS Inverter MOS transistor Circuit model – Bi–CMOS Inverters.

UNIT – III

MOS and BiCMOS circuit design process

MOS layers – Stick diagrams – Design rules and layout – General observation on the design rules, 2 m double metal, double poly – CMOS/BiCMOS rules, m Double metal, Double poly CMOS rules – Layout diagrams of NAND and NOR gates and CMOS inverter – Symbolic Diagrams – Translation toMaskForm.

UNIT – IV

Basic circuit concepts

Sheet resistance – Sheet resistance concept applied to MOS transistor and inverters – Area capacitance of layers – Standard unit of capacitance – Some area capacitance calculations – The delay unit – Inverter delays – Driving large capacitive loads – Propagations Delays – Wiring Capacitance – Fan–in and Fan–out characteristics – Choice of layers – Transistor switches – Realization of gates using nMOS, pMOS and CMOS technologies.

UNIT – V

Scaling of MOS circuit

Scaling models and scaling factors – Scaling factors for device parameters – Limitations of scaling – Limits due to sub threshold currents – Limits on logic level and supply voltage due to noise – Limits due to current density.

UNIT – VI:

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 net list formats for design representation – VHDL synthesis – Programming approach.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems by Kamran Eshraghian, Douglas and A.Pucknell and SholehEshraghian, Prentice–Hall of India Private Limited, 2005Edition.
2. VLSI Design by K. LalKishor and V.S.V.Prabhakar, I.K. International Publishing House Private Limited, 2009 First Edition.
3. VLSI Design by A.Shanthi and A.Kavitha, New Age International Private Limited, 2006 FirstEdition.

REFERENCES BOOKS:

1. VLSI Design By Debaprasad Das, Oxford University Press, 2010.
2. VLSI Design By A.Albert Raj & T. Latha, PHI Learning Private Limited,2010.

VII Semester Syllabus

VII Sem.	Radar Engineering	Course Code: V18ECT20	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student will beable to:

CO1: Derive the radar range equation and to solve some analytical problems. **[K2]**

CO2: Describe the operation of CW and FMCW Radar systems. **[K2]**

CO3: Illustrate the principle of each and every block of MTI and Pulse Doppler Radar **[K2]**

CO4: Distinguish the different methods used for tracking targets. **[K2]**

CO5: Relate the Noise Figure and Noise Temperature in Radar Receivers **[K2]**

CO6: Explain the various components of radar receiver and its performance. **[K2]**

UNIT–I:

Basics of Radar: Introduction, Maximum Unambiguous Range, simple Radar range Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications.
Radar Equation : Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, SNR, Probability of Detection, Probability of False Alarm, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets-sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses.

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.
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, Nth 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, Matched Filter with Non-white Noise, Noise Figure and Noise Temperature.

UNIT –VI:

Radar Receivers –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.

TEXT BOOKS:

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd Ed.,2007.
2. Radar Principles – Peebles, Jr., P.Z., Wiley, New York, 1998.
3. Microwave & Radar Engineering – G. SasibhushanaRao, Pearson Publications

REFERENCE BOOKS:

1. Introduction to Radar Systems, 3rd edition – M.I. Skolnik, TMH Ed., 2005
2. Microwave & Radar Engineering – M. Kulkarni, Umesh Publications, 3rd edition
3. Radar Engineering – GSN Raju, IK International.

VII Sem.	Optical Communication	Course Code: V18ECT21	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1: Describe the overview of optical fiber communication, ray theory transmission and Concepts of modes. **[K2]**

CO2: Explain thoroughly the operation of optical sources, Quantum efficiency and power. **[K2]**

CO3: Classify different types of optical detectors and also explain the operation of optical Receiver. **[K2]**

CO4: Illustrate the concept of power launching and power coupling for optical fibers. Discuss splicing techniques and connector losses. **[K3]**

CO5: Explain the types of fiber materials with their properties and fiber losses. **[K2]**

CO6: Construct optical link and becomes familiar with WDM concepts and measurement Techniques. **[K3]**

UNIT I

Introduction - Historical development, the general system, advantages of optical fiber communications. Optical fiber wave guides - 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

Optical sources-LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, Laser diode rate equations, External quantum efficiency, resonant frequencies, Reliability Considerations.

UNIT III

Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors, Optical receiver operation - Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantum limit, Analog receivers. Related problems.

UNIT IV

Fiber materials - Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal Degradation 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 V

Source to fiber power launching-Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Lensing Schemes for Coupling, Laser diode to fiber coupling. Fiber to Fiber joints – Mechanical misalignment, Fiber related losses, End face preparation, Fiber Splicing-Splicing techniques, Splicing single mode fibers, Optical fiber Connectors-Connector types, Single mode fiber connectors, Connector return loss,Multimode fiber joints, Single mode fiber joints.

UNIT VI

Optical system design - Point-to- point links- System considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, Operational Principles of WDM, Measurement of Attenuation and Dispersion, Eye pattern.

TEXT BOOKS:

1. Optical Fiber Communications – Gerd Keiser, McGraw-Hill International edition,3rd Edition, 2000.
2. Fiber Optic Communication Systems – Govind P. Agarwal, John Wiley, 3rdEdition, 2004.

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 Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

VII Sem.	Digital Image Processing	Course Code: V18ECT22	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1: Illustrate the different Transforms Techniques & their use in Image Processing Applications **(K3)**

CO2: Examine Spatial & frequency domain filtering like smoothing & sharpening Operation son Images **(K4)**

CO3: Analyze Restoration operations/techniques on Images **(K4)**

CO4: Describe the Image compression Techniques and multi-resolution processing on Images **(K3)**

CO5: Analyze morphological operations on Images & Image segmentation **(K4)**

CO6: Illustrate the different color Image Processing Techniques on Images **(K3)**

UNIT-I

Introduction: Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, image 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, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, Walsh Transform. Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform, Discrete Sine Transform, Comparison of different image transforms.

UNIT-II

Intensity Transformations and Spatial Filtering: Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, and sharpening spatial filters.

Filtering in the Frequency Domain: The Basics of filtering in the frequency domain, image Smoothing using frequency domain filters, Image Sharpening using frequency domain filters, Selective filtering.

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, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering, geometric mean filter.

UNIT-IV

Image compression: Fundamentals, Basic compression methods: Huffman coding, Arithmetic coding, LZW coding, Run-Length coding, Symbol-Based coding, Bit- Plane coding, Block Transform coding,

Wavelets and Multi resolution Processing: Image pyramids, sub band coding, Multi resolution expansions, wavelet transforms in one dimensions &two dimensions, Wavelet coding.

UNIT-V

Image segmentation: Fundamentals, point, line, edge detection, thresholding andregion –based segmentation.

