College Calendar 2021-22

Department of Electronics & Communication Engineering

Syllabus of 2nd Year
Do you know in how many ways the ‘Knowledge’ serves his master? Like mother it protects, like father it teaches and guides, like wife, provides all kinds of happiness after destroying all sorrows, it brings wealth from every corner and spreads the fame in all direction. Like ‘Kalpalatha’ knowledge offers everything to human being whatever he wishes.
COLLEGE CALENDAR
2021-22
(III & IV Semester)
Vision Statement

Pursuing Excellence, Empowering people, Partnering in Community Development

Mission Statement

To develop N.M.A.M. Institute of Technology, Nitte, as Centre of Excellence by imparting Quality Education to generate competent, Skilled and Humane Manpower to face emerging Scientific, Technological, Managerial and Social Challenges with Credibility, Integrity, Ethics and Social Concern.
Our Founder

Late Justice K. S. Hegde
1909-1990
SRI N. VINAYA HEGDE
President, Nitte Education Trust
Chancellor, Nitte (Deemed to be University), Mangaluru
<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Name of the Faculty</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dr. Niranjan N. Chiplunkar</td>
<td>Principal</td>
</tr>
<tr>
<td>2.</td>
<td>Mr. Yogeesh Hegde</td>
<td>Registrar</td>
</tr>
<tr>
<td>3.</td>
<td>Dr. Shrinivasa Rao B. R.</td>
<td>Vice Principal / Controller of Examinations / Professor</td>
</tr>
<tr>
<td>4.</td>
<td>Dr. I. Ramesh Mithanthaya</td>
<td>Vice Principal / Dean (Academics) / Professor</td>
</tr>
<tr>
<td>5.</td>
<td>Dr. Sudeesh Bekal</td>
<td>Dean (R&amp;D)/Professor</td>
</tr>
<tr>
<td>6.</td>
<td>Dr. Rajesh Shetty K.</td>
<td>Dean (Admissions) / Professor</td>
</tr>
<tr>
<td>7.</td>
<td>Dr. Subrahmanya Bhat K.</td>
<td>Dean (Student Welfare) / Professor</td>
</tr>
<tr>
<td>8.</td>
<td>Dr. Nagesh Prabhu</td>
<td>PG Coordinator/Professor</td>
</tr>
<tr>
<td>9.</td>
<td>Dr. Srinath Shetty K.</td>
<td>Resident Engineer/Professor</td>
</tr>
</tbody>
</table>

**HEADS OF DEPARTMENTS**

1. Prof. Shalini K. Sharma  
   Counseling, Welfare, Training & Placement

2. Dr. Arun Kumar Bhat  
   Civil Engg.

3. Dr. Jyothi Shetty  
   Computer Science & Engg.

4. Dr. Karthik Pai B. H.  
   Information Science & Engg.

5. Dr. Srinivas Pai P.  
   Mechanical Engg.

6. Dr. KV SSSS Sairam  
   Electronics & Communication Engg.

7. Dr. Suryanarayana K.  
   Electrical & Electronics Engg.

8. Dr. Ujwal P.  
   Biotechnology Engg.

9. Dr. Udaya Kumar Shenoy  
   Computer & Communication Engg.

10. Dr. Sharada Uday Shenoy  
    Artificial Intelligence & Machine Learning Engg.

11. Dr. Muralidhara K.  
    Robotics & Artificial Intelligence Engg.

12. Dr. Kumudakshi  
    Mathematics

13. Dr. Shobha R. Prabhu  
    Physics

14. Dr. Shivaprasad Shetty M.  
    Chemistry

15. Mrs. Rashmi D. Hegde  
    Humanities

16. Dr. Surendra Shetty  
    MCA

**INCHARGE OF INSTITUTION’S RESPONSIBILITIES**

1. Dr. Gururaj Upadhya  
   Workshop Supdt.

2. Dr. Narasimha Bailkeri  
   1st year Coordinator

3. Dr. Venkatesh Kamath  
   Deputy Controller of Examination

4. Dr. Janardhan Nayak  
   Co-ordinator, Red Cross Unit
5. Mr. Srinivas Nekkar
   NSS Co-ordinator
6. Mr. Krishnaraja Joisa
   Public Relations Officer
7. Dr. Jnaneshwar Pai Maroor
   Co-ordinator, Alumni
8. Sri. Shekar Poojari
   Student Welfare Officer
9. Dr. Shivaprasad Shetty M.
   NCC Officer

ENTREPRENEURSHIP DEVELOPMENT CELL

1. Dr. Ramakrishna B.
   Professor/EDC- Incharge
2. Mrs. Geetha Poojarthi
   Co-ordinator

DEPARTMENT OF TRAINING & PLACEMENT

1. Mr. Bharath G. Kumar
   Lead Placements

DEPARTMENT OF MATHEMATICS

1. Dr. Shashirekha B. Rai
   Professor
2. Dr. P. Shankaran
   Professor
3. Dr. Kumudakshi
   Asso. Professor/ HoD
4. Dr. Sharad M. Hegde
   Asst. Professor Gd III
5. Dr. Vasanth K. R.
   Asst. Professor Gd III
6. Mrs. Ambika N.
   Asst. Professor Gd I
7. Mrs. Vinaya Acharya
   Asst. Professor Gd I
8. Mrs. Anitha D. Bayar
   Asst. Professor
9. Mrs. Bhavya K.
   Asst. Professor
10. Ms. Chaithra K.
    Asst. Professor
11. Mrs. Bhavya. D.
    Asst. Professor
12. Mrs. Sharmila
    Asst. Professor
13. Mrs. Anjana Pai K.
    Asst. Professor
14. Mrs. Soumya
    Asst. Professor
15. Mrs. Smitha G. V.
    Asst. Professor

DEPARTMENT OF PHYSICS

1. Dr. K. B. Vijaya Kumar
   Professor
2. Dr. Sathyajith K. T.
   Asso. Professor
3. Dr. Manjunath K. B.
   Asso. Professor
4. Dr. Shobha R. Prabhu
   Asso. Professor / HoD
5. Dr. Nagaraja B. S.
   Asst. Professor Gd III
6. Dr. Raghavendra Bairy
   Asst. Professor Gd III
7. Dr. Shyam Prasad K.
   Asst. Professor Gd III
DEPARTMENT OF CHEMISTRY
1. Dr. Janardhana Nayak                        Professor
2. Dr. Ramesh Bhat                             Asso. Professor
3. Dr. Shivaprasad Shetty M.                  Asst. Professor Gd III/HoD
4. Dr. Aarti S. Bhat                           Asst. Professor Gd III
5. Dr. Subrahmanya Ishwar Bhat                Asst. Professor Gd III
6. Mr. Sarvajith M. S.                         Asst. Professor

DEPARTMENT OF HUMANITIES
1. Dr. Ramakrishna B.                          Professor
2. Mrs. Rashmi D. Hegde                        Asso. Professor/HoD
3. Dr. Vishwanatha                             Asso. Professor
4. Dr. Jnaneshwar Pai Maroor                   Asst. Professor Gd III
5. Dr. Joy Elvine Martis                       Asst. Professor Gd III
6. Mrs. Shyla D. Mendonca                      Asst. Professor Gd II
7. Ms. Sonia Lobo                               Asst. Professor Gd I
8. Mr. Srinivas Nekkar                        Asst. Professor
9. Mrs. Sudeeksha S. Pai                       Asst. Professor

OFFICE SECTION HEADS
1. Mr. Keshava Mugeraya                        Sr. Supdt., Academic Section/ Purchase In-Charge
2. Mrs. Suneetha R. Shetty                      Sr. Supdt., Administrative Section
3. Mr. Suresh Achar                            Sr. Supdt., Stores
4. Mrs. Jayashree                               Sr. Programmer
5. Mrs. Shailaja V. Shetty                     Supdt., Accounts Section
6. Sri. Sudhakar K.                             Incharge Librarian

SECURITY DEPARTMENT
1. Mr. Hirianna Suvarna S.                      Security Supervisor

SPORTS DEPARTMENT
1. Sri. Shyam Sundar M.                         P.E.D
2. Sri. Ganesh Poojary                          P.E.D
3. Ms. Sowjanya M.                              P.E.I
4. Mr. Ravi Prakash C. Anpur                    Basket Ball Coach
HOSTEL WARDENS

1. Dr. Veena Devi S.V  
   Chief Warden, NET Ladies Hostels, Nitte
2. Dr. Vishwanatha  
   Chief Warden, NET Gents Hostels, Nitte

HOSTEL SUPERINTENDENT / MANAGER

1. Mr. John D’Souza  
   Sr. Manager, Gents Main Hostel
2. Mr. Francis D’Souza  
   Hostel Manager, Gents Main Hostel
3. Mr. Rajesh Ballal  
   Supervisor, Gents PG Hostel
4. Mrs. Gayathri Kamath  
   Supdt. Ladies PG Hostel
5. Mrs. Chethana Sharma  
   Supdt. Ladies Main Hostel
6. Mrs. Hema S. Hegde  
   Supdt., Hostel Office
REGULATIONS
2021-22
(Applicable for admission batch 2018-19 onwards)

COMMON TO ALL B.E. (CREDIT SYSTEM)
DEGREE PROGRAMMES
CONTENTS

REGULATIONS

1. INTRODUCTION
2. DEGREE PROGRAMMES
3. REGISTRATION
4. ADD/DROP/AUDIT OPTIONS
5. COURSE STRUCTURE
6. ATTENDANCE REQUIREMENT
7. WITHDRAWAL FROM THE PROGRAMME
8. EVALUATION SYSTEM
9. EVALUATION OF PERFORMANCE
10. COMMUNICATION OF GRADES
11. VERTICAL PROGRESSION
12. AWARD OF CLASS
13. APPEAL FOR REVIEW OF GRADES
14. AWARD OF DEGREE
15. GRADUATION REQUIREMENTS AND CONVOCATION
16. AWARD OF PRIZES, MEDALS, CLASS AND RANKS
17. CONDUCT AND DISCIPLINE
18. EARNING OF ACTIVITY POINTS FOR THE AWARD OF DEGREE
19. LISTS OF MAJOR SCHOLARSHIPS
1. INTRODUCTION

1.1 The general regulations are common to all B.E. (Credit System) Degree Programmes conducted at the NMAMIT, Nitte Campus and shall be called “NMAMIT Regulations”.

1.2 The provisions contained in this set of regulations govern the policies and procedures on the Registration of students, imparting Instructions of course, conduct of the examination and evaluation and certification of student’s performance and all amendments related to the said Degree programme(s).

1.3 This set of Regulations, on approval by the Academic Council and Governing Council, shall supersede all the corresponding earlier sets of regulations of the BE Degree program (of VTU) along with all the amendments thereto, and shall be binding on all students undergoing the Graduate Degree Programme(s) (Credit System) conducted at the NMAMIT, Nitte with effect from its date of approval. This set of Regulations, may evolve and get modified or changed through appropriate approvals from the Academic Council / Governing Council from time to time, and shall be binding on all stake holders (The Students, Faculty, Staff of Departments of NMAMIT, Nitte). The decision of the Academic Council/ Governing Council shall be final and binding.

1.4 In order to guarantee fairness and justice to the parties concerned in view of the periodic evolutionary refinements, any specific issues or matters of concern shall be addressed separately, by the appropriate authorities, as and when found necessary.

1.5 The Academic Council may consider any issues or matters of Concern relating to any or all the academic activities of NMAMIT courses for appropriate action, irrespective of whether a reference is made here in this set of Regulations or otherwise.

1.6 The course shall be called Bachelor of Engineering course abbreviated as B.E. (Subject of specialization) – Credit System.

1.7 DURATION OF THE COURSE

(a) The course shall extend over a period of total duration of 4 years.
(b) Each year shall have the following schedule with 5 ½ days a week.

Suggested Break down of Academic Year into Semesters
1. No. of Semesters / Year Three; Two being Main semesters (odd, even) and one being a supplementary semester; after 2 main semesters.
   (Note: Supplementary semester is primarily to assist weak and/ or failed students through make up courses. However, Autonomous Colleges may use this semester to arrange Add-On courses for other students and/ or for deputing them for practical training elsewhere.)

2. Semester Duration
   | Main semester (odd, even) each 19 Weeks; Supplementary Semester 8 Weeks |

3. Academic Activities
   | Main Semester |
   | (Weeks):               |
   | Registration of Courses & Course Work (16.0) |
   | Examination Preparation and Examination (3.0) |
   | Total (19) |
   | Supplementary Semester |
   | Registration of Courses & Course Work (5.0) |
   | Examination Preparation and Examination (3.0) |
   | Total (8) |
   | Declaration of results: 2 weeks from the date of last examination |
   | Inter- Semester Recess: |
   | After each Main Semester (2) |
   | Total Vacation: 10 weeks (for those who do not register for supplementary semester) and 4 weeks (for those who register for supplementary semester) |

(Note: In each semester, there will be provision for students for Registration of courses at the beginning, dropping of courses in the middle and withdrawal from courses towards the end, under the advice of faculty member. These facilities are expected to enhance the learning capabilities of students, minimizing their chances of failure in courses registered and also ensure their better monitoring by Faculty Advisors).

A candidate shall be allowed a maximum duration of eight years from the first semester of admission to become eligible for the award of Bachelor Degree.

The calendar of events in respect of the course shall be fixed by the Senate from time to time, but preferably in line with the academic calendar of the VTU.)
2. DEGREE PROGRAMMES

2.1 Undergraduate B.E. Degree Programmes are offered in the following disciplines by
the respective programme hosting departments listed below:
   i) Biotechnology Engineering (BT)
   ii) Civil Engineering (CV)
   iii) Computer Science & Engineering (CS)
   iv) Electronics & Communications Engineering (EC)
   v) Electrical & Electronics Engineering (EE)
   vi) Information Science & Engineering (IS)
   vii) Mechanical Engineering (ME)
   viii) Artificial Intelligence and Machine Learning Engg. (AM)*
   ix) Computer and communication Engineering (CC)*
   x) Robotics and Artificial Intelligence Engineering (RA)*

Other teaching departments are –
   i) Mathematics (MA)
   ii) Physics (PH)
   iii) Chemistry (CY)
   iv) Humanities, Social Sciences and Management (HU)

2.2 The provisions of these Regulations shall be applicable to any new discipline* that
may be introduced from time to time and appended to the above list.

