**ACADEMIC REGULATIONS,**

**COURSE STRUCTURE**

**AND**

**detailed syllabus (III & IV Year)**

for

**B.Tech Four Year Degree Course**

**(A-20 – Regulation)**

in

**ELECTRICAL AND ELECTRONICS engineering**

**(EEE)**

(Applicable for the batches admitted from 2020-21)



**SREENIDHI INSTITUTE OF SCIENCE and TECHNOLOGY**

**(An Autonomous Institution approved by Ugc and affiliated to JNTUH)**

(Accredited by NAAC with ‘A’ Grade and Accredited by NBA of AICTE)

Yamnampet, Ghatkesar, Malkajigiri Medchal District -501 301.

**January, 2021**

**DEPARTMENT OF**

**ELECTRICAL AND ELECTRONICS ENGINEERING (EEE)**

**Program objective:**

B. Tech in Electrical and Electronics Engineering program emphasizes the fundamentals of electrical & electronics in daily life.

The first two years of this program begins with a set of introductory courses, like Mathematics, physics, English, computer languages (C, C++), circuits and networks, DC machines and introduction to power systems which provide students with a firm foundation in mathematics, Electrical, as well as communication skills. These courses include weekly labs in which students use state-of-the art techniques and equipments to create solutions to interesting problems.

The last two years of study focuses on the concepts and techniques used in the design and development of advanced systems in electrical and electronics. In addition, students choose from a rich set of electives, which covers skills in demand. These advanced courses give broad opening for research and help them to choose specialization in their higher studies. A generous allotment of open electives allows students to learn foreign languages like French, German, Spanish; and it includes computing with a business focus.

Students in this program pursue an inter-disciplinary course of study that combines strong foundation in electrical and electronics with a focus on interdisciplinary areas. This program is designed for students who seek to blend their abilities with skills in demand and skills specific to another domain to solve problems in that domain.

Having completed this course, a student is prepared to work independently within a well structured design frame work in the job and for higher studies.

**VISION**

To emerge as a leading Electrical and Electronics Engineering Department in Technical Education and Research in India with focus to produce professionally competent and socially sensitive engineers capable of working in multidisciplinary global environment.

**MISSION**

1. To empower the students and provide the academic environment to pursue and attain competencies in their studies at undergraduate, post graduate level in Electrical & Electronics Engineering.
2. To develop liaison with academia, R&D institutions and electrical industry for hands-on training which enable the students to design and produce novel products for better society.
3. To inculcate interpersonal skills, team work, leadership qualities and professional ethics in students.
4. To enable the students to pursue higher studies and conduct research which will help them in developing the qualities for life-long learning and for a successful professional career.

**Program Educational Objectives of B. Tech**

**(Electrical and Electronics Engineering)**

**PEO-I**: To empower the students by providing necessary knowledge, critical thinking and problem solving capabilities in the field of Electrical and Electronics Engineering so that they can excel in their profession, in industry, higher studies and Research & Development.

**PEO-II**: To develop competencies in core and allied fields, so as to conduct experiments, comprehend, analyze, design and apply appropriate techniques / tools to arrive at optimal solutions to face real time challenges.

**PEO-III:** To inculcate the sense of responsibility towards ethics, Intellectual Property rights, good communication skills and entrepreneurship with adequate knowledge of project / finance management skills for betterment of society at large.

**PEO-IV:** To motivate the students to be academically excellent and also to be sensitive to Professional ethics, to acquire leadership skills and to be life-long learners for a successful professional career.

**Program Outcomes of EEE Department**

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **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.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **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.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in Independent and life-long learning in the broadest context of technological change.

**Program Specific Outcomes (PSO)**

1. Able to demonstrate the applications of knowledge gained into the recent technologies in the areas of Power systems, Power electronics and allied fields.
2. Recognize the need of self learning and ability to get into the advanced fields such as renewable energy systems and smart grids.