Morphological Image Processing: Erosion and dilation, opening and closing,basic morphological algorithms for boundary extraction, thinning, gray scale morphology.

UNIT-VI

Color image processing: color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

TEXT BOOKS:

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.
2. Jayaraman, S. Esakkirajan, and T.Veerakumar,|| Digital Image Processing||, Tata McGra w- Hill Education,2011.

REFERENCE BOOKS:

1. AnilK. Jain,—Fundamentals of Digital Image Processing||, Prentice Hall of India ,9th Edition, Indian Reprint, 2002.
2. B.Chanda, D.Dutta Majumder, —Digital ImageProcessingandAnalysis||,PHI,2009.

VII Sem.	IOT: Use Cases (Professional Elective-III)	Course Code: V18ECT24	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1: Describe M2M and IOT Technologies. **[K2]**

CO2: Explain the layers and protocols in IOT. **[K2]**

CO3: Describe various communication technologies used in IOT. **[K2]**

CO4: Illustrate various hardware components required for IOT applications. **[K2]**

CO5: Discuss the cloud technologies and their services. **[K2]**

CO6: Explain the IoT Applications. **[K2]**

UNIT I – INTRODUCTION [1]

Introduction from M2M to IoT - An Architectural Overview, building architecture, Main design principles and needed capabilities, An IoT architecture outline, M2M and IoT Technology Fundamentals - Devices and gateways.

UNIT II – IOT PROTOCOLS [2]

Functionality of Layers in IoT –Study of protocols - Wireless HART, Z-Wave, 6LoWPAN, RPL, CoAP, MQTT.

UNIT III - COMMUNICATION TECHNOLOGIES IN IOT [2, 4]

Study of IoT Connectivity –IEEE 802.15.4,Zigbee, LPWAN, Wi-Fi, Bluetooth, 5G Era.

UNIT IV - SYSTEM HARDWARE [3, 4]

Sensors, Actuators, Radio Frequency Identification, Introduction to Embedded Devices for IoT - RASPBERRY PI, BeagleBone black.

UNIT V – Cloud Computing [3, 4]

Data Collection, Storage and Computing Using a Cloud Platform for IoTApplications/Services, AWS for IoT-Introduction to Amazon EC2.

UNIT VI - IOT APPLICATIONS [2, 3]

Applications - Smart and Connected Cities, Public Safety, Agriculture, and Healthcare.

TEXT BOOKS:

1. From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence‖, Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, 1st Edition, Academic Press, 2014.
2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, and Cisco Press 800 East 96th Street Indianapolis, Indiana 46240 USA.
3. Internet of Things (A Hands-on- Approach)‖, Vijay Madisetti and ArshdeepBahga, 1stEdition, VPT, 2014.
4. Internet of Things - By Raj Kamal, McGraw-Hill Education. Copyright.

REFERENCE BOOKS:

1. From Internet of Things to Smart Cities: Enabling Technologies - edited by Hongjian Sun, Chao Wang, Bashar I. Ahmad, CRC Press -2018.
2. Bernd Scholz-Reiter, Florian Michahelles, -Architecting the Internet of Things‖, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer.
3. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT, David Etter.

VII Sem.	CMOS ANALOG ICDESIGN (Professional Elective-III)	Course Code: V18ECT25	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student will beable to:

CO1: Describe the Large and Small signal models of different Analog Devices. **(K2)**
CO2: Analyze the various types of current mirrors**. (K3)**
CO3: Analyze the different types of single stage MOS amplifiers**. (K3)**
CO4: Describe the Noise modeling of Various Circuit Elements**. (K2**)
CO5: Illustrate the construction and working of OP-AMP**. (K3)**
CO6: Illustrate the types of CMOS Comparators**. (K3)**

UNIT -I: Integrated circuit Devices and Modelling
Semiconductors and p-n junction: diodes reverse biased diodes, graded junctions, large signal junction capacitance and forward biased junctions small signal model of forward biased diode
The MOS Transistor**:** symbol for MOS Transistors, basic Operation, and Large signal modelling small signal modelling.
Bi-Polar Transistors: basic Operation, Large signal modelling small signal modelling

UNIT -II: Basic Current Mirrors
Basic CMOS current Mirrors, source Degenerated current mirror, Cascade current Mirror and Wilson Current Mirror, bipolar current mirror and Current mirror with Beta Helper.
UNIT -III: Single Stage Amplifiers
Common source amplifier, Source follower, common gate Amplifier, Cascode Gain stage amplifier and MOS Differential Amplifiers. Frequency response of Amplifiers.
UNIT -IV: Noise Analysis and Modelling
Time Domain Analysis of Noise**:** RMS, SNR, Units of dBm& Noise summation**.**

Frequency Domain Analysis of Noise**:** Noise spectral Density, White Noise, Flicker Noise, Noise filtering & Noise bandwidth**.**
Noise models for circuit elements**:** Resistors, Diodes, Transistors and MOSFETS

UNIT -V: CMOS Operational Amplifiers & Compensation
Block diagram of Op-amp, op-amp gain, frequency response & Slew Rate, op-amp Compensation

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

TEXT BOOKS:

1. Analog Integrated Circuit Design- David A.Johns, Ken Martin, Wiley Student Edn,2013.
2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

REFERENCES:

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. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, Second Edition

VII Sem.	Digital TV Engineering (Professional Elective-III)	Course Code: V18ECT26	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1: Illustrate the fundamentals of television engineering. **[K2]**

CO2: Explain the colour TV transmission and reception **[K2]**

CO3: Compare Digital TV transmission standards **[K4]**

CO4: Discuss factors affecting system noise and transmission errors **[K2]**

CO5: Explain the Digital TV transmission and reception. **[K2]**

CO6: Describe the operation of LCD and Plasma screens **[K2]**

UNIT I

Introduction: TV transmitter and receivers, synchronization

Television Pictures: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution

Composite video signal: Horizontal and vertical sync details

TV Signal Transmission: VSB transmission, standard channel BW, TV transmitter

UNIT II

Colour Television: Perception of brightness and colours, additive colour mixing, video signals for colours, luminance signal, colour difference signals, encoding of colour difference signals, formation of chrominance signals, PAL encoder, PAL colour receiver

UNIT III

Digital Television Transmission Standards: ATSC terrestrial transmission standard, vestigial sideband modulation, DVB -T transmission standard, ISDB-T transmission standard, channel allocations, antenna height and power, MPEG-2.

UNIT IV

Performance Objectives for Digital Television: System noise, external noise sources, transmission errors, error vector magnitude, eye pattern, interference, co-channel interference, adjacent channel interference, analog to digital TV, transmitter requirements.