3. REGISTRATION

3.1 Every student after consulting his Faculty Advisor in parent department shall register
approved courses (core and elective) to earn credits for meeting the requirements of
degree program at the commencement of each Semester on the days fixed for such
registration and notified in the academic calendar. Students who fail to register on or
before the specified date will have to pay a late fee. Such courses together with their
grade and credits earned will be included in the grade card issued by the college at the
end of each semester, like odd, even, supplementary and it forms the basis for
determining the student’s performance in that semester.

3.2 Lower and Upper Limits for Course Credits Registered in a Semester
Course Credit Assignment

All courses comprise of specific Lecture/Tutorial/Practical (L-T-P) schedule. The course
credits are fixed based on the following norms.

Lecture / Tutorials / Practical:
   i) One hour Lecture per week is assigned one Credit.
   ii) 2-hour Tutorial session per week is assigned 1.0 Credit.
   iii) 2-hour Lab. session per week is assigned 1.0 credit.
For example, a theory course with L-T-P schedule of 3-2-0 hours will be assigned 4.0 credits.

A laboratory practical course with L-T-P schedule of 0-0-2 hours will be assigned 1.0 credit.

Calculation of Contact Hours / Week – A Typical Example

<table>
<thead>
<tr>
<th>Typical Course Load per Semester</th>
<th>No. of Courses</th>
<th>Credits / Course</th>
<th>Total Credits</th>
<th>Contact Hours per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Lecture Courses</td>
<td>2</td>
<td>3:0:0</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>2 Lec. cum Lab Courses</td>
<td></td>
<td>3:0:1</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>2 Lec. cum Tut. Courses</td>
<td></td>
<td>3:1:0</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>1 Lec. Tut. cum Lab Courses</td>
<td></td>
<td>1:1:1</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>10:2:2</td>
<td>25</td>
<td>31</td>
</tr>
</tbody>
</table>

A student must register, as advised by Faculty Advisor, between a minimum of 16 credits and up to a Maximum of 28 credits.

3.3 Mandatory Pre-Registration for higher semester

In order to facilitate proper planning of the academic activities of the Semester, it is necessary for the students to declare their intention to register for courses of higher semesters (3rd and above) at least two weeks before the end of the current semester choosing the courses offered by each department in the next higher semester which is displayed on the Department Notice Board at least 4 weeks prior to the last working day of the semester.

Registration to a higher semester is allowed only if the student fulfills the following conditions -

i) satisfied all the academic requirements to continue with the programme of studies without termination

ii) cleared all Institute, hostel and library dues and fines, if any, of the previous semester

iii) paid all required advance payments of the Institute and the hostel for the current semester

iv) has not been debarred from registering on any specific grounds by the Institute.

4. ADD / DROP / AUDIT options

4.1 Registration of courses

Each student shall have to register for course work at the beginning of a semester within 2 to 3 days of commencement after discussing with subject teacher and under faculty
advice. The permissible course load to be either average credits (=22) or to be within the limits of minimum (=16) and maximum (=28) credits.

4.2 DROP-option
During a specified period at the middle of a semester student’s performance in CIE is reviewed by the faculty advisor. Following poor performance by a student he/she can be facilitated to drop identified course(s) (up to the minimum credits specified for the semester). Such course(s) will not be mentioned in the Grade card. Such courses to be re-registered by these students and taken up for study at a later time.

4.3 Withdrawal from courses
During a specific period specified towards the end of the semester, student’s performance in CIE is reviewed by the Faculty advisors. Following poor performance by a student in identified course (s) he/she is advised to withdraw from such course(s) (up to the minimum credits specified for the semester) with mention in the Grade card (Grade ‘W’). Such courses to be re-registered by these students and taken up for study at a later time.

4.4 AUDIT-option
A student can register for courses for audit only, with a view to supplement his/her knowledge and/or skills. The student's grades in such course(s) will have to be reflected in the grade card. However, CORE courses shall not be made available for audit. But these shall not be taken into account in determining the student’s academic performance in the semester. ‘U’ grade is awarded to such courses on satisfying the attendance requirements and CIE requirements. The candidate need not appear for SEE in such courses.

5. COURSE STRUCTURE:

5.1 Typical Breakdown for the B.E. Degree Curriculum:

<table>
<thead>
<tr>
<th>No.</th>
<th>Course Category</th>
<th>Credit Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Basic Sciences (BSC)</td>
<td>24-30</td>
</tr>
<tr>
<td>2.</td>
<td>Engineering Sciences (ESC)</td>
<td>15 -20</td>
</tr>
<tr>
<td>3.</td>
<td>Humanities, Social Sciences and Management</td>
<td>7- 10</td>
</tr>
<tr>
<td>4.</td>
<td>Professional Courses (PCC) – core</td>
<td>70 - 90</td>
</tr>
<tr>
<td>5.</td>
<td>Professional Courses (PEC) – elective</td>
<td>18</td>
</tr>
<tr>
<td>6.</td>
<td>Open Elective Courses (OE)</td>
<td>06</td>
</tr>
<tr>
<td>7.</td>
<td>Project Work (PROJ)</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Seminar on Current Topic</td>
<td>(VI – 2, VII-2, VIII-12)</td>
</tr>
<tr>
<td>8.</td>
<td>Internship</td>
<td>03</td>
</tr>
<tr>
<td>9.</td>
<td>Mandatory Learning courses</td>
<td>Non-Credit</td>
</tr>
</tbody>
</table>

Note: Student can register between 16 to 28 credits per semester
Total Credits to be earned : 175
5.2 The Department Undergraduate Committee (DUGC) will discuss and recommend the exact credits offered for the programme for the above components ‘a’ to ‘g’, the semester wise distribution among them, as well as the syllabi of all undergraduate courses offered by the department from time to time before sending the same to the Board of Studies (BOS). The BOS will consider the proposals from the departments and make recommendations to the senate for consideration and approval.

5.3 **The earned Credit Requirement for the B.E. Degree is 175.**

Degree is awarded by prescribing the total number of credits to be earned, rather than by using the program duration, giving flexibility to student to plan their career.

5.4 **Mandatory Learning Courses**

These are courses that must be completed by the student at appropriate time or at his convenience. The ‘PP’ grade is awarded for a Pass in the course and ‘NP’ grade is awarded for a Fail in the course. In case ‘NP’ grade is awarded, the student has to re-register for the same course wherein he has no alternative options. However, he/she can opt for other courses if he/she has been provided with multiple options.

The ‘PP’ and ‘NP’ grades do not carry grade points and hence not included in the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) computations. However such non-credit mandatory courses are required to be included in the students’ performance record (transcript) with Pass or Fail (PP or NP).

Courses that come under this category are the following.

 Moral and Ethical Values, Communication skills, Entrepreneurship Development Programme, Environmental issues, Constitution of India, Proficiency in a Language etc.

Such courses will not carry any credits for the award of degree, but a pass in each of such course during the programme shall be a necessary requirement for the student to qualify for degree award.

5.5 **PROJECT**

i) Project work at 8th semester shall be completed batch wise. The batch shall consist of a maximum of 4 students.

ii) Project viva-voce examination shall be conducted individually.

5.6 **ELECTIVES**

i) A candidate shall take electives in each semester from groups of electives, commencing from 5th semester.

ii) The minimum number of students to be registered for any Elective offered shall not be less than ten.

iii) A candidate shall opt for his/her choice of electives and register for the same if pre-registration is not done, at the beginning of each of 5th, 6th, 7th and 8th semesters. The candidate is permitted to opt for change of elective within 15 days from the date of commencement of the semester as per the academic calendar of the college.
6. ATTENDANCE REQUIREMENT:

6.1 Each semester is considered as a unit and the candidate has to put in a minimum attendance of 85% in each subject with a provision of condoning 10% of the attendance by Principal for reasons such as medical grounds, participation in University level sports, cultural activities, seminars, workshops and paper presentation.

6.2 The basis for the calculation of the attendance shall be the period of term prescribed by the College by its calendar of events. For the first semester students, the same is reckoned from the date of admission to the course (as per CET/COMED-K or Management allotment).

6.3 The students shall be informed about their attendance position in the first week of every month by the College so that the students shall be cautioned to make up the shortage.

6.4 A candidate having shortage of attendance (<75%) in any course(s) registered shall not be allowed to appear for SEE of such course(s). Such students will be awarded ‘N’ grade in these courses.

He/she shall have to repeat those course(s). Such students shall re-register for the same course(s) core or elective, as the case may be when the particular course is offered next either in a main (odd/even) or supplementary semester.

6.5 Attendance in CIE and SEE: Attendance at all examinations both CIE and SEE of each course registered shall be compulsory and there shall not be any provision for re-examinations. Any student against whom any disciplinary action is pending shall not be permitted to attend any SEE in that semester.

7. WITHDRAWAL FROM THE PROGRAMME

7.1 Temporary Withdrawal

a) A student who has been admitted to a degree programme of the college may be permitted once during the course to withdraw temporarily, for a period of one semester, on the grounds of prolonged illness or grave calamity in the family etc., provided –

i) The student applies to the College within 6 weeks of the commencement of the college stating fully the reasons for withdrawal together with supporting documents and endorsement from his parent/guardian.

ii) The College is satisfied about the genuineness of the case and that even by taking into account the expected period of withdrawal, the student has the possibility to complete the programme requirements (175 credits) within the time limits specified by the university.

iii) The student does not have any dues or demands at the College / University including tuition and other fees as well as library material.

iv) A student availing of temporary withdrawal shall be required to pay such fees and/or charges as may be fixed by the college until such time as his/her name appears on the Student's roll list. The fees/charges once paid shall not be refunded.

v) A student will be entitled to avail the temporary withdrawal facility only once during his/her studentship. However, any other concession for the concerned student shall have to be approved by the academic council.
7.2 **Permanent Withdrawal**

Any student who withdraws admission before the closing date of admission for the Academic Session is eligible for the refund of the deposits only. Fees once paid will not be refunded on any account.

Once the admission for the year is closed, the following conditions govern withdrawal of admissions.

(a) A student who wants to leave the College for good, will be permitted to do so (and take Transfer Certificate from the College, if needed), only after remitting the Tuition fees as applicable for all the remaining semesters and clearing all other dues if any.

(b) Those students who have received any scholarship, stipend or other forms of assistance from the College shall repay all such amounts.

(c) The decision of the Principal of the College regarding withdrawal of a student is final and binding.

8. **EVALUATION SYSTEM**

8.1 The Academic Performance Evaluation of a student shall be according to a Letter Grading System, based on the Class Performance Distribution.

8.2 The Letter grades S, A, B, C, D, E, F indicate the level of academic achievement, assessed on a decimal (0-10) scale.

8.3 The Letter grade awarded to a student in a course, for which he has registered shall be based on his performance in quizzes, tutorials, assignments etc., as applicable, in addition to two mid-semester examinations and one semester end examination. The distribution of weightage among these components may be as follows.

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester End Examination (SEE)</td>
<td>50% (50 marks)</td>
</tr>
<tr>
<td>Continuous Internal Evaluation (CIE)</td>
<td>50% (50 marks)</td>
</tr>
<tr>
<td>i) Quizzes, Tutorials, Assignments, Seminars, mini projects, tutorials etc.</td>
<td>10 marks</td>
</tr>
<tr>
<td>ii) Mid-semester Examination</td>
<td>40 marks</td>
</tr>
</tbody>
</table>

Any variation, other than the above distribution, requires the approval of the pertinent DUGC and Academic Council.

8.4 The letter grade awarded to a student in a 0-0-P (Practical) course, is based on an appropriate continuous evaluation scheme that the course instructor shall evolve, with the approval of the pertinent DUGC and the performance in SEE held on specified period in a semester.

8.5 The course Instructor shall announce in the class and/or display at the Faculty door/website the details of the Evaluation Scheme, including the distribution of the weightage for each of the components and method of conversion from the raw scores to the letter-grades within the first week of the semester in which the course is offered, so that there are no ambiguities in communicating the same to all the students concerned.
8.6 **Passing standards**

<table>
<thead>
<tr>
<th>Evaluation Method</th>
<th>Passing Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sessional (CIE)</td>
<td>Score: ≥40% (≥20 marks)</td>
</tr>
<tr>
<td>Terminal (SEE)</td>
<td>Score: ≥40% (≥20 marks)</td>
</tr>
</tbody>
</table>

i) Project work evaluation: The evaluation of CIE of the project work shall be based on the progress of the student in the work assigned by the project supervisor, periodically evaluated by him/her together with a Department committee constituted for this purpose. Seminar presentation, project report and final oral examination conducted by project evaluation committee at the department level shall form the SEE of the project work.

ii) In the case of other requirements, such as, seminar, industrial internship, field work, comprehensive viva voce, if any, the assessment shall be made as laid down by the Academic council.

iii) **There shall be no re-examination for any course in the credit system.**

However, students

- who have abstained from attending CIE or SEE without valid reasons (‘N’ grade), or
- who have failed (‘F’ grade) to meet the minimum passing standards prescribed for CIE and/or SEE, or
- who have been detained for want of attendance, or
- who have withdrawn (‘W’ grade),
- who have dropped any course

shall be required to re-register for such course(s) and go through CIE and SEE again and obtain a grade equal to or better than E in each case. While such students should re-register for same course(s) if core, they can re-register for alternative course(s) from among the elective courses, as the case may be. The re-registration shall be possible when the particular course is offered again either in a main (Odd/Even) or a supplementary semester.