**ACADEMIC REGULATIONS**

**FOR B.TECH. REGULAR STUDENTS**

**WITH EFFECT FROM**

**THE ACADEMIC YEAR 2020-21**

**(A-20)**

**1.0 Under-Graduate Degree Programme in Engineering & Technology (E&T)**

**1.1** SNIST offers a 4-year (8 semesters) **Bachelor of Technology** (B. Tech.) degree programme, under Choice Based Credit System (CBCS) with effect from the academic year 2020-21 in the following branches of Engineering.

|  |  |
| --- | --- |
| **Sl. No.** | **Branch** |
|  | Civil Engineering |
|  | Electrical and Electronics Engineering |
|  | Mechanical Engineering |
|  | Electronics and Communication Engineering |
|  | Computer Science and Engineering |
|  | Information Technology |
|  | Electronics and Computer Engineering |

**1.2. Credits (Semester system for B. Tech courses)**

The existing credit system of giving one credit for a lecture hour/ tutorial hour per week and giving 0.5 credit for every hour of practical and drawing shall be continued in these regulations also.

**2.0 Eligibility for admission**

**2.1** Admission to the Under Graduate courses shall be made either on the basis of the rank of the candidate in entrance test conducted by the Telangana State Government (EAMCET) or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government from time to time. However, admissions under Management / NRI Category shall be made on the relevant orders issued by the Govt. of Telangana from time to time.

**2.2** The medium of instruction for the entire Under Graduate programme of study in E&T will be **English** only.

**3.0 B. Tech. Programme structure**

**3.1** A student after securing admission shall pursue the Under Graduate programme in B. Tech. in a minimum period of **four** academic years (8 semesters), and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B. Tech course. However, the student can take two more years for appearing the examinations to clear the backlog subjects.

In the First year it is structured to provide **45 credits** and the credits in II , III and IV years should not exceed **119 credits** as per AICTE model curriculum for the B. Tech. programme. Each student shall secure **164 credits** (with CGPA >5) required for the completion of the Under Graduate programme and Award of B. Tech degree.

Each student shall secure **164 total credits** (with CGPA ≥ 5) for the completion of the Under Graduate programme for the award of the B.Tech. degree. However, any revision made in this regard and approved by the Academic Council of the college and by Parent University shall be implemented from the date of the revision.

**3.2 UGC/AICTE** specified definitions/ descriptions are adopted appropriately for various terms and abbreviations stated below.

**3.2.1 Semester scheme**

Each Under Graduate programme is of 4 academic years (8 semesters) with the academic year being divided into two semesters of 22 weeks ( 90 instructional days) each, each semester having - ‘Continuous Internal Evaluation (CIE)’ and ‘Semester End Examination (SEE)’.

Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated curriculum / course structure as suggested by AICTE are followed.

**3.2.2 Credit courses**

* A student in a semester has to earn credits which shall be assigned to each subject/ course in an L: T: P: C (lecture periods: tutorial periods: practical periods: credits) structure based on the following general pattern.
* One credit for one hour/ week offered in the entire semester for theory lecture (L) / Tutorial (T) courses.
* One credit for two hours/ week offered in the entire semester for laboratory/ practical (P) courses.
* The orientation course recommended by AICTE in the model curriculum is offered for 3 weeks and Cyber Security in III year as mandatory course.
* Environmental Engineering is offered mandatory course for B. Tech Mechanical Engineering and ECE students in II year.
* However, these courses will be reflected in the Memo of Marks, the grading will be awarded below, with some total of 100 marks with CIE for 30 marks and SEE for 70 marks.

|  |  |
| --- | --- |
| **% of Marks Secured in a Subject/Course** | **Letter Grade** |
| Greater than or equal to 90% | O (Outstanding) |
| 80 and less than 90% | A+ (Excellent) |
| 70 and less than 80% | A (Very Good) |
| 60 and less than 70% | B+(Good) |
| 50 and less than 60% | B (Average) |
| 40 and less than 50% | C (Pass) |
| Below 40% | F (FAIL) |
| Absent | Ab |

* For mandatory courses i.e., **Orientation Course** for B. Tech I year students to be taught for one week in I semester with Two Units and remaining Four Units in B. Tech. I year II semester and **Cyber Security**  is offered as mandatory course for all the students of Civil, ME, EEE and will not have credits, but evaluation will be done as per the above table. A student cannot obtain degree unless he / she complete all the mandatory courses.