UNIT V

Digital Television: Digital System Hardware, Signal Quantization and Encoding, Digital Satellite Television, Direct to Home Satellite Television, Digital TV Receiver, Merits of Digital TV Receivers

UNIT VI

LCD and Plasma Screens: LCD Technology, LCD Matrix types and operation, LCD Screens for Television, Plasma and conduction of charge, Plasma TV Screens, Plasma Color Receiver, LCD color receiver

TEXT BOOKS:

1. Modern Television Practice: Transmission, Reception and Applications- R. R.Gulati, 4thRevised edition, New Age International Publishers.
2. Television and Video Engineering – A.M. Dhake, 2nd Edition, Tata McGraw HillPublishers.
3. Fundamentals of Digital Television Transmission- Gerald W. Collins, John Wiley & Sons.
4. Television engineering and video systems – R G Gupta, Tata McGraw Hill Publishers.

REFERENCES:

1. Basic Television and Video Systems – Bernard Grob, McGrawHill Publishers.
2. Monochrome and Colour Television - R RGulati, New Age International Publishers.
3. Colour Television, Theory and Practice - S.P.Bali, Tata McGraw-Hill Publishers.

VII Sem.	Low Power IC Design (Professional Elective-IV)	Course Code: V18ECT27	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1: Explain the need of Low power circuit design. **(K2)**
CO2: Describe the different architectural approaches. **(K2)**
CO3: Analyze Low-Power Design Approaches. **(K4)**
CO4: Analyze and design Low-Voltage Low-Power Adders circuits. **(K4)**
CO5: Analyze and design Low-Voltage Low-Power Multiplier circuits. **(K4)**
CO6: Analyze and design of Low-Voltage Low-Power Memories. **(K4)**

UNIT-I:

Fundamentals: 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.

UNIT-II:

Supply Voltage Scaling for Low Power: Device Feature Size Scaling, Constant-Field Scaling, Constant-Voltage Scaling, Architectural-Level Approaches: Parallelism for Low Power, Pipelining for Low Power, Combining Parallelism with Pipelining.

Voltage Scaling Using High-Level Transformations: Multilevel Voltage Scaling Challenges in MVS Voltage Scaling Inter faces, Static Timing Analysis Dynamic Voltage and Frequency Scaling.

UNIT-III

Low-Power Design Approaches: Low-Power Design through Voltage Scaling– VTCMOS circuits, MT CMOS circuits, Architectural Level Approach– Pipelining and Parallel Processing Approaches. Power Gating, Clock Gating Versus PowerGating, Power-Gating Issues.

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.

UNIT-V

Low-Voltage Low-Power Multipliers: Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, Baugh-Wooley 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, Pre-charge and Equalization Circuit, Low-Power SRAM Technologies, Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

TEXTBOOKS:

1. CMOS Digital Integrated Circuits–Analysis and Design–Sung-Mo Kang, YusufLeblebici, TMH, 2011.
2. Low-Voltage, Low-Power VLSI Subsystems–Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering, 1st edition, 2004

REFERENCEBOOKS:

1. Introduction to VLSI Systems: ALogic, Circuit and System Perspective–Ming-BO Lin,CRC Press, 2011
2. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C.Prasad, John Wiley & Sons, 2000.
3. Practical Low Power Digital VLSI Design–Gary K.Yeap, KluwerAcademic Press, 2002.
4. Leakage in Nanometer CMOS Technologies–SivaG. Narendran, Anatha Chandrakasan, Springer, 2005.

VII Sem.	System on Chip (Professional Elective-IV)	Course Code: V18ECT28	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1: Describe SOC System Approach, design and its Architecture. **[K2]**
CO2: Discuss the selection of processor and its micro architecture for SOC. **[K2]**
CO3: Describe Memory Design for SOC. **[K2]**
CO4: Explain the concepts of bus models and Interconnect Architectures. **[K2]**
CO5: Describe the overview of Zynq SOC. **[K2]**
CO6: Explain the SOC based Applications. **[K2]**

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, Basic concepts in Processor 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, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance Specific design, Customizable Soft Processor.

UNIT-V: Zynq system on chip design overview: interfacing and signals, interconnects, Memory and interrupts.

UNIT - VI: Application Studies / Case Studies: SOC Design approach, Design and evaluation - AES algorithms, Image compression – JPEG compression.

TEXT BOOKS:

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
2. Embedded Processing with the ARM Cortex-A9 on the Xilinx Zynq-7000 All Programmable SoC-Louise H. Crockett Ross A. Elliot Martin A. Enderwitz Robert W. Stewart
3. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer.

REFERENCE BOOKS:

1. Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) – Jason Andrews – Newnes, BK and CDROM.
2. System on Chip Verification – Methodologies and Techniques – Prakash Rashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

VII Sem.	System Design Through VERILOG (Professional Elective-IV)	Course Code: V18ECT29	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1: Outline basic concepts of RTL code for digital circuits. **K2**

CO2: Model RTL codes for digital circuit at gate level **K3**

CO3: Model RTL codes for digital circuit at behavioural level **K3**

CO4: Model RTL codes for digital circuit at data flow and switch level **K3**

CO5: Ouline the concepts of task, function and complier directives **K2**

CO6: Analyze Synthesize of Combinational and Sequential Circuits **K4**

UNIT-I INTRODUCTIONTOVERILOG:

Verilog as HDL, Levels of design description, concurrency, module, simulation and synthesis, test bench, functional verification, programming language interface (PLI), simulation and synthesis tools.

LANGUAGECONSTRUCTSANDCONVENTIONS:

Introduction, keywords, identifiers, whitespace characters, comments, numbers, strings, logic values, data types, scalars and vectors, parameters, memory, operators, system tasks.

UNIT-II GATELEVELMODELLING:

Introduction, and gate primitive, module structure, other gate primitives, illustrative examples, tri state gates, array of instances of primitives, design of Flip flops with gate primitives, delays, strengths and contention resolution, net types, design of basic circuits.

UNIT-III BEHAVIORALMODELLING:

Introduction, operations and assignments, initial construct, always construct, examples, assignments with delays, wait construct, multiple always blocks, designs at behavioral level, blocking and non-blocking assignments, the case statement, if and if else constructs, assign-De assign construct, repeat construct, FOR loop, the disable construct, While loop, Forever loop, parallel blocks, force-release construct, event.

UNIT-IV

DATA FLOWLEVEL MODELLING

Introduction, continuous assignment structures, delays and continuous assignments, assignment to vectors.

SWITCH LEVEL MODELLING

Basic transistor switches, CMOS switch, Bidirectional gates and time delays with switch primitives, instantiations with strengths and delays, strength contention with triregnets, switch level modeling for NAND, NOR and XOR.