8.7 **i) Grade point scale for absolute grading**

<table>
<thead>
<tr>
<th>Level</th>
<th>Out Standing</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Good</th>
<th>Average</th>
<th>Poor</th>
<th>Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade</td>
<td>S</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td>Grade Points</td>
<td>10</td>
<td>09</td>
<td>08</td>
<td>07</td>
<td>06</td>
<td>04</td>
<td>00</td>
</tr>
<tr>
<td>Score (Marks) Range(%)</td>
<td>≥ 90</td>
<td>&lt; 90 - ≥80</td>
<td>&lt; 80 - ≥70</td>
<td>&lt; 70 - ≥60</td>
<td>&lt; 60 - ≥50</td>
<td>&lt; 50 - ≥40</td>
<td>&lt; 40</td>
</tr>
</tbody>
</table>

ii) The grade points given above help in the evaluation of credit points earned by the student in a course as the credit points are equal to the number of credits assigned to the course multiplied by the grade points awarded to the student in that course. This shall
be used in arriving at the credit index of the student for that semester, as it is the sum
total of all the credit points earned by the student for all the courses registered in that
semester.

8.8 **Earning of Credits**

A student shall be considered to have completed a course successfully and earned the
credits if he/she secures an acceptable letter grade in the range S-E. Letter grade ‘F’ in any
course implies failure of the student in that course and no credits earned.

8.9 The Transitional Grades ‘I’, ‘W’ and ‘X’ would be awarded by the teachers in the
following cases. These would be converted into one or the other of the letter grades
(S-F) after the student completes the course requirements.

- Grade ‘I’: To a student having satisfactory attendance at classes and meeting
  the passing standard at CIE, but remained absent from SEE for valid &
  convincing reasons acceptable to the College, like:
  i) Illness or accident, which disabled him/her from attending SEE;
  ii) A calamity in the family at the time of SEE, which required the student to be
      away from the College;

- Students who remain absent for Semester End Examinations due to valid reasons
  and those who are absent due to health reasons are required to submit the
  necessary documents along with their request to the Controller of Examinations to
  write Make up Examinations within 2 working days of that particular examination for
  which he or she is absent, failing which they will not be given permission. This is
  admissible only for students who have more than 45 CIE marks.

- Grade ‘W’: To a student having satisfactory attendance at classes, but withdrawing
  from that course before the prescribed date in a semester under Faculty Advice

- Grade ‘X’: To a student having attendance ≥85% and CIE rating (90%), in a course
  but SEE performance observed to be poor, which could result in a F grade in the
  course. *(No ‘F’ grade awarded in this case but student’s performance
  record maintained separately).*

8.10 **Grade Card:** Each student shall be issued a Grade Card (or Transcript) at the
end of each semester. This will have a list of all the courses registered by a student
in the semester, together with their credits, the letter grades with grade points
awarded. Only those courses registered for credit and having grade points shall be
included in the computation of the students performance like SGPA and CGPA and the
courses taken for audit will not form part of this computation. The results of
mandatory courses, which are of the non-credit type shall also be reflected in the
Grade card as PP (for Passed) or NP (for not passed). **Each UG student shall have to
obtain the grade PP in each mandatory course to qualify for the Degree awarded by the
university.**

8.11 **The Make Up Examination**

The Make Up Examination facility would be available to students who may have missed to
attend the SEE of one or more course(s) in a semester for valid reasons and given the
‘I’ grade; Also, students having the ‘X’ grade shall be eligible to take advantage of this facility. The makeup examination would be held as per dates notified in the Academic Calendar. However, it would be possible to hold a makeup examination at any other time in the semester with the permission of the Academic Council of the College. In all these cases, the standard of makeup examinations shall be same as the regular SEE for the course(s).

a) In the event of a student in the final semester failing in a Laboratory course and/or in CIE of a course, he/she could be given ‘I’ grade for the course. In such a case the concerned course instructor would have the possibility to grant the student extra time not exceeding 12 weeks for completing the course, with the concurrence of the Department/College. If no such extra time is sought/granted, the concerned student would have to re-register for the course in a succeeding semester and take steps to fulfill the requirements of the Degree.

b) All the ‘I’ and ‘X’ grades awarded to the students would be converted to appropriate letter grades after the make-up examinations. Any outstanding ‘I’ and ‘X’ grades after the last scheduled make-up examinations shall be automatically converted to ‘F’ grade.

c) All the ‘W’ grades awarded to the students would be eligible for conversion to the appropriate letter grades only after the concerned students re-register for these courses in a main/ supplementary semester and fulfill the passing standards for their CIE and (CIE+SEE).

9. EVALUATION OF PERFORMANCE

The overall performance of a student will be indicated by two indices: SGPA; which is the Semester Grade Point Average, and CGPA which is the Cumulative Grade Point Average.

SGPA for a semester is computed as follows.

\[
SGPA = \frac{\sum [ (\text{course credit}) \times (\text{Grade point})] (\text{for all courses in that semester})}{\sum (\text{course credits})}
\]

CGPA is computed as follows:

\[
CGPA = \frac{\sum (\text{course credits})\times(\text{Grade points}) (\text{for all courses excluding those with F grades until that semester})}{\sum (\text{course credits}) (\text{for all courses excluding those with F grades until that semester})}
\]

10. COMMUNICATION OF GRADATES

The SGPA and CGPA respectively, facilitate the declaration of academic performance of a student at the end of a semester and at the end of successive semesters. Both of them would be normally calculated to the second decimal position, so that the CGPA, in particular, can be made use of in rank ordering the students' performance at a College. If two students get the same CGPA, the tie could be resolved by
considering the number of times a student has obtained higher SGPA; But, if it is still not resolved, the number of times a student has obtained higher grades like S,A,B etc. could be taken into account.

11. VERTICAL PROGRESSION (PROMOTION / ELIGIBILITY TO HIGHER SEMESTERS)

11.1 There shall be no restriction for promotion from an odd semester to the next even semester, provided the student has fulfilled the attendance requirement.

11.2 A Student shall be declared fail if he/she

(i) Has not satisfied the CIE requirements of any Course/s.
(ii) Has not registered for the SEE even after satisfying the attendance and CIE requirements.

11.3 (A) Vertical Progression in case of students admitted to First year:

(a) Students having not more than four F grades in the two semesters of first year of the Programme shall be eligible to move to second year.
(a.1) Students having not more than four F grades in the four semesters of I and II year shall be eligible to move to III year.
(a.2) Students who have earned all the prescribed credits of I year, and having not more than four F grades in the four semesters of II and III year shall be eligible to move to IV year.

(B) Vertical Progression in case of Diploma students admitted to Second year (lateral entry):

(a) Students having not more than four F grades (excluding the Fail or pass status of Additional Mathematics I and II) in the two semesters of II year of the Programme shall be eligible to move to III Year.
(a.1) Students having not more than four F grades (excluding the Fail or pass status of Additional Mathematics I and II, if any) in the four semesters of II and III year shall be eligible to move to IV year.

(b) The mandatory non-credit Courses Additional Mathematics I and II prescribed at III and IV semesters respectively, to lateral entry Diploma holders admitted to III semester of B.E/B.Tech. Programmes shall attend the classes during the respective semesters to satisfy attendance and CIE requirements and to appear for the University examinations.

(b.1) In case, any student fails to satisfy the attendance requirement of the Courses Additional Mathematics I and II, he/she shall not be eligible to appear for the Semester End Examinations of that semester and shall not be permitted to take admission to next higher semester. The candidate shall be required to repeat that semester during the subsequent year.

(b.2) Students who have satisfied the attendance requirement but not the CIE requirements of the Courses Additional Mathematics I and II shall be permitted to register afresh and appear for SEE after satisfying the CIE requirements in the same Course/s (with or without satisfying the attendance requirement) when offered during subsequent semester/s.

(c) Completion of Additional Mathematics I and II shall be mandatory for the award of degree.
(C) Vertical Progression in case of B.Sc students admitted to Second year (Lateral entry):

(a) Students having not more than four F grades (excluding the Fail or pass status of Engineering Graphics and Elements of Civil Engineering and Mechanics of First Year Engineering Programme) in the two semesters of II year of the Programme shall be eligible to move to III year.

(a.1) Students having not more than four F grades (excluding the Fail or pass status of Engineering Graphics and Elements of Civil Engineering and Mechanics of First Year Engineering Programme, if any) in the four semesters of II and III year shall be eligible to move to IV year.

(b) The prescribed mandatory non-credit Courses Engineering Graphics and Elements of Civil Engineering and Mechanics of First Year Engineering Programme to lateral entry B. Sc holders admitted to III semester of B.E/B. Tech Programmes, shall attend the classes during the respective semesters to complete CIE and attendance requirements and to appear for the University examinations.

(b.1) In case, any student fails to satisfy the attendance requirement of the above said Courses; he/she shall not be eligible to appear for the Semester End Examinations of that semester and shall not be permitted to take admission to next higher semester. The candidate shall be required to repeat that semester during the subsequent year.

(b.2) Students who have satisfied the attendance requirement but not the CIE requirements of the above said Courses, shall be permitted to register afresh and appear for SEE after satisfying the CIE requirements in the same Course/s (with or without satisfying the attendance requirement) when offered during subsequent semester/s.

(c) Completion of Engineering Graphics and Elements of Civil Engineering and Mechanics shall be mandatory for the award of degree.

The Principal of each college shall make suitable arrangements in the timetable to facilitate the B. Sc students to attend the above mentioned courses to satisfy the CIE and attendance requirements and to appear for the University examinations.

11.4 Termination from the programme

A student shall be required to withdraw (discontinue) from the programme and leave the college on the following grounds.

i) Failure to secure a CGPA = 5.0 on three consecutive occasions.

ii) Failure to earn a credit of 175 (135 for lateral entry students) in 8 years (6 years for lateral entry students) of duration from the year of admission including the duration of temporary withdrawal (leave of absence).

iii) Absence from classes for more than six weeks at a time in a semester without leave of absence being granted by competent authorities.

iv) Failure to meet the standards of discipline as prescribed by the college from time to time.

12. AWARD OF CLASS

Sometimes, it would be necessary to provide equivalence of these averages, viz., SGPA and CGPA with the percentages and/or Class awarded as in the conventional system of declaring the results of University examinations. This can be done by prescribing certain specific thresholds in these averages for Distinction, First Class and Second
This can be seen from the following Table.

<table>
<thead>
<tr>
<th>Grade Point</th>
<th>Percentage of Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.75</td>
<td>50 (second class)</td>
</tr>
<tr>
<td>6.25</td>
<td>55</td>
</tr>
<tr>
<td>6.75</td>
<td>60 (First class)</td>
</tr>
<tr>
<td>7.25</td>
<td>65</td>
</tr>
<tr>
<td>7.75</td>
<td>70 (Distinction)</td>
</tr>
<tr>
<td>8.25</td>
<td>75</td>
</tr>
</tbody>
</table>

Percentage = (GPA - 0.75) x 10

13. APPEAL FOR REVIEW OF GRADES

a. The entire process of evaluation shall be made transparent and the course instructor shall explain to a student why he/she gets whatever grade he/she is awarded, if and when required. A mechanism for review of grade is incorporated in the evaluation system. However, before appealing for such review, a student shall first approach the concerned course Instructor and then the concerned DUGC, with the request to do the needful; and only in situations where satisfactory remedial measures have not been taken, the student may then appeal to the Department Academic Appeals Boards (DAAB) before the date specified in Academic Calendar, by paying the prescribed fees.

b. The fee for such an appeal will be decided by the Senate from time to time. If the appeal is upheld by DAAB, then the fee amount will be refunded to the student.

14. AWARD OF DEGREE

14.1 (1) B.E. Degree

a) Students shall be declared to have completed the Programme of B.E./B.Tech. degree and is eligible for the award of degree, provided the students have undergone the stipulated Course work of all the semesters under the Scheme of Teaching and Examinations and has earned the prescribed number of credits (175 credits for regular students registered for 4 year degree programmes & 135 for lateral entry students).

b) For the award of degree, a CGPA≥5.00 at the end of Programme shall be mandatory.

c) Completion of Additional Mathematics I and II, shall be mandatory for the award of degree to lateral entry diploma students.

d) Completion of Engineering Graphics and Elements of Civil Engineering and Mechanics of First Year Engineering Programme shall be mandatory for the award of degree to lateral entry B.Sc. graduates.

e) (i) Over and above the academic credits, every Day College regular student admitted to the 4 years Degree Programme and every student entering 4 years Degree Programme through lateral entry, shall earn 100 and 75 Activity Points respectively through AICTE Activity Point Programme for the award of degree. Students transferred from other Universities/Autonomous colleges under VTU to fifth semester are required to earn 50 Activity Points from the year of entry to VTU. The Activity Points earned shall be reflected on the student’s eight semester Grade Card.

(ii) Activity Points (non-credit) have no effect on SGPA/CGPA and shall not be considered for vertical progression.

In case students fail to earn the prescribed activity Points before the commencement of 8th semester examinations, eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of degree
only after the release of the Eighth semester Grade Card.

(2) **B.E. (Honors) Degree**

VTU, Belagavi has framed the guidelines for applying for the award of Bachelor of Engineering (Honors) degree.

These Regulations are applicable for the following students:

1. Admitted to I semester / I year from the academic year 2018-19 (i.e. USN XXX18XXXXX)
2. Admitted to III semester / II year from the academic year 2019-20 (i.e. USN XXX19XX4XX)
3. These Regulations are uniformly applicable to Affiliated, Autonomous and Constituent Colleges under VTU.

**Eligibility criterion**

(i) Students have to earn 18 or more additional credits through MOOCs.
(ii) Students shall register for this course from fifth semester onwards.
(iii) Students shall obtain a grade $\geq$ D in all the courses in first attempt only in all the semesters till 5th.
(iv) Students shall obtain CGPA of 8.5 and above at the end of fourth semester.
(v) For Diploma students, they shall complete Additional Mathematics I and II during 3rd and 4th semesters in first attempt only.