**3.2.3 Subject Course Classification**

All subjects / courses offered for the Under Graduate programme in E&T (B. Tech. Degree programmes) are broadly classified as follows. The Institution has followed all the guidelines issued by AICTE/UGC.

The groups of the subjects shall be as given in the table hereunder along with the credits suggested by AICTE. Efforts are made by individual departments to make up the total credits equal to 164.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl.**  **No.** | **Category** | **Suggested Breakup of Credits**  **(Total 160)** | **CSE** | **ECE** | **CED** | **EEE** | **ME** | **IT** | **ECM** |
| 1 | Humanities and social sciences including Management courses | 12\* | 14 | 14 | 11 | 13 | 13 | 14 | 13 |
| 2 | Basic Science including Mathematics courses | 25\* | 22 | 23 | 29 | 30 | 24 | 22 | 26 |
| 3 | Engineering Science courses including workshop, drawing, basic electrical /electronics mechanical course as well as various computer courses offered for Non – IT branches | 24\* | 29 | 28 | 31 | 25 | 28 | 29 | 28 |
| 4 | Professional core courses | 48\* | 59 | 59 | 51 | 61 | 62 | 59 | 59 |
| 5 | Professional Elective courses ( five courses )relevant to chosen specialization / branch | 18\* | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 6 | Open Electives( 3 courses) offered by any other departments / MBA department \*\* | 18\* | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| 7 | Project work, seminar and internship in industry or elsewhere | 15\* | 19 | 19 | 21 | 14 | 16 | 19 | 17 |
| 8 | Mandatory courses (Environmental Sciences, Induction training, Indian constitution, Essence of Indian Traditional Knowledge) | (Non-credit) | (Non-credit) | (Non-credit) | (Non-credit) | (Non-credit) | (Non-credit) | (Non-credit) | (Non-credit) |
|  | Total | 160\* | 164 | 164 | 164 | 164 | 164 | 164 | **164** |

**The Joint Board of Studies and Academic Council of the institution has approved the total number of credits to be 164**. The various groups of subjects mentioned above shall have credits suggested above with minor variations.

**4.0 Course registration**

**4.1** A ‘faculty advisor or counselor’ shall be assigned to a group of 20 students, who will advise student about the under graduate programme, its course structure and curriculum, choice/option for Professional and open Electives based on their employment potential / further studies.

**4.2** The student will progress semester after semester as the Institute is following cohort system to satisfying the conditions of promotion to the next semester.

**4.3 In the present system there shall be five subjects in each professional elective stream and three subjects in open elective stream.** A student can opt for a stream of professional/ open electives which should be submitted to the faculty Advisor/ Counselor and copy of it to the Examination Section through the Head of the department. A copy of it will be retained with the Head of the department/ faculty Advisor/ Counselor and the student.

4.4. **The student can take one extra subject in each semester and can complete the program in 3 ½ years but original degree will be issued along with his / her batch mates after 4 years.**

4.5. **If a student acquires 20 credits extra than the required credits as per the regulations he will be awarded honors.**

4.6 The purpose of offering Elective Streams in both Professional and Open Electives is to facilitate the students to have a minor specialization based on their interest, so that they will have multi disciplinary exposure. Hence, a student is to take a stream of Electives in either in Professional / Open Elective. He shall not be permitted to opt for other elective subjects in other streams in subsequent semesters.

**4.7** Dropping of Electives may be permitted, only after obtaining prior approval from the faculty advisor / counselor, ‘**within a period of 15 days** from the beginning of the current semester.

**5.0 Subjects / courses to be offered**

**5.1** A typical section (or class) nominal strength for each semester shall be 60.

**5.2** A subject / course may be offered to the students, **only if** a minimum of **30 students** opt for it. The maximum strength of a section is limited to 80.

**6.0 Attendance requirements:**

**6.1** A student shall be eligible to appear for the semester end examinations, if student acquires a minimum of 75% of attendance in aggregate of all the subjects / courses (excluding attendance in mandatory courses, Internship during II year, NCC / NSO and NSS) for that semester.