UNIT-V

SYSTEM TASKS, FUNCTIONS, AND COMPILER DIRECTIVES: Introduction, System Tasks and Functions, File based Tasks and Functions, Compiler Directives, Hierarchical Directives, User-defined Primitives (UDP), FSM Design (Moore and Melay Machines).

UNIT-VI

SYNTHESISOFCOMBINATIONAL ANDSEQUENTIAL LOGIC USINGVERILOG: Synthesis of Combinational logic: Net list of structured primitives, a set of continuous assignment statements and level sensitive cyclic behavior with examples, Synthesis of priority structures, exploiting logic don't care conditions.

Synthesis of sequential logic with latches: Accidental synthesis of latches and Intentional synthesis of latches, Synthesis of sequential logic with flip- flops, Synthesis of explicit state machines.

TEXTBOOKS:

1. Design through Verilog HDL —T.R. Padmanabhanand B. Bala Tripura Sundari, WSE, IEEE Press, 2004.
2. Advanced Digital Design with Verilog HDL—MichaelD.Ciletti,PHI,2005.

REFERENCES:

1. FundamentalsofLogicDesignwithVerilog—Stephen.BrownandZvonkoVranesic,TMH,2005.
2. AVerilog Primier—J.Bhasker,BSP,2003.

VII Sem.	Microwave & Optical Comm. Lab	Course Code: V18ECL11	L	T	P	C
			0	0	3	1

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student will beable to:

CO1: Sketch the characteristics of various Microwave & Optical sources. **(K3)**

CO2: Compute the various Parameters of Microwave & Optical Components. **(K3)**

CO3: Measure the radiation pattern of Horn antenna and reflector antenna. **(K5)**

CO4: Analyze a rectangular microstrip patch antenna using HFSS software. **(K4)**

Minimum Twelve Experiments to be conducted:

Part - A (Any 7 Experiments):

1. Reflex Klystron Characteristics.
2. Gunn-Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. Impedance and Frequency Measurement.
6. Scattering parameters of Circulator.
7. Scattering parameters of Magic Tee.
8. Radiation Pattern of Horn and Parabolic Antennas.
9. Synthesis of Microstrip antennas (Rectangular Structure) Using HFSS.

Part – B (Any 5 Experiments):

10. Characterization of LED.
11. Characterization of Laser Diode.
12. Intensity modulation of Laser output through an optical fiber.
13. Measurement of Data rate for Digital Optical link.
14. Measurement of NA.
15. Measurement of losses for Analog Optical link.

Equipment required for Laboratories:

1. Klystron Power Supply, Klystron mount
2. VSWR Meter
3. Micro Ammeter
4. Multi meter
5. CRO
6. GUNN Power Supply, Pin Modulator
7. Crystal Diode detector
8. Attenuator
9. Frequency Meter
10. Slotted line carriage
11. Probe detector
12. Wave guide shorts
13. SS Tuner
14. Directional Coupler
15. E, H, Magic Tees
16. Circulators, Isolator
17. Matched Loads
18. Pyramidal Horn and Parabolic Antennas
19. Turntable for Antenna Measurements
20. HFSS Software
21. Fiber Optic Analog Trainer based LED
22. Fiber Optic Analog Trainer based laser
23. Fiber Optic Digital Trainer
24. Fiber cables - (Plastic, Glass)

VIII Semester Syllabus

VIII Sem.	Cellular & Mobile Communication	Course Code: V18ECT30	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student will beable to:

CO1: Demonstrate the limitations of conventional mobile telephone systems; Understand the concepts of cellular systems. **[K2]**
CO2: Illustrate the concept of frequency Reuse channels, deduce Co- channel Interference reduction factor **[K2]**
CO3: Understand the frequency management, channel assignment strategies and Antennas in cellular systems. **[K2]**
CO4: Discuss the concepts of Handoff, dropped calls and cell splitting, Intersystem Handoff. **[K2]**
CO5: Explain the knowledge about GSM architecture and GSM channels, multiple Access schemes like FDMA, TDMA and CDMA. **[K2]**
CO6: Summarize the concepts of upcoming technologies like 3G, 4G etc. **[K2]**

UNIT-I CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile System, uniqueness of mobile radio environment, operation of cellular systems, consideration of the components of Cellular system, Hexagonal shaped cells, Analog and Digital Cellular systems.

CELLULAR CONCEPTS: Evolution of Cellular systems, Concept of frequency reuse, frequency reuse ratio, Number of channels in a cellular system, Cellular traffic: trunking and blocking, Grade of Service; Cellular structures: macro, micro, pico and femto cells; Cell splitting, Cell sectoring.

UNIT-II INTERFERENCE: Types of interferences, Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, design of Antenna system, antenna parameters and their effects, diversity receiver, non-cochannel interference-different types.

UNIT-III FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT:
Numbering and grouping, setup access and paging channels, channel assignments to cell sites and mobile units: fixed channel and non-fixed channel assignment, channel sharing and borrowing, overlaid cells. 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, 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-IV HANDOFF STRATEGIES Concept of Handoff, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assigned handoff, intersystem handoff, vehicle locating methods, dropped call rates and their evaluation.

UNIT-V DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiple access schemes; FDMA, TDMA, CDMA, OFDMA;

UNIT-VI HIGHER GENERATION CELLULAR STANDARDS: 3G System architecture (UMTS) enhancements in 4G standard, Architecture and representative protocols, introduction to 5G.

TEXTBOOKS:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn,2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International2nd 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.Mobile Cellular Communication – G Sasibhushana Rao Pearson
3. Wireless Communication and Networking – Jon W. Mark and Weihua Zhqung,PHI, 2005.
4. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.

VIII Sem.	Electronics Measurements & Instrumentation (Professional Elective-V)	Course Code: V18ECT31	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1. Select the instrument to be used based on the requirements**. [K2]**

CO2. Understand the design of oscilloscopes for different applications**. [K2]**

CO3. Explain different signal generators and analyzers**. [K2]**

CO4. Understand the design of different types of Bridge circuits for different Applications. **[K2]**

CO5. Explain and Design different types of transducers for different Applications. **[K2]**

CO6. Explain different types of transducers for measurement of Physical parameters. **[K2]**

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- Multi-range, Range extension/Solid state and differential voltmeters, AC voltmeters- multirange, range extension, shunt. Thermocouple type RF ammeter, Ohmmeters series type, and shunt type, Multi-meter for Voltage, Current and resistance measurements.

UNIT-II

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 types.