**Requirements:**

(i) Students shall maintain a grade $\geq$ D in all courses from 5th to 8th semester in ‘first attempt’ only.
(ii) Students not having CGPA greater than or equal to 8.5 at the end of the B.E. programme shall not be eligible for the award of Honors degree, even if they have satisfied the requirement of additional credits.
(iii) Students shall take up additional course work, other than the regular courses prescribed by the University from 5th to 8th semester from NPTEL and other platforms notified by the University and complete the same in any number of attempts with a final score (online assignments: 25 % + Proctored examination: 75 %) leading to the following certificates – ELITE (60 to 75 %) or ELITE + SILVER (76 to 89 %) or ELITE + GOLD ( $\geq$ 90 %) before closure of eighth semester as per the academic calendar.
(iv) Students shall be permitted to drop the registered course work (s) and select alternative course work (s) in case they cannot give proctored examination.
(v) Students have to take courses from the list of MOOCs approved by the University, which can be from NPTEL / SWAYAM / other platforms.
(vi) Students shall select courses in consultation with their Class Advisor, such that the content / syllabus of them are not similar to that of the core courses, professional electives or open electives, which the students may chose in the program.
(vii) Students shall earn the additional credits for these courses through MOOCs, by only appearing in person to the proctored examinations conducted by NPTEL / SWAYAM / other platform. The method of assessment shall be as per NPTEL online platform.
(viii) The Credit equivalence shall be as follows - 4 weeks of online course duration – 1 credit, 8 weeks of online course duration – 2 credits and 12 weeks of online course duration – 3 credits.
Registration:

(i) Any student meeting the eligibility criteria and interested to register for Honors degree qualification shall apply to the University through the Principal in the prescribed form along with the prescribed application fees within 15 working days after notification by the University.

(ii) The Registrar shall notify the registration of the student and it will be notified to the student and the student shall pay a one-time, non-refundable registration fees as prescribed by the University to confirm the registration.

Award of Honors Qualification:

(i) Students who successfully complete the MOOCs prescribed by the University and submit their E-certificates to the University through the Principal against the notification issued by the Registrar in time before the closure of eighth semester, as per the academic calendar shall be eligible for B.E. (Honors) degree. If a student does not submit the certificates in time on or before the last date, their request shall not be considered, even if they have earned the requisite number of credits.

(ii) The Honors degree shall be awarded only if the CGPA at the end of the B.E. programme is equal to or greater than 8.5.

(iii) A student who has earned the requisite number of credits and who has submitted the certificates in time and has been accepted by the University will get B.E. degree with Honors suffixed indicating recognition of higher achievement by the student concerned.

(iv) Further students fulfilling all the above requirements shall be entitled to receive their transcripts indicating both the achievement of the student concerned.

(v) The award of the Honors degree shall be recommended by the Academic Senate and approved by the Executive Council of the University.

14.2 (1) Noncompliance of CGPA ≥ 5.00 at the end of the Programme

(a) Students, who have completed all the courses of the Programme but not having a CGPA ≥ 5.00 at the end of the Programme, shall not be eligible for the award of the degree.

(b) In the cases of 14.2 (1) a, students shall be permitted to appear again for SEE in course/s (other than Internship, Technical seminar, Project (Mini and Main), and Laboratories) of any Semester/s without the rejection of CIE marks for any number of times, subject to the provision of maximum duration of the Programme to make up the CGPA equal to or greater than 5.00 for the award of the Degree.

(c) In case, the students earn improved grade/s in all the reappeared course/s, the CGPA shall be calculated considering the improved grade/s. If it is ≥5.00, the students shall become eligible for the award of the degree. If CGPA <5.00, the students shall follow the procedure laid in 14.2 (1) b

(d) In case, the students earn improved grade/s in some course/s and the same or lesser than the previously earned pass grade/s in the other reappeared course/s, the CGPA shall be calculated considering the improved grade/s and the pass grades earned before the reappearance. If it is ≥5.00, the students shall become eligible for the award of the degree. If CGPA<5.00, the students shall follow the procedure laid in 14.2 (1) b
(e) In case, the students earn improved grade/s in some courses and fail in the other reappeared course/s, the CGPA shall be calculated by considering the improved grade/s and the previously earned pass grade/s of the reappeared course/s in which the students have failed. If it is≥5.00, the students shall become eligible for the award of the degree. If CGPA <5.00, the students shall follow the procedure laid in 14.2 (1) b

(f) In case, the students fail (i.e., earns F grade) in all the reappeared course/s, pass grade/s of the course/s earned by the students before reappearance shall be retained. In such cases, the students shall follow the procedure laid in 14.2 (1) b

(g) Students shall obtain written permission from the Registrar (Evaluation) to reappear in SEE to make up the CGPA equal to or greater than 5.00.

(2) Noncompliance of Mini-project

(a) The mini-project shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take-up/complete the mini-project shall be declared fail in that course and shall have to complete the same during subsequent University examinations after satisfying the Mini-project requirements. Also, mini-project shall be considered for eligibility to VII semester.

(3) Noncompliance of Internship

(a) All the students of B.E/B.Tech shall have to undergo mandatory internship of 4 weeks during the vacation. A University examination shall be conducted during VIII semester. Internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take-up/complete the internship shall be declared fail in that Course and shall have to complete the same during subsequent University examinations after satisfy the internship requirements.

14.3 The maximum duration for a student for complying to the Degree requirements is 16 – semesters from the date of first registration for his first semester (8 years from the date of admission to first year, (12 semesters / 6 years from the date of admission for lateral entry student)).

15 GRADUATION REQUIREMENTS AND CONVOCATION

15.1 A student shall be declared to be eligible for the award of the degree if he/she has

a) Fulfilled “Award of Degree” Requirements

b) No Dues to the College, Departments, Hostels, Library, Central Computer Centre and any other centres

c) No disciplinary action pending against him/her.

15.2 The award of the degree must be recommended by the Senate

15.3 Convocation

Degree will be awarded for the students who have graduated during the preceding academic year. Students are required to apply for the Convocation along with the prescribed fees, after having satisfactorily completed all the degree requirements (refer ‘Award of Degree’) within the specified date in order to arrange for the award of the degree during convocation.

16 AWARD OF PRIZES, MEDALS, CLASS & RANKS

For the award of Prizes and Medals, the conditions stipulated by the Donor may be considered as per the statutes framed by the College for such awards.
Sometimes, it would be necessary to provide equivalence of these averages, viz., SGPA and CGPA with the percentages and/or Class awarded as in the conventional system of declaring the results of University examinations. This can be done by prescribing certain specific thresholds in these averages for Distinction, First Class and Second Class as described in 12.

17  **CONDUCT AND DISCIPLINE**

17.1 Students shall conduct themselves within and outside the premises of the College in a manner befitting the students of an Institution of National Importance.

17.2 **As per the order of Honorable Supreme Court of India, ragging in any form is considered as a criminal offence and is banned.** Any form of ragging will be severely dealt with.

17.3 The following acts of omission/ or commission shall constitute gross violation of the Code of Conduct and are liable to invoke disciplinary measures:

a) Ragging.

b) Lack of courtesy and decorum; indecent behaviour anywhere within or outside the campus.

c) Willful damage or stealthy removal of any property/belongings of the College/Hostel or of fellow students/citizens.

d) Possession, consumption or distribution of alcoholic drinks or any kind of hallucinogenic drugs.

e) Mutilation or unauthorized possession of Library books.

f) Noisy and unseemly behaviour, disturbing studies of fellow students.

g) Hacking in computer systems (such as entering into other Person’s area without prior permission, manipulation and/or Damage of computer hardware and software or any other Cyber crime etc.).

h) Plagiarism of any nature.

i) Any other act of gross indiscipline as decided by the Senate from time to time.

j) Use of Mobile in the college Academic area.

k) Smoking in College Campus and supari chewing.

l) Unauthorized fund raising and promoting sales.

Commensurate with the gravity of offence the punishment may be: reprimand, expulsion from the hostel, debarring from an examination, disallowing the use of certain facilities of the College, rustication for a specified period or even outright expulsion from the College, or even handing over the case to appropriate law enforcement authorities or the judiciary, as required by the circumstances.

17.4 For an offence committed in (i) a hostel (ii) a department or in a class room and (iii) elsewhere, the Chief Warden, the Head of the Department and the Dean (Academics), respectively, shall have the authority to reprimand or impose fine.

17.5 All cases involving punishment other than reprimand shall be reported to the Principal.

17.6 Cases of adoption of unfair means and/or any malpractice in an examination shall be reported to the Controller of Examinations for taking appropriate action.

18. **EARNING OF ACTIVITY POINTS FOR THE AWARD OF DEGREE**

18.1 As per VTU guidelines, every students entering 4 year degree programme should earn 100
activity points & every students entering 4 year degree programme through Lateral Entry should earn 75 activity points for the award of the Engineering Degree.

18.2 The Activity Points earned will be reflected on the student’s eighth semester Grade Card.

18.3 The activities can be spread over the years (duration of the programme) any time during the semester weekends and holidays, as per the interest & convenience of the students from the year of entry to the programme.

18.4 Activity Points (non-credit) have no effect on SGPA/CGPA point.

18.5 In case students fail to earn the prescribed Activity Points, Eighth semester Grade Card shall be issued only after earning the required Activity Points.

Note: Students are required to be inside the examination hall, 20 minutes before the commencement of examination. This is applicable for all examinations (Semester end/Supplementary/makeup) henceforth. Students will not be allowed inside the examination hall after the commencement, under any circumstances.

**********
# LIST OF MAJOR SCHOLARSHIPS

<table>
<thead>
<tr>
<th>Applicable to</th>
<th>Types of scholarship</th>
<th>Method</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>For SC/ST Students</td>
<td>Income : Below Rs.2,50,000/-</td>
<td>Online application</td>
<td>SSP</td>
</tr>
<tr>
<td></td>
<td>Income : Above Rs.2,50,000/- to Rs.10,00,000/-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For Others</td>
<td>Category I :</td>
<td>Online application</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Category 2A, 3A, 3B, &amp; GM Income Below Rs.1,00,000/-</td>
<td>Online application</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minority students Income Below Rs.2,50,000/-</td>
<td>Online application</td>
<td>NSP &amp; SSP</td>
</tr>
<tr>
<td>Parents must have Beedi Id. Card</td>
<td>Beedi Scholarship</td>
<td>Online application</td>
<td>scholarships.gov.in or nsp.gov.in</td>
</tr>
<tr>
<td>1st year Students</td>
<td>Central Sector Scholarship (MHRD)</td>
<td>Online application</td>
<td>scholarships.gov.in or nsp.gov.in</td>
</tr>
<tr>
<td>1st year Students</td>
<td>AICTE-Pragati.etc</td>
<td>Online application</td>
<td><a href="http://www.aicte-india.org">www.aicte-india.org</a></td>
</tr>
</tbody>
</table>

1. Scholarship details will be published in the notice board near College Academic Section. Students must see the notice board and submit the application before due dates.
2. All SC/ST and Category I students who have not paid any fee in CET must apply for Fee concession or Scholarship. Otherwise they must pay the tuition fee and college fee.
3. The students, who are applying for any of the above scholarship through online, must submit the hardcopy with supporting documents (with attestation) to the academic section in time.
B. E. SYLLABUS

ELECTRONICS & COMMUNICATION ENGINEERING

III & IV SEMESTER

With

Scheme of Teaching

& Examination
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Qualification</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. K. Rajesh Shetty</td>
<td>Ph.D.</td>
<td>Professor/Dean (Admissions &amp; Alumni Affairs)</td>
</tr>
<tr>
<td>2</td>
<td>Dr. Rekha Bhandarkar</td>
<td>Ph.D.</td>
<td>Professor</td>
</tr>
<tr>
<td>3</td>
<td>Dr. K. V. S. S. S. Sairam</td>
<td>Ph.D.</td>
<td>Professor &amp; Head</td>
</tr>
<tr>
<td>4</td>
<td>Dr. Veena Devi Shastrimath V.</td>
<td>Ph.D.</td>
<td>Professor</td>
</tr>
<tr>
<td>5</td>
<td>Dr. Prabha Niranjan</td>
<td>Ph.D.</td>
<td>Professor</td>
</tr>
<tr>
<td>6</td>
<td>Dr. K. S. Shivaprakasha</td>
<td>Ph.D.</td>
<td>Professor</td>
</tr>
<tr>
<td>7</td>
<td>Dr. Krishnananda Shet</td>
<td>Ph.D.</td>
<td>Assoc. Professor</td>
</tr>
<tr>
<td>8</td>
<td>Dr. Usha Desai</td>
<td>Ph.D.</td>
<td>Assoc. Professor</td>
</tr>
<tr>
<td>9</td>
<td>Dr. Subramanya Bhat</td>
<td>Ph.D.</td>
<td>Assoc. Professor</td>
</tr>
<tr>
<td>10</td>
<td>Dr. Shankar B. B.</td>
<td>Ph.D.</td>
<td>Assoc. Professor</td>
</tr>
<tr>
<td>11</td>
<td>Dr. Vidya Kudva</td>
<td>Ph.D.</td>
<td>Assoc. Professor</td>
</tr>
<tr>
<td>12</td>
<td>Dr. Durga Prasad</td>
<td>Ph.D.</td>
<td>Assoc. Professor</td>
</tr>
<tr>
<td>13</td>
<td>Dr. Roopa B. Hegde</td>
<td>Ph.D.</td>
<td>Assoc. Professor</td>
</tr>
<tr>
<td>14</td>
<td>Mrs. Shrividya G.</td>
<td>M.Tech.</td>
<td>Assoc. Professor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Ph.D.)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Mrs. Sushma P.S.</td>
<td>M.Tech.</td>
<td>Assoc. Professor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Ph.D.)</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Mrs. Padmavathi K.</td>
<td>M.Tech.</td>
<td>Assoc. Professor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Ph.D.)</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Mr. Sukesh Rao M.</td>
<td>M.Tech.</td>
<td>Assoc. Professor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Ph.D.)</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Mr. Mahaveera K.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Ph.D.)</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Mrs. Sunitha Lasrado</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Ph.D.)</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Mr. Satheesh Rao</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Ph.D.)</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Dr. Ashish Singh</td>
<td>Ph.D.</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>22</td>
<td>Dr. Narendra K. C.</td>
<td>Ph.D.</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td>23</td>
<td>Dr. Shivakumar B. R.</td>
<td>Ph.D.</td>
<td>Asst. Prof Gd III</td>
</tr>
<tr>
<td></td>
<td>Name</td>
<td>Qualification</td>
<td>Designation</td>
</tr>
<tr>
<td>----</td>
<td>-------------------------</td>
<td>---------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>24</td>
<td>Mr. Ravindra K.S.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>25</td>
<td>Mr. Pradyumna G.R.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>26</td>
<td>Mrs. Charishma</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>27</td>
<td>Mrs. Niju Rajan</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>28</td>
<td>Mrs. Shubha B.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>29</td>
<td>Mr. Anil Kumar Bhat</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>30</td>
<td>Mr. Dileep Kumar M.J.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>31</td>
<td>Mr. Sudharshana</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>32</td>
<td>Mrs. Nagapiya Kamath K.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>33</td>
<td>Mr. Prajwal Hegde N.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>34</td>
<td>Mrs. Anusha R.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>35</td>
<td>Mr. Bommegowda K. B.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd II</td>
</tr>
<tr>
<td>36</td>
<td>Mrs. Deepa K.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd I</td>
</tr>
<tr>
<td>37</td>
<td>Mrs. Anupama B.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd I</td>
</tr>
<tr>
<td>38</td>
<td>Mr. Karthik</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd I</td>
</tr>
<tr>
<td>39</td>
<td>Mrs. Ramya Shetty</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd I</td>
</tr>
<tr>
<td>40</td>
<td>Mrs. Ashwini K.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd I</td>
</tr>
<tr>
<td>41</td>
<td>Mrs. Shankari N.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd I</td>
</tr>
<tr>
<td>42</td>
<td>Mrs. Harshitha Bhat</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd I</td>
</tr>
<tr>
<td>43</td>
<td>Mrs. Kavitha S.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd I</td>
</tr>
<tr>
<td>44</td>
<td>Mrs. Lavanya B. L.</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd I</td>
</tr>
<tr>
<td>45</td>
<td>Mr. Santhosh</td>
<td>M.Tech.</td>
<td>Asst. Prof Gd I</td>
</tr>
</tbody>
</table>
DEPARTMENT: ELECTRONICS & COMMUNICATION ENGINEERING

Vision:
Empowering people, Partnering in Community Development by achieving expertise requiring the knowledge of state of the art technology in the field of Electronics and Communication.

Mission:
To impart specialized education in the field of Electronics & Communication that contributes to the socio-economic development of the region and to generate technical manpower with high degree of credibility, integrity and ethical standards by providing vibrant learning environment.

Program Educational Objectives (PEOs):

PEO1: The graduate should have effective foundation in mathematics, science as well as other relevant disciplines and a strong foundation in Electronics and Communication Engineering.

PEO2: The graduate will inculcate effective communication skills, teamwork, lifelong learning and leadership in preparation for a successful career in industry and academia with credibility, integrity and ethics.

PEO3: The graduate will be able to design and develop innovative systems that contribute to socio-economic development.
Program Specific Outcomes (PSOs):

PSO1: Understand the concepts and applications in the field of communication, signal processing, VLSI, embedded systems, power electronics and control systems.

PSO2: Effectively apply the domain knowledge to arrive at optimum solutions to real time applications.

PSO3: Apply acquired skills in project management and execution to Electronics and Communication systems.

Program Outcomes (POs):

Engineering Graduates will be able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: 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.

PO4: 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.
PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: 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.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: 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.

PO11: 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.
PO12: 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.

Graduate Attributes:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Graduate Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Engineering Knowledge</td>
</tr>
<tr>
<td>B</td>
<td>Problem Analysis</td>
</tr>
<tr>
<td>C</td>
<td>Design / development of solutions</td>
</tr>
<tr>
<td>D</td>
<td>Conduct investigations of complex problems</td>
</tr>
<tr>
<td>E</td>
<td>Modern tool usage</td>
</tr>
<tr>
<td>F</td>
<td>The engineer and society</td>
</tr>
<tr>
<td>G</td>
<td>Environment and sustainability</td>
</tr>
<tr>
<td>H</td>
<td>Ethics</td>
</tr>
<tr>
<td>I</td>
<td>Individual and team work</td>
</tr>
<tr>
<td>J</td>
<td>Communication</td>
</tr>
<tr>
<td>K</td>
<td>Project management and finance</td>
</tr>
<tr>
<td>L</td>
<td>Life-long learning</td>
</tr>
</tbody>
</table>
### DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
**SCHEME OF TEACHING AND EXAMINATION**

#### III SEMESTER B.E.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>CODE</th>
<th>COURSE</th>
<th>Theory/Tuto./Prac./Self Study</th>
<th>Total Hrs./Week</th>
<th>C.I.E.</th>
<th>S.E.E.</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>20EC301</td>
<td>Vector Calculus and Transform Techniques</td>
<td>3+0+0+0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>20EC302</td>
<td>Digital Systems Design</td>
<td>4+0+0+0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>20EC303</td>
<td>Electronic Devices</td>
<td>4+0+0+0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>20EC304</td>
<td>Network Theory</td>
<td>4+0+0+0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>20EC305</td>
<td>Signals &amp; Systems</td>
<td>4+0+0+0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>6.</td>
<td>20EC306</td>
<td>Digital System Design Lab*</td>
<td>0+0+3+0</td>
<td>3</td>
<td>50</td>
<td>50*</td>
<td>1.5</td>
</tr>
<tr>
<td>7.</td>
<td>20EC307</td>
<td>Electronic Devices Lab</td>
<td>0+0+3+0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>1.5</td>
</tr>
<tr>
<td>8.</td>
<td>20HU311</td>
<td>Enhancing Self Competence</td>
<td>2+0+0+0</td>
<td>2</td>
<td>50</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td>9.</td>
<td>20HU312/20HU412</td>
<td>Kannada (Aadalita Kannada / Vyavaharika Kannada)</td>
<td>0+2+0+0</td>
<td>2</td>
<td>50</td>
<td>50</td>
<td>1</td>
</tr>
</tbody>
</table>

| Total   |         | 21+2+6+0 | 29   | 450 | 450 | 25 |

*Project based evaluation*
### DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING  
#### SCHEME OF TEACHING AND EXAMINATION

**IV SEMESTER B.E.**  
**25 Hours/week**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>CODE</th>
<th>COURSE</th>
<th>Theory/Tuto./Prac./ Self Study</th>
<th>Total Hrs. / Week</th>
<th>C.I.E.</th>
<th>S.E.E.</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>20EC401</td>
<td>Probability Theory and Numerical Methods</td>
<td>3+0+0+0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>20EC402</td>
<td>Analog Electronic Circuits</td>
<td>4+0+0+0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>20EC403</td>
<td>Control Systems</td>
<td>4+0+0+0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>20EC404</td>
<td>Digital Signal Processing</td>
<td>4+0+0+0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>5.</td>
<td>20EC405</td>
<td>Electromagnetic Wave Theory</td>
<td>4+0+0+0</td>
<td>4</td>
<td>50</td>
<td>50</td>
<td>4</td>
</tr>
<tr>
<td>6.</td>
<td>20EC406</td>
<td>Analog Electronic Circuits Lab</td>
<td>0+0+3+0</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>1.5</td>
</tr>
<tr>
<td>7.</td>
<td>20EC407</td>
<td>Digital Signal Processing Lab</td>
<td>0+0+3+0</td>
<td>3</td>
<td>50</td>
<td>50 '</td>
<td>1.5</td>
</tr>
<tr>
<td>8.</td>
<td>20HU312/20HU412</td>
<td>Kannada (Aadalita Kannada / Vyavaharika Kannada</td>
<td>0+2+0+0</td>
<td>2</td>
<td>50</td>
<td>50</td>
<td>1#</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>19+2+6+0</strong></td>
<td><strong>25</strong></td>
<td><strong>350</strong></td>
<td><strong>350</strong></td>
<td><strong>22</strong></td>
</tr>
</tbody>
</table>

*Project based evaluation*
Course Learning Objectives:

At the end of the course the successful student is expected to:

1. To apply operators like gradient, divergence and curl to both scalar as well as vector functions.
2. To evaluate surface and volume integrals in terms of line integrals using various integral theorems.
3. To apply theory of complex variables in life related problems.
4. To perform Fourier analysis on non-sinusoidal periodic signals.
5. To introduce Z-transform and its applications to solve difference equation.

UNIT – I


UNIT – II

THEORY OF COMPLEX VARIABLES: Functions of complex variables, Cauchy Riemann equations, Properties of analytic functions, Conformal mapping, Bilinear transformations.


UNIT- III

FOURIER ANALYSIS: Periodic functions, Euler’s formulae, Trigonometric Fourier series.


Scheme of SEE Question Paper
There will be 8 questions of 20 marks each in the question paper divided into 3 Units as per the syllabi & contact hours and the student will have to answer 5 full questions, selecting 2 full questions from Unit - I & Unit – II and 1 full question from Unit – III.

Course Outcomes:
At the end of the course the student should be able to
1. Solve the vector functions and their derivatives for engineering applications.
2. Demonstrate the applications of Gauss divergence and Stoke’s theorem.
3. Illustrate the concept of complex variables and line integrals in complex plane.
4. Apply Fourier analysis to solve engineering problems.
5. Apply the concepts of Z- transforms to solve engineering problems.

Mapping of PO’s/ PSO’s & CO’s:

<table>
<thead>
<tr>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>CO2</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>CO3</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>CO4</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>CO5</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
</tbody>
</table>

3 – High
2 – Medium
1 - Low

TEXTBOOKS:

REFERENCE BOOKS:

************
Course Learning Objectives:
Upon Completing this course, the students will be able to
1. Understand the functions of different logic gates and simplify the Algebraic Equations using Karnaugh Maps and Map Entered Variable method.
2. Describe and Analyze Combinational Logic circuits - Decoders, Encoders, Digital multiplexers, Adders/Subtractors and Binary comparators.
3. Describe and analyze the operation of Latches / Flip Flops, Master-Slave Flip-Flops, Edge-Triggered flip-flops and Flip-Flop Conversions.
5. Understand the basics of Verilog and program combinational and sequential circuits using data flow and behavioral modelling respectively.

UNIT - I
Principles of combination logic: Definition of combinational logic, Canonical forms, Generation of switching equations from truth tables, Karnaugh map-3,4 variables, Incompletely specified functions (Don’t care terms),Simplifying min/max term equations, Map entered Variables (Text 1, Chapter 3).
HDL: Structure of Verilog Module, Operators, Data types, Simulation and Synthesis (Text 3 Chapter 1)

UNIT – II
Analysis and design of combinational logic - I: Adders and Subtractors, Cascading adders/subtractors, Look ahead carry adder, Decoders, Encoders, Digital multiplexers, Binary comparators, Array Multipliers(Text 1, Chapter 4), Verilog coding in behavioral modeling, Comparison of Dataflow modeling and behavioral modeling (Text 3, chapter 3)

UNIT – III
Flip-Flops and its Applications: Basic Bistable element, Latches, SR latch, Switch debounce , SR flip-flops , D Flip flop, T flip flop, JK flip flops, Master slave JK ,0’s and 1’s catching problem, Edge triggered flip flop, Characteristic equations, (Text 2, Chapter 6), Verilog coding in behavioral modeling (Text 3, chapter 3)

UNIT – IV
Sequential Circuit Design - I: Introduction-Registers, Counters -binary ripple counters, Synchronous binary counters, Design of a synchronous mod-n counter
using clocked JK, D, T and SR flip-flops (Text 2,1 Chapter 6). Verilog coding in behavioral modeling (Text 3, chapter 3)

11 Hours

UNIT – V

Sequential Circuit Design -II: Mealy and Moore models, State machine notation, Construction of state diagrams (Text 2,1 Chapter 6), Verilog coding in behavioral modeling (Text 3, chapter 3)

10 Hours

Scheme of SEE Question Paper
There will be 10 questions of 20 marks each in the question paper divided into 5 units as per the syllabi & contact hours and the student will have to answer 5 full questions, selecting one full question from each unit.

Course Outcomes:
At the end of the course the student should be able to
1. Generate Switching equations in Canonical form from Truth table and Simplify Algebraic expressions for minimal Sum/Product using Karnaugh Map and Map Entered Variable method.
2. Analyze and Design different Combinational logic circuits such as Decoders, Encoders, Multiplexers, Adders, Subtractors, Code converters, Binary Comparators and Array Multipliers; implement combinational circuits using Verilog behavioral model.
3. Describe the operation of Sequential circuits such as Latches, Flip flops, Mater-Slave Flip flops, Edge triggered Flip-flops and implement using Verilog behavioral model.
4. Make use of Flip flops to design Registers, Synchronous/Asynchronous Counters and implement using Verilog behavioral model.
5. Construct excitation table, transition table, state table and state diagram for Mealy/Moore model and implement using Verilog behavioral model.

Mapping of PO's/ PSO's & CO's:

<table>
<thead>
<tr>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO4</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO5</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3 – High 2 – Medium 1 – Low

TEXTBOOKS:
REFERENCE BOOKS:

NPTEL/ MOOC Link:
3. https://onlinecourses.nptel.ac.in/noc18_ee33
4. https://onlinecourses.nptel.ac.in/noc15_ec01
5. https://onlinecourses.nptel.ac.in/noc17_cs21

**********

<table>
<thead>
<tr>
<th>ELECTRONIC DEVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Code</td>
</tr>
<tr>
<td>Teaching Hours/Week (L:T:P)</td>
</tr>
<tr>
<td>Total Hours</td>
</tr>
</tbody>
</table>

Course Learning Objectives:
This course will enable students to:
1. Understand the fabrication process of semiconductor devices.
2. Understand the basics of semiconductor device physics.
3. Describe the mathematical models BJT and FETs along with the constructional details.
4. Understand the construction and working principles MESFET, MISFETs and optoelectronic devices.