UNIT-III

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-IV

DC Bridges: Measurement of Resistance-Wheatstone's Bridge, Kelvin's Bridge. AC Bridges: Measurement of inductance- Maxwell's bridge, Hay's bridge, Anderson Bridge. Measurement of capacitance-Schering's Bridge. Measurement of Frequency-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, Acceleration, Humidity, Moisture, Proximity, Displacement. Data acquisition systems.

TEXTBOOKS:

1. Electronic Instrumentation, second edition-H.S. Kalsi, Tata McGrawHill,2004.
2. Modern Electronic Instrumentation and Measurement Techniques–A.D. Helfrickand W.D.Cooper, PHI, 5thEdition, 2002.

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 Edition, 2004.
3. Electronic Measurements & Instrumentations by K. Lal Kishore, PearsonEducation-2005.
4. Electronic Measurements & Instrumentation by UdayA.Bakshi& Ajay V. Bakshi Technical Publications

VIII Sem.	FPGA Architecture (Professional Elective-IV)	Course Code: V18ECT32	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student will beable to:

CO1: Describe Low end programmable devices. **[K2]**
CO2: Explain FPGA basics. **[K2]**
CO3: Comprehend Spartan 6 basics. **[K2]**
CO4: Use Virtex 5 clock sources and FIFO. Comprehend various I/O standards. **[K2]**
CO5: Use Memory, DSP blocks in complex designs. Comprehend SerDes. **[K2]**
CO6: Comprehend JTAG. Distinguish RISC based Soft processors from Xilinx, Aletra. **[K2]**

UNIT-I
DESIGNING WITH PROGRAMMABLE LOGIC DEVICES:
Read only Memories, Programmable logic Arrays (PLA), Programmable Array logic (PAL), Programmable logic Devices (PLD) Skew, setup, hold time.

UNIT-II
DESIGNING WITH FPGA:
Logic implementation options, Technology trends, Simple SRAM programmable FPGA architecture, Xilinx 3000 series FPGAs, Programmable interconnects, Xilinx 4000 series FPGAs, Programming the FPGA.

UNIT-III
SPARTAN 6 ARCHITECUTUTE:
Spartan 6 Device features- 6 input LUT, Slice, Single Port RAM, Dual Port RAM, ROM, Distributed RAM, 32 x 6, 64 x 1, 128 x 1, Distributed RAM timings, Shift Registers, Multiplexers, Interconnect, PLL, DCM, DSP Slice.

UNIT-IV
VIRTEX 5 ARCHITECTURE:
Clock resources-Global clocks, regional clocks, Clock buffer, Clock Gating.Clock Tree, Clock De-skew, True Dual port RAM. Write modes, FIFO architecture, empty flags, almost empty flags, almost fill flags, full flag, cascading FIFOS, connecting FIFOs in parallel, designing Large multiplexer 4xl, 8xl, 16xl. Control impedance, I/O primitives. I/O supported standards, LVDS.

UNIT-V
STARATIX V ARCHITECTURE:
ALM Block diagram, ALM operating modes, ALM in Arithmetic mode, Types of embedded memory, Control clocking, Memory features, Memory modes, DSP block features, operational modes, DSP block architecture in 27 X 27 mode, independent complex multiplier mode, I/O features mixing voltage referenced and non-voltage referenced standard I/O features standards. Dynamic OCT.LVDS SerDes block diagram and features, Differential Receiver Block diagram and features.

UNIT-V

SOFT PROCESSORS:

JTAG, programming through JTAG, IEEE 1149.1 Boundary scan testing, programmable power technology, Features of Soft processors, Nios-II, Microblaze.

TEXT BOOKS:

1. Charles H Roth Jr —Digital System Design using VHDL||, second edition, 2008.
2. Spartan 6 family overview.
3. Virtex 5- User Guide.
4. Staratix V Device Hand Book.
5. Nios-II, Microblaze Features – Altera, Xilinx.

REFERENCES:

1. J. Old Field,R.Dorf, —Field Programmable Gate Arrays||, John Wiley & Sons, NewYork, 1995.
2. S. Trimberger, Edr.—Field Programmable Gate Arrays Technology||, KluwerAcademic Publications, 1994.
3. Bob Zeidman, —Designing with FPGAs & CPLDs||, CMP Books, 2002.

VIII Sem.	Principles of Modern Wireless Communication Systems (Professional Elective-V)	Course Code: V18ECT33	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student will beable to:

CO1: Describe how to measure the performance of wireless system, in multipath Environment **[K2]**
CO2: Summarize about Wireless Channel. **[K2]**
CO3: Explain Principle and properties of CDMA. **[K2]**
CO4: Discuss the working and advantages of MIMO wireless communication systems. **[K2]**
CO5: Explain the principle and advantages of OFDM system. **[K2]**
CO6: Describe of various modern wireless communication technologies. **[K2]**

UNIT-I

Principles of Wireless Communication: The wireless communication environment, modelling of wireless systems, system model for narrowband signals, Rayleigh fading wireless channel, BER performance of wireless systems, channel estimation in wireless systems, Diversity in wireless communication, multiple antenna receive model, BER in multiple antenna system, channel estimation in multiple antenna system.

UNIT-II

Wireless Channel: Basics of Wireless Channel Modelling, Maximum Delay Spread, RMS Delay Spread, RMS Delay Based on Average Power Profile, Average Delay Spread in Outdoor Cellular Channels, Coherence Bandwidth in Wireless Communications, Relation between ISI and Coherence Bandwidth.

UNIT-III

Code Division Multiple Access: Fundamentals of CDMA codes, Spreading codes based on Pseudo-Noise sequences, correlation properties of random CDMA spread sequences, Multi-user CDMA, Advantages of CDMA, CDMA near far problem and power control.

UNIT-IV

Multiple Input Multiple Output Wireless Communications: Introduction to MIMO wireless Communications, MIMO System model, MIMO zero forcing (ZF) receiver, MIMO MMSE receiver, Singular Value Decomposition (SVD) of the MIMO channel, MIMO capacity, Asymptotic MIMO capacity, MIMO beam forming.

UNIT-V

Orthogonal Frequency Division Multiplexing: Introduction to OFDM, multicarrier transmission, cyclic prefix in OFDM, BER for OFDM, MIMO-OFDM, effect of frequency offset in OFDM, Peak to Average Power ratio in OFDM, SC-FDMA.

UNIT-VI

Recent advancements in wireless technology: Introduction to 4G LTE, VoLTE, 5G Technology, NOMA and Massive MIMO.