UNIT – I

Fabrication of semiconductor devices

UNIT – II

Semiconductors and p-n Junctions
Intrinsic Semiconductors, Doped Semiconductors, Drift Current, Diffusion Current, Einstein relationship, The pn Junction: Structure, Depletion region, Built-in voltage,
Width of the depletion region, pn Junction with forward bias, Diode current, Reverse breakdown: Avalanche and Zener breakdown, Depletion Capacitance, Diffusion Capacitance. Diode I/V Characteristics, Diode models, Large-signal and small-signal operation, Diode circuits: Voltage limiting circuits, Voltage doublers, Level shifters and switches (Text 2: 3.1-3.6, 4.3.5-4.3.7, 4.6).

12 Hours

UNIT – III

Bipolar Junction Transistor
BJT structure and operation: Operation of the npn Transistor in the Active Mode, Saturation mode, pnp transistor, BJT characteristics in Common Emitter (CE) configuration.
BJT models: Large-Signal Model, Concept of Transconductance, Small-Signal Model, Early Effect, High-Frequency Model of Bipolar Transistor, Transit Frequency (Text 3).
Other BJT models: Eber’s-Moll Model, $r_e$-model and $h$-model for CE mode (qualitative). (Text 3:4.2-4.6, 11.2).

12 Hours

UNIT – IV

Metal Oxide Semiconductor Field Effect Transistors
Device Structure and Operation, Current–Voltage Characteristics, Channel Length Modulation, Trans-conductance, Other 2nd order effects, PMOS transistor (Text 2).
MOS device Models: Large-Signal Model, Small-Signal Model, MOSFET internal capacitances and High frequency model, Transit Frequency (Text 3:6.1-6.6, 11.2).

10 Hours

UNIT – V

Metal-Semiconductor FET: GaAs MESFET, High Electron Mobility Transistor (HEMT), Metal Insulator Semiconductor FET basic operation, Ideal MOS capacitor, Effects of real surfaces, Threshold voltage (Text 1).

10 Hours

Scheme of SEE Question Paper
There will be 10 questions of 20 marks each in the question paper divided into 5 units as per the syllabi & contact hours and the student will have to answer 5 full questions, selecting one full question from each unit.
Course Outcomes:
At the end of the course the student will be able to

1. Explain the process steps involved in IC Fabrication; Describe the fabrication process of Diode, BJT and MOSFET;
2. Explain the structure and operation of a Semiconductor Diode; Compute the value of depletion region width and built-in potential; Demonstrate the use of diodes in voltage limiting and doubling applications;
3. Explain the structure and operation of BJTs; Determine the small signal model for a given BJT Circuit; Discuss Early effect, Transit frequency & its implications;
4. Explain the structure and operation of MOSFETs; Determine the small signal model for a given MOS Circuit; Discuss 2nd order effects, Transit frequency & its implications;
5. Explain the structure and operation of MESFET, HEMT, Photodiodes, Phototransistors and Solar Cell;

Mapping of PO’s/ PSO’s & CO’s:

<table>
<thead>
<tr>
<th></th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO2</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO3</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO4</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO5</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3 – High  2 – Medium  1 - Low

TEXTBOOKS:

REFERENCE BOOKS:
NPTEL/ MOOC Link
1. https://nptel.ac.in/courses/122106025/2
2. https://nptel.ac.in/courses/117106091/

************

NETWORK THEORY

<table>
<thead>
<tr>
<th>Course Code</th>
<th>20EC304</th>
<th>CIE Marks</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Hours/Week (L:T:P)</td>
<td>4:0:0</td>
<td>SEE Marks</td>
<td>50</td>
</tr>
<tr>
<td>Total Hours</td>
<td>52</td>
<td>Credits</td>
<td>04</td>
</tr>
</tbody>
</table>

Course Learning Objectives:
This course will enable students to

1. Understand about analysis of complex circuits using Source transformations, Star- Delta transformations, mesh current & nodal voltage method.
2. Use the concepts of graph theory to solve the electrical networks and analyze series and parallel resonant circuits.
3. Apply and analyze various network theorems in solving the problems related to Electrical Circuits.
4. Describe behavior of circuit elements under switching condition and their representations, evaluate initial and final condition for RL, RC and RLC circuits for DC and AC excitations, and understand the use of Laplace transform to solve Electrical Circuits.
5. Describe and analyze two-port networks.

UNIT – I

Basic Concepts: Practical sources, Source transformations, Network reduction using Star- Delta transformation, Loop and node analysis with linearly dependent and independent sources for DC and AC networks, Concepts of Super node and Super mesh. 10 Hours

UNIT – II

Network Topology: Graph of a network, Concept of tree and co-tree, Incidence matrix, Tie-set and Cut-set schedules, Formulation of equilibrium equations in matrix form, Solution of resistive networks, Principle of duality. 12 Hours
UNIT – III

**Network Theorems:** Superposition, Reciprocity Theorem and Millman’s theorems, Thevenin’s and Norton’s theorems, Maximum power transfer theorem.  

10 Hours

UNIT – IV

**Transient Behavior and Initial Conditions:** Behavior of circuit elements under switching condition and their representation, Evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations.  


12 Hours

UNIT – V

**Two Port Network Parameters:** Definition of z, y, h and transmission parameters, Modeling with these parameters and relationship between parameters sets. 8 Hours

Scheme of SEE Question Paper
There will be 10 questions of 20 marks each in the question paper divided into 5 units as per the syllabi & contact hours and the student will have to answer 5 full questions, selecting one full question from each unit.

Course Outcomes:
At the end of the course the student will be able to

1. Apply source transformation, star- delta transformation, mesh analysis, node analysis, supermesh and supernode analysis to determine branch currents and nodal voltages.  
2. Discuss the concepts of tree, co-tree of a network graph; Apply the concepts of node incidence matrix, Tie set schedule and Cut set schedule to solve for branch voltage and node current of the given electrical networks; discuss the concept of duality; determine resonant frequency, bandwidth and Q factor for series and parallel resonant circuits.  
3. Apply Thevenin’s and Norton’s theorems, Maximum power transfer theorem, Superposition, Reciprocity Theorem and Millman’s theorems to find current, voltage and power in network elements.  
4. Examine the behaviour of circuit elements under switching condition to evaluate the initial and final condition of RL, RC and RLC circuits for DC and AC excitations; use Laplace transformations in circuit analysis and waveform synthesis.  
5. Relate and determine z, y, h and ABCD parameters for two-port electrical networks.
## Mapping of PO’s/ PSO’s & CO’s:

<table>
<thead>
<tr>
<th></th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>CO2</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>CO4</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO5</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>

- **3** – High
- **2** – Medium
- **1** – Low

### TEXTBOOKS:

### REFERENCE BOOKS:

### NPTEL/ MOOC Link:
1. [http://nptel.ac.in/courses/117106116/](http://nptel.ac.in/courses/117106116/)
2. [http://nptel.ac.in/courses/117106108/64](http://nptel.ac.in/courses/117106108/64)
3. [http://www.nptel.ac.in/courses/108102042/9](http://www.nptel.ac.in/courses/108102042/9)
4. [https://www.edx.org/course/circuits-electronics-1-basic-circuit-mitx-6-002-1x-0](https://www.edx.org/course/circuits-electronics-1-basic-circuit-mitx-6-002-1x-0)

************
**Course Learning Objectives:**
This course will enable students to

1. Understand different types of signals, systems, basic operations on signals.
2. Study different representations for LTI/LSI systems.
4. Study the Fourier transform representation for non-periodic signals & the applications of Fourier representation in analyzing LTI/LSI systems.
5. Understand the process of sampling and its implications.

**UNIT – I**

Introduction, Energy and Power signals, Continuous and Discrete time signals, Periodicity, Continuous and Discrete amplitude signals. Representation of Basic Signals, Operations on signals.  

10 Hours

**UNIT – II**

**System properties:** Linearity: Additivity and Homogeneity, Shift-invariance, Causality, Stability, Realizability. Linear Shift-Invariant (LSI) systems/Linear Time Invariant (LTI) systems, Impulse response and Step response, Convolution, Numerical on convolution.  

10 Hours

**UNIT – III**

Characterization of Causality and Stability of LSI/ LTI systems. System representation through differential equations (solution not included) and Difference equations & its solutions, Block diagram representation.  

10 Hours

**UNIT – IV**

Periodic inputs to an LSI/ LTI system, The notion of a frequency response and its relation to the impulse response, Fourier series representation and their properties (CTFS & DTFS).  

10 Hours

**UNIT – V**


12 Hours
**Scheme of SEE Question Paper**
There will be 10 questions of 20 marks each in the question paper divided into 5 units as per the syllabi & contact hours and the student will have to answer 5 full questions, selecting one full question from each unit.

**Course Outcomes:**
At the end of the course the student will be able to
1. Apply the knowledge of energy, power, periodicity to classify signals and basic operations on signals.
2. Solve an LTI/LSI system to determine the output and system properties.
3. Solve difference equation; Illustrate difference and differential equations using block diagram representation.
4. Apply the knowledge of convolution to determine sinusoidal steady state response; determine frequency domain representation for periodic signals.
5. Determine frequency domain representation for non periodic signals; Make use of frequency domain representation in sampling process.

**Mapping of PO's/ PSO's & CO's:**

<table>
<thead>
<tr>
<th></th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO4</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO5</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3 – High  2 – Medium  1 - Low

**TEXTBOOKS:**

**REFERENCE BOOKS:**
NPTEL/ MOOC Link:
1. https://nptel.ac.in/courses/108104100/

************

DIGITAL SYSTEM DESIGN LAB

<table>
<thead>
<tr>
<th>Course Code</th>
<th>20EC306</th>
<th>CIE Marks</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Hours/Week (L:T:P)</td>
<td>0:0:3</td>
<td>SEE Marks</td>
<td>50</td>
</tr>
<tr>
<td>Total Hours</td>
<td>39</td>
<td>Credits</td>
<td>1.5</td>
</tr>
</tbody>
</table>

*This course is a project based learning subject associated, which will be evaluated based on project work carried out during semester (50 marks) and the CIE for the lab (50 marks).

Course Learning Objectives:
This laboratory course enables students to get practical experience in design, realization and verification of:
1. Demorgan’s theorem.
2. Half/Full/Parallel Adders and Subtractors.
5. Flip-Flops, Shift registers and Counters.
6. Verilog coding for combinational and sequential circuits.

LIST OF EXPERIMENTS

<table>
<thead>
<tr>
<th>Lab Number</th>
<th>EXPERIMENT TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FAMILIARIZATION OF IC’S AND DE MORGAN’S THEOREM</td>
</tr>
<tr>
<td></td>
<td>i. Familiarization of IC’s and trainer kit.</td>
</tr>
<tr>
<td></td>
<td>ii. To verify De Morgan’s theorem for two variables.</td>
</tr>
<tr>
<td>2</td>
<td>ADDERS AND SUBTRACTORS</td>
</tr>
<tr>
<td></td>
<td>i. To Design and implement Half/Full adder and Half/Full Subtractor using basic gates.</td>
</tr>
<tr>
<td></td>
<td>ii. To Design and implement 4 bit parallel adder/subtractor using IC7483.</td>
</tr>
<tr>
<td></td>
<td>i. To Design and implement one bit comparator using logic gates and four bit magnitude comparator using IC 7485.</td>
</tr>
</tbody>
</table>
3. **MULTIPLEXER AND DEMULTIPLEXER**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i. To Design and implement Arithmetic Circuits (Half/Full adder) using IC74153 (Multiplexer).</td>
<td></td>
</tr>
<tr>
<td>ii. To Design and implement Arithmetic Circuits (Half/Full Subtractor) using IC74139 (Demultiplexer).</td>
<td></td>
</tr>
<tr>
<td>i. To realize a) SISO b) SIPO c) PISO d) PIPO shift registers using IC 7474 and IC 7495.</td>
<td></td>
</tr>
</tbody>
</table>

4. **COUNTERS**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i. To realize Asynchronous mod-N counter using IC 7490/7496.</td>
<td></td>
</tr>
<tr>
<td>ii. To realize Synchronous counter using IC 74192/7476.</td>
<td></td>
</tr>
<tr>
<td>iii. To realize Ring and johnson counter using IC's.</td>
<td></td>
</tr>
</tbody>
</table>

5. **CODE FOR COMBINATIONAL CIRCUITS USING DATAFLOW STYLE OF MODELING.**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Adder/Subtractor.</td>
<td></td>
</tr>
<tr>
<td>ii. Multiplexer/ Demux.</td>
<td></td>
</tr>
<tr>
<td>iii. Encoder/ Decoder.</td>
<td></td>
</tr>
<tr>
<td>iv. Comparator.</td>
<td></td>
</tr>
</tbody>
</table>

6. **CODE FOR SEQUENTIAL CIRCUITS USING BEHAVIORAL STYLE OF MODELING.**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i. JK, D, T Flip Flops.</td>
<td></td>
</tr>
<tr>
<td>ii. Up/Down BCD counter.</td>
<td></td>
</tr>
<tr>
<td>iii. Counting number of ones using for/while loop.</td>
<td></td>
</tr>
<tr>
<td>iv. Sequence generation using case.</td>
<td></td>
</tr>
</tbody>
</table>

**Course Outcomes:**

**At the end of the course the student will be able to**

1. Design and implement Combinational Logic Circuits using Multiplexers and Demultiplexers; Design and implement mod-N counters using Flip-Flops and counter ICs.
2. Develop Verilog HDL codes for given digital circuits in Behavioral modeling style and perform simulation using Xilinx Tool.