TEXT BOOKS:

1. Aditya K. Jagannatham, —Principle of Modern Wireless Communication Systems: Theory and practice‖ 1st Edition, McGrawHill Publication
2. Theodore S. Rappaport, —Wireless Communications: Principles and Practice‖ Second Edition, Pearson Education

REFERENCE BOOKS:

1. Simon Haykin, MichaleMoher, —Modern Wireless Communications‖, Pearson.
2. Xiaodong Wang, H. Vincent Poor, —Wireless Communication Systems: Advanced Techniques for Signal Reception‖, Pearson 5 Proakis J.J.,D Wozencraft J.M. and Jacobs I.M., Principles of Communication Engineering, John Wiley

VIII Sem.	Satellite Communication (Professional Elective-VI)	Course Code: V18ECT34	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1: Describe the basic concepts of Satellite Communications & analyze the concepts ofOrbital mechanics & Launchers. **(K4)**

CO2: Discuss the major Sub-Systems of a Satellite. **(K2)**

CO3. Design the Communication Link for Satellite**(K4)**

CO4: Compare the various Multiple Access Techniques**(K3)**

CO5: Analyze the various sub-systems used in Earth stations & review the different orbits. **(K4)**

CO6: Analyze the Satellite Navigation & the Global positioning system. **(K4)**

UNIT-I

Introduction: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communication.

Orbital Mechanics and Launchers: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT-II

Satellite Subsystems: Attitude and orbit control system, telemetry, tracking, Command &monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

UNIT-III

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.

UNIT-IV

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-V

Earth Station Technology: 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.

UNIT-VI

Satellite Navigation & 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& Jeremy Allnutt,WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson &Henri G. Suyderhoud, 2nd Edition, Pearson Publications, 2003.

REFERENCES:

1. Satellite Communication: Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
4. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

VIII Sem.	Bio-Medical Engineering (Professional Elective-VI)	Course Code: V18ECT35	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1: Explain the basics concepts of Bio-Medical Instrumentation. **[K2]**
CO2: Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications.**[K2]**
CO3: Explainhe Anatomy and Physiology of Cardiovascular system and Illustrate
the application of Bio-Medical Instruments to measure the Physiological parameters of Cardiovascular System.**[K2]**
CO4: Discuss the processing methods in elements used for Patient's Health care &monitoring.**[K2]**
CO5: Explain the Principles of Diagnostic Techniques and the concepts of Bio-Telemetry.**[K2]**
CO6: Classify different types of monitors, discuss the principles of recorders and Illustrate the methods of accident preventions i.e. Shock Hazards from different Electrical Equipment.**[K2]**

UNIT-I:

INTRODUCTION TO BIO MEDICAL INSTRUMENTATION: Age of Bio medical Engineering , Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, Bio electric Potentials-ECG, EEG and EMG, Evoked Responses.

UNIT-II:

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Bio potential Electrodes, Examples of Electrodes, Basic Transducer Principles ,The Transducer and Transduction Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

UNIT-III:

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sounds, Plethysmography.

MEASUREMENTS IN THE RESPIRATORY SYSTEM: The Physiology of The Respiratory System, Tests and Instrumentation for the Mechanics of Breathing, Respiratory Therapy Equipment.

UNIT-IV:

PATIENT CARE AND MONITORING: Elements of Intensive- Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators.

UNIT-V:

DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Ray and Radio- Isotope Instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise,Telemetry for Emergency Patient Monitoring

UNIT-VI:

MONITORS,RECORDERSANDSHOCKHAZARDS: Bio potential Amplifiers, Monitors, Recorders, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Isolated Power Distribution System.

TEXT BOOKS:

1. Bio-Medical Electronics and Instrumentation||, Onkar N.Pandey,RakeshKumar, Katson Books.
2. Bio-Medical Instrumentation||,Cromewell, Wiebell, Pfeiffer

REFERENCES:

1. Hand Book of Bio-Medical Instrumentation||, Khandapur. Mc Graw Hill
2. Introduction to Bio- medical Equipment Technology||,4th Edition, Joseph J. Carr, JohnM.Brown, Pearson Publications.

VIII Sem.	Wireless Sensor Networks (Professional Elective-VI)	Course Code: V18ECT36	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1: Explain the concepts of Wireless Sensor Networks, its Architecture. **[K2]**

CO2: Describe the Networking Technologies**. [K2]**

CO3: Explain the MAC Protocols**. [K2]**

CO4: Illustrate the Routing Protocols. **[K2]**

CO5: Describe the Transport Layer Protocols. **[K2]**

CO6: Explain the Security Layer Protocols and Applications of WSN. **[K2]**

UNIT-I –Introduction to Wireless Sensor Networks:
Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints and challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks. Single- Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Gateway Concepts.

UNIT-II - Networking Technologies:
Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETsand WANETs.

UNIT-III - MAC Protocols for Wireless Sensor Networks:
Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols - Contention - Based Protocols, with reservation Mechanisms, and with Scheduling Mechanisms.

UNIT-IV - Routing Protocols:
Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table–Driven Routing Protocols, On – Demand Routing Protocols, Hierarchical Routing Protocols, Proactive Routing.

UNIT-V - Transport Layer Protocols:
Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks.

UNIT- VI - Security, Platforms & Applications:
Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning; Sensor Node Hardware – Berkeley Motes, Programming Challenges; Applications - Home Automation, Smart Metering.

TEXT BOOKS:

1. Ad Hoc Wireless Networks: Architectures and Protocols, C. Siva Ram Murthy and B.S.Manoj, 2004, PHI.
2. Wireless Adhoc and Sensor Networks: Protocols, Performance and Control, Jagannathan Sarangapani, CRC Press.
3. Holger Karl & Andreas Willig, —Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2005.

REFERENCES:

1. Wireless Sensor Networks- Technology, Protocols, and Applications, KazemSohraby,Daniel Minoli, &TaiebZnati, John Wiley, 2007.
2. Wireless Sensor Networks- Information Processing Approach, Feng Zhao & Leonidas J.Guibas, Elsevier, 2007.
3. Adhoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh,1st Ed., PearsonEducation.
4. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004,Springer.
5. Wireless Sensor Networks – S Anandamurugan, Lakshmi Publications.

VII Sem.	Principles of WirelessComm. (Open Elective-II)	Course Code: V18ECTOE4	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student will beable to:

CO1: Discuss the cellular system evolution of mobile radio systems **[K2]**
CO2: Illustrate the basic cellular concepts. **[K2]**
CO3: Explain the Various Propagation models. **[K2]**
CO4: Discuss the need of modulation, diversity and equalization in cellular & Mobile Communication. **[K2]**
CO5: Demonstrate the knowledge about GSM architecture, multiple accesss chemes likeFDMA,TDMA, CDMA. **[K2]**
CO6: Summarize the concepts of upcoming technologies like 3G, 4G etc. **[K2]**

UNIT-I: Introduction of Wireless Communication
History and evolution of mobile radio systems: Types of mobile wireless services/systems- Cellular, WLL, Paging, Satellite systems, Future trends in personal wireless systems.