**Mapping of PO’s/ PSO’s & CO’s:**

<table>
<thead>
<tr>
<th></th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<p>| | | | | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3 – High</td>
<td>2 – Medium</td>
<td>1 - Low</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Course Code: 20EC307
CIE Marks: 50
Teaching Hours/Week (L:T:P): 0:0:3
SEE Marks: 50
Total Hours: 39
Credits: 1.5

Course Learning Objectives:
This laboratory course enables students to:
1. Understand the circuit schematic and its working.
2. Study the characteristics of different electronic devices.
3. Design simple electronic circuits as per the specifications using discrete electronic components.
4. Familiarize with EDA tools which can be used for electronic circuit simulation.

LIST OF EXPERIMENTS

PART A: Experiments using Discrete components
1. Conduct experiment on Half wave rectifier and Full wave rectifier with and without filter and measure the ripple factor.
2. Design a Zener voltage regulator to determine line and load regulation.
3. Design of Regulated power supply.
4. Conduct experiment to test diode clipping circuits (single/double ended).
5. Conduct experiment to test diode clamping circuits (positive/negative).
6. Conduct an experiment to find characteristics of LDR and Photo diode and to turn on an LED using LDR.
7. Series and parallel resonant circuits.
8. Conduct an experiment to find characteristics of solar cell.

PART-B: Simulation using EDA software (PSpice, Proteus, LTSpice or KiCAD)
1. Determine characteristics of Diode and Zener diode.
2. Input, Output and Transfer characteristics of BJT Common emitter configuration and evaluation of BJT parameters.
3. Transfer and drain characteristics of a JFET and MOSFET.
4. RC Phase Shift Oscillator using BJT and FET.
5. Verification of Network Theorems: Thevenin’s, Norton’s and Maximum Power Transfer.
Course Outcomes:
At the end of the course the student will be able to
1. Design and debug electronic circuits involving diodes, resistors and capacitors.
2. Setup a simulation to characterize basic electronic devices and test simple electronic circuits using LTSPICE simulation tool.

Mapping of PO's/ PSO's & CO's:

<table>
<thead>
<tr>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>CO2</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>

3 – High
2 – Medium
1 – Low

REFERENCE BOOKS:

************

ENHANCING SELF COMPETENCE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>CIE Marks</th>
<th>SEE Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>20HU311</td>
<td>50</td>
<td>50</td>
<td>02</td>
</tr>
</tbody>
</table>

Pre-requisites:
Students must have essential knowledge of English Language Communication.

Course Learning Objectives (CLO):
By the end of the course, students should be able to:
1. Introspect and learn about oneself.
2. Develop professional writing skills.
3. Acquaint with the various social behaviour and etiquette.
4. Apply the techniques of fundamental communication skills.
5. Develop necessary techniques for formal presentations and be acquainted with cultural diversities & issues related to gender sensitivity.
UNIT – I

Personality Traits:
Types & Kinds of personality, Ways to Identify Self (Entry -Exit survey- Tests; SWOT Analysis, Johari Window).
6 Hours

UNIT – II

Effective Communication Skills:
One-way and two-way Communication (Square activities), Active listening, Speaking.
8 Hours

UNIT – III

Writing Skills:
Formal E-mails, Framing Requests, Greetings, Salutations, Close
8 Hours

UNIT – IV

Social Behavior and Etiquette:
Time Management, Personal Grooming, Hygiene, Dressing for different occasions, Making Small Talk, Showing Respect, Feedback.
7 Hours

UNIT – V

Professional Presentation Techniques:
Group discussion, Formal Presentation, Awareness of the cultural diversity of the workplace, the global work cultures, Introduction to Gender Sensitivity
10 Hours

Course Outcomes (CO):
By the end of the course, students will be able to:
1. Understand the importance of human conduct.
2. Demonstrate knowledge of theory and competence in office communication.
3. Develop and assess various types of communication.
4. Be Familiar with the current practices of social behaviour.
5. Prepare and deliver presentation appropriate for the workplace.

Mapping of PO’s/ PSO’s & CO’s:

<table>
<thead>
<tr>
<th></th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>CO2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>CO3</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-2</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>CO4</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>CO5</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

3 – High
2 – Medium
1 – Low
REFERENCE BOOKS:

**********

<table>
<thead>
<tr>
<th>Course Code</th>
<th>20HU312/412</th>
<th>Semester</th>
<th>III / IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Hours/Week (L:T:P)</td>
<td>0:2:0</td>
<td>CIE Marks</td>
<td>50</td>
</tr>
<tr>
<td>Total Hours</td>
<td>26</td>
<td>SEE Marks</td>
<td>50</td>
</tr>
</tbody>
</table>

ಅಧ್ಯಯನ ಮುಖ್ಯ ವಿಷಯಗಳು
- ಕನ್ನಡ ಮಾತ್ರಗಳ ಸ್ಥಾನೀಯತೆ ಜಾನಿಸುವುದು
- ಅಧ್ಯಯನಗಳ ಸ್ಥಾನೀಯತೆ ಜಾನಿಸುವುದು
- ಕೆಲವು ಇತರ ಸಾಮಾನ್ಯತೆಯ ಜಾನಿಸುವುದು, ಕನ್ನಡ ಮಾತ್ರಗಳ ಸ್ಥಾನೀಯತೆ ಜಾನಿಸುವುದು.
- ಬೀಳದಿನ ಅಧ್ಯಯನಗಳು, ಕೆಲವು ಇತರ ಸಮಾಧ್ಯಮಗಳ ಸ್ಥಾನೀಯತೆ ಜಾನಿಸುವುದು.
- ಮೈತ್ರೀ ಮತ್ತು ಮೂಲದ ಸ್ಥಾನೀಯತೆ ಜಾನಿಸುವುದು.
- ಕೆಲವು ಸಾಮಾಜಿಕ ಮತ್ತು ಸ್ಮಾರಕ ವಿಷಯಗಳು ಸ್ಥಾನೀಯತೆ ಜಾನಿಸುವುದು.

ಅಧ್ಯಯನ ಭಾಗಗಳ
- ಭಾಗ 1 ಸ್ಥಾನೀಯ ವಿಷಯದ ವಿವರಣೆ.
- ಭಾಗ 2 ಕೆಲವು ಇತರ ವಿಷಯಗಳ ವಿವರಣೆ.
- ಭಾಗ 3 ಭಾಗಗಳ ವಿಷಯಗಳ ವಿವರಣೆ.
- ಭಾಗ 4 ಭಾಗಗಳ ವಿಷಯಗಳ ವಿವರಣೆ.
- ಭಾಗ 5 ಭಾಗಗಳ ವಿಷಯಗಳ ವಿವರಣೆ.
PROBABILITY THEORY AND NUMERICAL METHODS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>20EC401</th>
<th>CIE Marks</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Hours/Week (L:T:P)</td>
<td>3:0:0</td>
<td>SEE Marks</td>
<td>50</td>
</tr>
<tr>
<td>Total Hours</td>
<td>39</td>
<td>Credits</td>
<td>03</td>
</tr>
</tbody>
</table>

Course Learning Objectives:
At the end of the course the successful student is expected to:
1. Apply numerical methods to solve engineering problems where the analytical solutions are not possible.
2. Identify the suitable numerical methods to solve the problems which occur in engineering and real world problems involving large system of equations, nonlinearities and complicated geometries.
3. Identify and formulate parabolic, hyperbolic and elliptic partial differential equations and solve by grid analysis.
4. Understand and appreciate the application of statistics in data collection and analysis.
5. Understand and appreciate the application of Probability distributions.

UNIT - I
NUMERICAL ANALYSIS-I
Numerical integration: General quadrature formula, Trapezoidal rule, Simpson’s one third rule, Simpson’s three eighth rule and Weddle’s rule.  

UNIT – II
NUMERICAL ANALYSIS-II
Roots of algebraic and transcendental equations.
Numerical solution of partial differential equations: Classification, Solution of Laplace and Poisson equations by standard five point formulae, Solution of heat and wave equations by explicit method.

UNIT - III
PROBABILITY THEORY
Finite sample space, Conditional probability and independence, Bayes' theorem (overview). One dimensional random variable: Discrete and Continuous random variable, Probability functions, Binomial, Poisson, Normal and exponential distributions. Two dimensional random variable, Covariance and correlation coefficient.

Scheme of SEE Question Paper
There will be 8 questions of 20 marks each in the question paper divided into 3 Units as per the syllabi & contact hours and the student will have to answer 5 full questions, selecting 2 full questions from Unit - I & Unit – II and 1 full question from Unit – III.

Course Outcomes:
At the end of the course the student should be able to
1. Apply numerical methods to find solutions of algebraic equations.
2. Appreciate and apply different numerical methods to solve initial value problems.
3. Apply numerical methods to solve partial differential equations.
4. Demonstrate and appreciate probabilistic models for situations involving chance effect.
5. Illustrate the applications of two and higher dimensional random variables and different types of distributions for engineering problems.
Mapping of PO’s/ PSO’s & CO’s:

<table>
<thead>
<tr>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>CO2</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>CO3</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>CO4</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>CO5</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

3 – High
2 – Medium
1 - Low

TEXTBOOKS:

REFERENCE BOOK:

*************

ANALOG ELECTRONIC CIRCUITS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>20EC402</th>
<th>CIE Marks</th>
<th>SEE Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Hours/Week (L:T:P)</td>
<td>4:0:0</td>
<td>50</td>
<td>50</td>
<td>04</td>
</tr>
<tr>
<td>Total Hours</td>
<td>52</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Course Learning Objectives :

This course will enable students to
1. Understand the need for Biasing a Transistor and different biasing schemes.
2. Understand the design and analysis procedure for different Transistor Amplifier topologies.
3. Understand the concept of positive and negative feedback and its uses.
4. Explain different Power Amplifier Topologies.
5. Appreciate the usefulness of Op-amps and other Linear Integrated Circuits.
6. Understand the design and analysis procedure for op-amp based circuits.
7. Understand the design and analysis procedure for 555-Timer based circuits.
UNIT – I

Bipolar Amplifiers:
Operating point analysis and design: Resistive Divider Biasing, Biasing with Emitter Degeneration, Self-Biased Stage
Bipolar amplifier topologies: Common-Emitter (CE) Topology, CE Stage with Emitter Degeneration, Emitter Follower, Bipolar Current Mirrors [Text-1]. 12 Hours

UNIT – II

MOS Amplifiers:
Biasing: Resistive Divider Biasing, Biasing with Source Degeneration, Self-Biased Stage
Amplifier topologies: Common-Source (CS) Topology, CS Stage with Source Degeneration, Source Follower, MOS Current Mirrors [Text-1]. 10 Hours

UNIT – III

Feedback concepts & Power Amplifiers:
Feedback Amplifiers: Feedback concepts, Feedback connection types, Practical feedback circuits, Oscillator operation, Phase shift oscillator, Tuned oscillator circuit.
Power amplifier: Introduction-definition and amplifier types, Series fed class A amplifier, Transformer coupled class A amplifier, Class B amplifier operation, Class B amplifier circuit, Class C and class D amplifiers [Text 2]. 10 Hours

UNIT – IV

Op-Amp Circuits:
Inverting and Non-inverting Amplifiers – revision. DC and AC Amplifiers, Summing, Scaling and Averaging Amplifiers, Instrumentation amplifier, Comparators, Zero Crossing Detector, Peak detector, Sample and hold circuit, Inverting Schmitt trigger. Precision rectifiers-half and full wave [Text 3]. 10 Hours

UNIT – V

Filters, Data-converters & Timer Circuits:
First and second order low-pass and high-pass Butterworth filters, Band-pass filters, Band reject filters and All-pass filters. DAC - Weighted resistor and R-2R ladder, ADC- Successive approximation type.
555 Timer applications: Monostable, Astable Multivibrators & Applications [Text 3]. 10 Hours

Scheme of SEE Question Paper
There will be 10 questions of 20 marks each in the question paper divided into 5 units as per the syllabi & contact hours and the student will have to answer 5 full questions, selecting one full question from each unit.
Course Outcomes:
At the end of the course the student will be able to
1. Explain the working of CE amplifier, emitter follower, BJT current mirror; Design CE and CC amplifier, BJT current mirror for the given specifications. Design and Analyze MOS Amplifier circuits for a given specification.
2. Explain the working of CS amplifier, source follower, MOS current mirror; Design CS and CD amplifier, MOS current mirror for the given specification Design and Analyze op-amp circuits.
3. Explain the impact of negative feedback on gain and impedance; explain the working of RC phase shift and LC oscillators; compute the efficiency of class A and class B power amplifiers.
4. Explain the working of op-amp circuits; design nop-amp based circuits for the given specification.
5. Explain the working of R-2R DAC, SAR ADC; design first and second order active Butterworth filters for the given specifications; design a stable and monostable circuits for the given specification using 555 Timer.

Mapping of PO's/ PSO's & CO's:

<table>
<thead>
<tr>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO2</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO3</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO4</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CO5</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3 – High  2 – Medium  1 - Low

TEXTBOOKS:
CONTROL SYSTEMS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>20EC403</th>
<th>CIE Marks</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Hours/Week (L:T:P)</td>
<td>4:0:0</td>
<td>SEE Marks</td>
<td>50</td>
</tr>
<tr>
<td>Total Hours</td>
<td>52</td>
<td>Credits</td>
<td>04</td>
</tr>
</tbody>
</table>

Course Learning Objectives:

This course will enable students to

1. Develop the theoretical aspects of Control systems and feedbacks, to find the mathematical models of physical systems and Analysis of Control Systems using Block Diagram Reduction and Signal Flow Graph Techniques.
2. Analyse steady state and transient behaviour of Control systems.
3. Study the concepts of RH-Criteria, Root Locus and to perform stability analysis in time domain.
4. Study the concepts of Bode Plot, to understand stability analysis in frequency domain.
5. Study the concepts of Nyquist Plot and to provide knowledge in solving the time invariant state equations.

UNIT – I

Introduction to Control Systems: Introduction to control system, Definitions, Open Loop Control Systems, Closed Loop (Feedback) Control Systems, Merits and Demerits of feedback, Transfer Function Concept, Unity Feedback Systems.