UNIT-II: Cellular Concepts and System Design Fundamentals
Cellular concept and frequency reuse, channel assignment, handoff strategies, Interference and system capacity, Trunking and GOS, cell splitting, cell sectoring.

UNIT-III: Mobile radio Propagation Models

Radio wave propagation issues in personal wireless systems, Propagation models, Multipath fading, parameters of mobile multipath channels and Antenna systems in mobile radio.

UNIT-IV: Overview analog and digital modulation techniques
Need For Modulation. Different Analog and Digital modulation techniques used in Cellular and mobile communication systems.

UNIT-V DIGITAL CELLULAR NETWORKS: GSM architecture, GSM Services, multiple access schemes; FDMA, TDMA, CDMA, OFDMA;
UNIT-VI Higher Generation Cellular Standards: 3G System architecture (UMTS), 4G System Architecture, Introduction to 5G.

TEXT BOOKS:

1. Theodore S. Rappaport, —wireless communications Principles and Practices||, PHI,2005
2. Jochen Schiller, —Mobile Communications||, Pearson Education, second edition, 2009.

REFERENCE BOOK:

1. Lee W.C.Y, -Mobile communication Engineering
2. Theory and Applications||, 2/e McGraw-Hill,New York, 2003
3. Andreas F. Molisch, -Wideband Wireless Digital Communication||, Pearson Education 2001.
4. Blake, —Wireless Communication Technologies,|| Thomson Delmer, 2003

VII Sem.	Medical Electronics (Open Elective-II)	Course Code: V18ECTOE5	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1: Explain the basics concepts of Bio-Medical Instrumentation. **[K2]**

CO2: Explain the concepts of electrode theory, classification of Electrodes and Transducers used in Bio-Medical Applications. **[K2]**

CO3: Explain the Anatomy and Physiology of Cardiovascular system and Illustrate the application of Bio-Medical Instruments to measure the Physiological Parameters of Cardiovascular System. **[K2]**

CO4: Discuss the elements used for Patient's Health care & monitoring. **[K2]**

CO5: Explain the Principles of Diagnostic Techniques and the concepts of Bio-Telemetry. **[K2]**

CO6: Classify different types of monitors, discuss the principles of recorders and Illustrate the methods of accident preventions. **[K2]**

UNIT-I:

INTRODUCTION TO BIOMEDICAL INSTRUMENTATION: Age of Biomedical Engineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man- Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, Bioelectric Potentials- ECG, EEG and EMG,

UNIT-II:

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Bio potential Electrodes, Examples of Electrodes, Basic Transducer Principles, Active Transducers,Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

UNIT-III:

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sounds, Plethysmography.

UNIT-IV:

PATIENT CARE AND MONITORING: Elements of Intensive- Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators.

UNIT-V:

DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X- Ray and Radio- Isotope Instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements duringExercise, Telemetry for Emergency Patient Monitoring.

UNIT-VI:

MONITORS, RECORDERS AND SHOCK HAZARDS: Bio potential Amplifiers, Monitors, Recorders, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention.

TEXT BOOKS:

1. Bio-Medical Electronics and Instrumentation||, Onkar N.Pandey,RakeshKumar,Katson Books.
2. Bio-Medical Instrumentation||, Cromewell, Wiebell, Pfeiffer

REFERENCES:

1. Hand Book of Bio-Medical Instrumentation||, Khandapur. Mc GrawHill
2. IntroductiontoBio-MedicalEquipmentTechnology||,4th Edition, Joseph J.Carr, John M.Brown, Pearson Publications.

VII Sem.	Concepts of Embedded Systems (Open Elective-II)	Course Code: V18ECTOE6	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

- **CO1:** Describe the Basic Concepts of embedded systems- **(K2).**
- **CO2:** Describe the characteristics of Embedded Systems - **(K2)**
- **CO3:** Explain the Architecture and Pin Description of 8051- **(K2)**
- **CO4:** Explain various Addressing Modes and Instructions of 8051- **(K2)**
- **CO5:** Discuss the various Interrupts , Modes of Timers/Counters in 8051**-(K2)**
- **CO6:** Discuss the fundamentals of RTOS based embedded firmware design - **(K2)**

UNIT-I - INTRODUCTION TO EMBEDDED SYSTEMS:

Introduction to Embedded Systems, Embedded Systems vs. General Computing Systems, Classification of Embedded systems, Major application areas of embedded systems, Purpose of embedded Systems, The Typical embedded system - core of the embedded system, Difference between RISC and CISC, Types of Memories.

UNIT-II - CHARACTERISTICS OF EMBEDDED SYSTEM:

Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT-III-8051 Micro Controller – Architecture, Pin Description

Introduction, 8051 Architecture, Registers in 8051, Pin Diagram – Description, Parallel I/O Ports and Memory Organization

UNIT-IV - 8051 Micro Controller – Addressing Modes and Instructions:

8051 Addressing Modes, 8051 Instruction Set, Instructions and Sample Programs, Stack Pointer.

UNIT-V - 8051 Micro Controller – Interrupts, Timer/ Counter:

Interrupts in 8051, Timers and Counters, Timer/ Counter Modes, Serial Communication – Modes

UNIT-VI- REAL TIME OPERATING SYSTEM:

Operating System basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Inter Task communication.

TEXT BOOKS:

1. Embedded Systems-By Shibu. K.V-Tata McGraw Hill Education Private Limited,2013.
2. Micro Controllers [Theory and Applications] – Ajay V Deshmukh – Tata McGraw-HillEducation Private Limited,2012

REFERENCES:

1. The 8051 Micro Controller- Kenneth Ayala – CENGAGE- 3rd Edition
2. Embedded/Real Time Systems by KVKK Prasad by Dreamtech Publication.

VIII Sem.	Fundamentals of DigitalImage & Video Processing (Open Elective-III)	Course Code: V18ECTOE7	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1: Analyze Image transforms for various Image processing operations. **(K4)**
CO2: Examine Spatial & frequency domain filtering like smoothing & sharpening Operations on Images. **(K4)**
CO3: Estimate Image degradation functions and analyze various Image Restoration Techniques on Images. **(K4)**
CO4: Analyze various Image segmentation techniques. **(K4)**
CO5: Describe various Image compression techniques. **(K3)**
CO6: Explain basic concepts regarding to motion estimation, video filtering and Video standards. **(K2)**

UNIT-I

IMAGE FUNDAMENTALS & TRANSFORMS: Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization. Two dimensional orthogonal transforms: DFT, WHT, Haar transform, DCT and DST

UNIT-II

Intensity Transformations, Spatial Filtering and frequency domain filtering: Somebasic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters, `Image smoothing and sharpening in frequency domain filtering

UNIT-III

IMAGE RESTORATION: Degradation Models, Linear Position –Invariant Degradations, Estimating the degradation function, inverse filtering, Minimum mean square error (Wiener) filtering and geometric mean filter.