Block diagrams and Signal Flow Graphs: Block Diagram Reduction, Signal Flow Graph and Mason’s Gain Formula. 12 Hours

UNIT – II

Time Response of Feedback Control Systems: Standard test signals, Unit step response of first and second order systems, Time response specifications of second order systems, Steady– state errors and error constants. 8 Hours

UNIT – III


Root-Locus Technique: Introduction to Root-Locus Techniques, Root-Locus concepts, Construction of Root Loci. 10 Hours

67
UNIT – IV

**Bode Plot:** Introduction, Stability in frequency domain, Bode plots for simple systems (systems with quadratic factors and Transportation Lag are excluded), and Determination of transfer function from Bode magnitude plot.  

**Nyquist Plot:** Nyquist plots, Nyquist stability criterion (systems with transportation lag excluded).

**State Variable Analysis:** Concepts of state, state variable, state model, state models for linear continuous time functions, transfer function from state model, solution of state equations.

**10 Hours**

**12 Hours**

**Scheme of SEE Question Paper**
There will be 10 questions of 20 marks each in the question paper divided into 5 units as per the syllabi & contact hours and the student will have to answer 5 full questions, selecting one full question from each unit.

**Course Outcomes:**
At the end of the course the student will be able to

1. Develop mathematical model of Mechanical & Electrical systems. Obtain transfer function using Block Diagram Reduction/Signal Flow Graph Techniques to find the system behavior.
2. Analyze the step response of the second order system; compute the time domain performance parameters; Delay time/rise time/Peak time/Peak Overshoot/Settling time. Determine steady state error of a given system using standard test signals; step/ramp/parabolic.
3. Use the Routh-Hurwitz criterion and Root-locus technique to determine the stability of the system.
4. Apply Bode plot technique to determine the system stability in frequency domain.
5. Use the Nyquist criterion to determine the stability of a system. Develop state space model of a system to evaluate dynamic behavior.

**Mapping of PO’s/ PSO’s & CO’s:**

<table>
<thead>
<tr>
<th></th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CO2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CO3</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO4</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO5</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>3 – High</th>
<th>2 – Medium</th>
<th>1 – Low</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>PO1</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PO2</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>PO3</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PO4</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PO5</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PO6</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PO7</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PO8</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PO9</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PO10</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PO11</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PO12</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PSO1</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PSO2</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>PSO3</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
</tbody>
</table>
TEXTBOOK:

REFERENCE BOOKS:

NPTEL/ MOOC Link
1. http://nptel.ac.in/courses/108101037/3
3. https://nptel.ac.in/courses/108102044/
4. https://nptel.ac.in/courses/108106098/
5. https://nptel.ac.in/courses/108102043/

************

DIGITAL SIGNAL PROCESSING

<table>
<thead>
<tr>
<th>Course Code</th>
<th>20EC404</th>
<th>CIE Marks</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Hours/Week (L:T:P)</td>
<td>4:0:0</td>
<td>SEE Marks</td>
<td>50</td>
</tr>
<tr>
<td>Total Hours</td>
<td>52</td>
<td>Credits</td>
<td>04</td>
</tr>
</tbody>
</table>

Course Learning Objectives:
This course will enable students to
1. Understand the concept of Frequency Domain Sampling, Computation of DFT and properties of DFT.
2. Understand Linear Filtering methods using Overlap Add and Overlap Save Algorithms.
4. Design and Analyze the characteristics of Analog filters using Butterworth & Chebyshev approximation techniques.
5. Design Digital Filters using Bilinear transformation Technique.
6. Design Linear phase FIR filters using windowing and frequency sampling technique.
7. Implement digital filters using various structures.

UNIT – I

Discrete Fourier Transform: Its Properties and Applications: Frequency Domain sampling and reconstruction of Discrete-Time signals, Discrete Fourier Transform (DFT), DFT as a linear Transformation, Properties of DFT: Periodicity, Linearity, and
Symmetry Properties, Multiplication of two DFTs and Circular Convolution, Additional DFT Properties.  

10 Hours

UNIT – II

Use of DFT in linear filtering: Overlap-save and Overlap-add method.  
Efficient Computation of DFT: Direct Computation of the DFT, Radix – 2 Fast Fourier Transform (FFT) algorithms, Decimation in Time FFT (DITFFT) algorithm and In-place computations, Decimation in Frequency FFT (DIFFFT) algorithm. Inverse Fast Fourier Transforms.  

8 Hours

UNIT – III

Design of Analog Filters and Frequency Transformations: Characteristics of commonly used Analog filters and Design of Butterworth and Chebyshev Analog filters, Frequency Transformations in the Analog Domain.  
Basic IIR Filter structures: Direct forms (I & II), Cascade and Parallel realizations, Signal flow graph, Transposed structure.  

13 Hours

UNIT – IV

Basic FIR Filter Structures: Direct Form structure, Linear phase FIR Structure, Frequency Sampling structure, Lattice structure.  

13 Hours

UNIT – V

Digital Signal Processors: DSP Architecture, DSP Hardware Units, Fixed point format, Floating point Format, IEEE Floating point formats, Fixed point digital signal processors, Floating point processors, FIR and IIR filter implementations in Fixed point systems  

8 Hours

Scheme of SEE Question Paper
There will be 10 questions of 20 marks each in the question paper divided into 5 units as per the syllabi & contact hours and the student will have to answer 5 full questions, selecting one full question from each unit.
Course Outcomes:
At the end of the course the student will be able to
1. Develop representations for signal analysis and synthesis using DFT and its properties.
2. Build and apply algorithms using Overlap Add Method and Overlap Save Method for sequences of length not more than 20 and faster algorithms Radix 2 DIT FFT and Radix 2 DIFFFT to compute DFT.
3. Make use of Butterworth & Chebyshev approximations to design and implement analog and digital IIR Filters.
4. Design & implement FIR Filters using windowing and Frequency sampling approaches.
5. Identify architectural features of Fixed point DSP processors and plan the implementation of Filters.

Mapping of PO’s/ PSO’s & CO’s:

<table>
<thead>
<tr>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO3</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO4</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO5</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 – High
2 – Medium
1 - Low

TEXTBOOKS:

REFERENCE BOOKS:

NPTEL/ MOOC Link
1. http://nptel.ac.in/courses/117104070/
2. http://nptel.ac.in/courses/117102060/
3. http://nptel.ac.in/courses/108105055/
5. https://www.mooc-list.com/tags/dsp

************
Course Learning Objectives:
This course will enable students to
1. Understand the behavior of static electric field and basic laws the govern the Electrostatic fields.
2. Understand the behavior and basic laws of Steady magnetic.
3. Understand the behavior and basic laws of Time Varying field.
4. Understand uniform plane wave and Learn Wave propagation in lossy and lossless medium.
5. Understand characteristics and wave propagation on transmission lines and Learn Standing waves on Loss-less and Low loss Transmission line.
6. Demonstrate Construction and Application as impedance chart.
7. Demonstrate Modes of propagation in rectangular waveguide

UNIT – I

Basic laws of Electromagnetics- Electrostatic Fields: Basics of Vector Algebra, Differential and Integral Vector calculus and coordinate Systems. Coulomb’s law, Electric flux density, Gauss’ law, Divergence Theorem, Potential gradient, Energy density in an electrostatic field, Conductor properties and boundary conditions, Boundary conditions for perfect Dielectrics. 12 Hours

UNIT – II


UNIT – III

Uniform Plane Wave: Plane Wave, Uniform plane wave, Derivation of Wave equations in terms of E and H, Propagation of wave, Wave polarization, Wave propagation in free space and conducting medium, Skin effect, Phase and Group velocity in free space propagating media, Power flow and Poynting vector 8 Hours

UNIT – IV

Transmission Lines: Equations of Voltage and Current on Transmission line, Propagation constant and characteristic impedance and reflection coefficient and VSWR, Standing waves on Loss-less and Low loss Transmission line & Power calculation on Transmission line. 14 Hours

Smith Chart: Construction and Application as impedance chart.

72
UNIT – V

Wave Propagation: Wave propagation in parallel plane waveguide, Analysis of waveguide general approach, Rectangular waveguide, Modes of propagation in rectangular waveguide. 8 Hours

Scheme of SEE Question Paper
There will be 10 questions of 20 marks each in the question paper divided into 5 units as per the syllabi & contact hours and the student will have to answer 5 full questions, selecting one full question from each unit.

Course Outcomes:

At the end of the course the student will be able to
1. Interpret the electrostatic fields using Coulomb’s & Gauss’s laws of Electromagnetics and determine Potential gradient, Energy density, Conductor properties.
2. Interpret Steady Magnetic fields using Ampere’s Circuital Law, Stokes Theorem, BiotSavart’s Law, Gauss Law of Electromagnetics to Determine current & current density and Apply the concepts on time varying fields using Faraday’s Law of Electromagnetic Induction.
3. Apply the concepts of time varying fields for Characterisation of uniform plane wave and Wave propagation in lossy and lossless medium.
4. Identify the characteristics of wave propagation in transmission lines and Interpret the characteristics of transmission lines using Smith chart as impedance chart.
5. Discuss the Modes of propagation in rectangular waveguide.

Mapping of PO’s/ PSO’s & CO’s:

<table>
<thead>
<tr>
<th>CO1</th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CO2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CO3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CO4</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CO5</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

3 – High 2 – Medium 1 – Low

TEXTBOOKS:
REFERENCE BOOKS:

NPTEL/ MOOC Link
1. http://nptel.ac.in/courses/108106073/
2. http://nptel.ac.in/courses/108104087/

************

ANALOG ELECTRONIC CIRCUITS LAB

<table>
<thead>
<tr>
<th>Course Code</th>
<th>CIE Marks</th>
<th>SEE Marks</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>20EC406</td>
<td>50</td>
<td>50</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Teaching Hours/Week (L:T:P) 0:0:3
Total Hours 39

Course Learning Objectives:

This course will enable students to
1. Analyse and Design Amplifier Circuits using discrete components
2. Analyse and Design different linear and non-linear circuits using Op-Amps & Timers

LIST OF EXPERIMENTS
1. Design and set up the BJT common emitter amplifier using voltage divider bias with and without feedback and determine the gain-bandwidth product from its frequency response.
2. Design and setup the Common Source MOSFET amplifier and plot the frequency response.
3. Design and set-up Colpitts Oscillator for a given frequency.
4. Design and set-up a Hartley Oscillator for a given frequency.
5. Design Adder Integrator and Differentiator circuits using Op-Amp.
6. Test a comparator circuit and design an Inverting Schmitt trigger for the given UTP and LTP values and obtain the hysteresis.
7. Design an active second order Butterworth low pass filter for a given cut-off frequency.
8. design an active second order Butterworth high pass filter for a given cut-off frequency.
10. Design a Monostable Multivibrator using 555 Timer for a given pulse-width.
11. Design an Astable Multivibrator using 555 Timer for a given frequency and duty cycle.
**Course Outcomes:**
At the end of the course the student will be able to
1. Design and debug Transistor, Op-amps and 555 timer based electronic circuits.

**Mapping of PO's/ PSO's & CO's:**

<table>
<thead>
<tr>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>CO2</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

3 – High
2 – Medium
1 - Low

**REFERENCE BOOKS:**

*************

**DIGITAL SIGNAL PROCESSING LAB**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>20EC407</th>
<th>CIE Marks</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Hours/Week (L:T:P)</td>
<td>0:0:3</td>
<td>SEE Marks</td>
<td>50</td>
</tr>
<tr>
<td>Total Hours</td>
<td>39</td>
<td>Credits</td>
<td>1.5</td>
</tr>
</tbody>
</table>

*This course is a project based learning subject associated, which will be evaluated based on project work carried out during semester (50 marks) and the CIE for the lab (50 marks).*

**Course Learning Objectives:**

This course will enable students to:
1. Analyze and understand N-point DFT computation on a given discrete time signal and plot its magnitude and phase spectrum.
2. Study and simulate DFT properties.
3. Study and Simulate FIR and IIR filters for the given specifications.
4. Implement linear convolution, circular convolution, impulse response of an LTI system and FIR filter design on DSP processor using Code Composer Studio platform.
5. Implement real-time projects using DSP processor.

**LIST OF EXPERIMENTS USING MATLAB**

<table>
<thead>
<tr>
<th>Experiment No.</th>
<th>Title</th>
</tr>
</thead>
</table>
| 1              | (i) Verification of Sampling theorem  
               (ii) Finite and Infinite Response of an LTI System |
| 2              | Computation of N point DFT of a given sequence and plot high density, high resolution Magnitude and Phase Spectrum. |
| 3              | Linear & Circular Convolution of two given sequences. |
| 4              | Linear & Circular Convolution of two given sequences using DSP Kit |
| 5              | (i) Computation of N point DFT of a given sequence using DSP Kit.  
               (ii) Impulse response of a given system of a given system of first and second order using DSP Kit. |
| 6              | Verification of DFT properties:  
               i) Frequency shift  
               ii) Time shift  
               iii) Linearity  
               iv) Auto Correlation & Cross Correlation  
               v) Parseval’s Theorem |
| 7              | Design and implementation of FIR filter to meet the given specifications using Rectangular /Bartlett /Hanning /Hamming /Blackman window for the following types of filters,  
               i) LPF  
               ii) HPF  
               iii) BPF  
               iv) BSF |
| 8              | Design and Implementation of Analog and Digital IIR filter to meet the given specifications for the following types of filters,  
               i) LPF  
               ii) HPF  
               iii) BPF  
               iv) BSF |

**Course Outcomes:**
Upon successful completion of this lab, students will be able to:
2. Implement DSP algorithms using C programming with TMS320C6748 floating point DSP processor with Code Composer Studio Platform.
3. Implement a project using MATLAB or Code Composer studio for real-time applications.

**Mapping of PO's/ PSO's & CO's:**

<table>
<thead>
<tr>
<th></th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PSO1</th>
<th>PSO2</th>
<th>PSO3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>CO2</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>CO3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

3 – High  2 – Medium  1 - Low

************