UNIT-IV

IMAGE SEGMENTATION: Pixel classification, Bi-level Thresholding, Multi- level Thresholding, Adaptive Thresholding, Spectral & spatial classification, Edge detection, Hough transform, Region growing.

UNIT-V

IMAGE COMPRESSION: Compression models, Huffman Coding, Arithmetic coding, Bit plane coding, run length coding, Lossy compression: Transform coding, Image compression standards.

UNIT-VI

VIDEO PROCESSING: Representation of Digital Video, Spatio-temporal sampling, Motion Estimation. Video Filtering, Video Compression, Video coding standards.

TEXT BOOKS:

1. R.C.Gonzalez,R.E.Woods,-DigitalImageProcessing‖,PearsonEducation. 2nd edition,2002
2. M.Tekalp,-DigitalVideoProcessing‖,Prentice-Hall,1995

REFERENCE BOOKS:

1. AnilK.Jain,—FundamentalsofDigitalImageProcessing‖,PrenticeHallofIndia,9th Edition,IndianReprint,2002.
2. B.Chanda,D. Dutta Majumder,—Digital ImageProcessingandAnalysis‖,PHI,2009.
3. Bovik,-HandbookofImage&Videoprocessing‖,AcademicPress,2000.
4. Khalid Sayood,Introduction to data compression ,third edition, The MorganKaufmann publishers,2005

VIII Sem.	Embedded RTOS (Open Elective-III)	Course Code:V18ECTOE8	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:

After Successful completion of the Course, the student will beable to:

CO1: Describe the basics of Real time OS. **[K2]**
CO2: Explain the tasks, Interrupts, Security. **[K2]**
CO3: Describe the basics of µCOS-II RTOS. **[K2]**
CO4: Describe the basics of µCOS-II RTOS. **[K2]**
CO5: Illustrate the mechanism of target image creation and porting. **[K2]**
CO6: Explain the Application of RTOS. **[K2]**

UNIT-I: Introduction

OS Basics, Task, Process, Threads, Multiprocessing & Multitasking, Process Management, Timer Functions, Event Functions, Memory Management, Device, File and IO Systems Management, Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls.

UNIT-II: RTOS

Basic Design Using an RTOS, RTOS Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Metrics, OS Security Issues. Basic Functions and Types of RTOS.

UNIT-III: RTOS µCOS-II

Introduction, Task Service, Task Scheduling, Memory Allocation, IPC – Semaphore, Mailbox, Queue, Interrupt Handling.

UNIT-IV: RTOS Vx Works

Introduction, Task Service, Task Scheduling, Memory Allocation, IPC – Semaphore, Mailbox, Queue, Interrupt Handling.

UNIT-V: Embedded OS & Target Image Creation

Off-The-Shelf Operating Systems, Embedded OS, Handheld OS, Operating System Software, Target Image Creation for Window XP Embedded, Porting RTOS on a Micro Controller based Development Board.

UNIT-VI: Program Modeling – Case Studies

Case study of embedded system design and coding for an Automatic Chocolate Vending Machine (ACVM) Using µCOS-II RTOS, Case study of digital camera hardware and software architecture, Using RTOS Vx Works, Case Study of Embedded System for an Adaptive Cruise Control (ACC) System in Car, Case Study of Embedded System of Mobile Phone Software for Key Inputs.

TEXT BOOKS:

1. Shibu K V: —Introduction to Embedded Systems||, Tata McGraw Hill Publications,Second Edition.
2. Dr. K.V.K.K. Prasad: —Embedded/Real-Time Systems||, Dream Tech Publications,Black pad.
3. Raj Kamal: —Embedded Systems-Architecture, Programming and Design||, TataMcGraw Hill Publications, Second Edition.

REFERENCES:

1. Labrosse, —Embedding system building blocks —, CMP publishers.
2. Rob Williams,|| Real time Systems Development||, Butterworth HeinemannPublications.

VIII Sem.	Principles of Digital TV Engineering (Open Elective-III)	Course Code: V18ECTOE9	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes:
After Successful completion of the Course, the student will beable to:

CO1:	Illustrate the fundamentals of television engineering	**[K2]**
CO2:	Explain about TV signal transmission	**[K2]**
CO3:	Explain the colour TV fundamentals	**[K2]**
CO4:	Classify Digital TV transmission standards	**[K2]**
CO5:	Explain the operation of Digital TV receiver	**[K2]**
CO6:	Describe the working of LCD and Plasma screens	**[K2]**

UNIT-I

Introduction: TV transmitter and receivers, synchronization **Television Pictures**: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution

UNIT-II

Composite video signal: Horizontal and vertical sync details **TV Signal Transmission:** VSB transmission, standard channel BW, TV transmitter

UNIT-III

Colour Television: Perception of brightness and colours, additive colour mixing, video signals for colours, luminance signal, colour difference signals, encoding of colour difference signals, formation of chrominance signals, PAL encoder, PAL colour receiver

UNIT-IV

Digital Television Transmission Standards: ATSC terrestrial transmission standard, vestigial sideband modulation, DVB -T transmission standard, ISDB-T transmission standard

UNIT-V

Digital Television: Digital Satellite Television, Direct to Home Satellite Television, Digital TV Receiver, Merits of Digital TV Receivers

UNIT-VI

LCD Screens: LCD Technology, LCD Matrix types and operation, LCD Screens for Television, LCD color receiver

Plasma Screens: Plasma and conduction of charge, Plasma TV Screens, Plasma Color Receiver

TEXT BOOKS:

1. Television engineering and video systems – R G Gupta, Tata McGraw HillPublishers.
2. Television and Video Engineering – A.M.Dhake, 2nd Edition, Tata McGraw Hill Publishers.
3. Modern Television Practice: Transmission, Reception and Applications- RRGulati, 4th revised edition, New Age International Publishers.
4. Fundamentals of Digital Television Transmission- Gerald W. Collins, John Wiley& Sons.

REFERENCES

1. Basic Television and Video Systems – Bernard Grob, McGrawHill Publishers.
2. Monochrome and Colour Television - R RGulati, New Age InternationalPublishers.
3. Colour Television, Theory and Practice - S.P.Bali, Tata McGraw-Hill Publishers.