**6.2** Shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student’s representation with supporting evidence.

**6.3** A stipulated fee shall be payable towards condoning of shortage of attendance as decided by finance committee of SNIST from time to time.

**6.4** Shortage of attendance below 65% in aggregate shall in **NO CASE** be condoned.

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

**They get detained and their admission for that semester shall stand cancelled.**

**They will not be promoted to the next semester.** They may seek re-admission for all those subjects registered in that semester in which student was detained, by seeking re-admission into that semester as and when offered; in case if there are any professional electives and / or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category. He will be governed by the new regulations in which he takes re-admission.

6.6 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same semester.

**7.0 Academic requirements**

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in item no.6.

7.1 **A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject / course, if student secures not less than 35% marks (24 out of 70 marks) in the semester end examination, and a minimum of 40% of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing ‘C’ grade or above in that subject / course.**

**7.2** A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to group projects, seminar, comprehensive test, viva-voce and major project. If a student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them.

The student would be treated as failed, if student

(i) does not complete all the mandatory courses offered during the course

(ii) doesnot submit a report on internship, group project, major project, or does not make a presentation of the same before the evaluation committee as per schedule, or

(iii) does not present the seminar as required in the I year and II year or

(iv) secures less than 40% marks in comprehensive test and seminar/ comprehensive test and viva-voce / group project/major project evaluations.

Student may reappear once for each of the above evaluations, when they are scheduled again; if student fails in such ‘one re-appearance’ evaluation also, student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

**7.3 Promotion Rules based upon credits**

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Promotion** | **Conditions to be fulfilled** |
| 1 | First year First Semester to Second Semester | Regular course of study of first year first semester and should have satisfied the minimum requirement of attendance to appear I year I semester. |
| 2 | First year to second year first semester | i. Regular course of study of first year First and second semesters.  ii. Must have secured at least 50% of credits (22) upto first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not. |
| 3. | II Year I Semester to II Semester | Regular course of study of second year first semester. |
| 4 | Second year to third year first semester | i. Regular course of study of First and second semesters of second year.  ii. Must have secured at least 60% of credits (54) upto second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not. |
| 5 | Third year first semester to second semester | Regular course of study of third year first semester. |
| 6 | Third year second semester to fourth year first semester | i. Regular course of study of third year second semester.  ii. Must have secured 60% of credits (79) up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not. |
| 7 | Fourth year first semester to fourth year second semester | Regular course of study of fourth year first semester. |

**7.4** A student (i) shall attend for all courses / subjects covering 164 credits as specified and listed in the course structure, (ii) fulfils all the attendance and academic requirements for 164 credits, (iii) earn all 164 credits by securing SGPA > 5.0 (in each semester), and CGPA (at the end of each successive semester) > 5.0, (iv) **passes all the mandatory courses,** to successfully complete the under graduate programme. The performance of the student in these 164 credits shall be taken into account for the calculation of ‘the final CGPA (at the end of under graduate programme), and shall be indicated in the grade card of IV year II semester.

**7.5** If a student registers for some more ‘**extra subjects’** (in the parent department or other departments / branches of engineering) other than those listed subjects as specified in the course structure of his Department, the performances in those ‘ **extra subjects**’ will not be taken into account while calculating the SGPA and CGPA. For such ‘**extra subjects’** registered, Percentage (%) of marks and letter grade alone will be indicated in the grade card as a performance measure, subject to completion of the attendance and academic requirements as stated in the regulations 6 and 7.1 to 7.4 above.

**7.6** A student eligible to appear in the semester end examination for any subject / course, but absent from it or failed (thereby failing to secure **‘C’** grade or above) has to reappear for that subject/ course in the supplementary examination as and when conducted. In such cases, CIE assessed earlier for that subject / course will be carried over, and added to the marks obtained in the supplementary examination for evaluating performance in that subject.

**7.7** A student **detained in a semester due to shortage of attendance, may be re-admitted when the same semester is offered in the subsequent academic years for the fulfilment of academic requirements**.

The academic regulations under which student has been readmitted shall be applicable. However, no grade allotments or SGPA / CGPA calculations will be done for the entire semester in which student has been detained.

**7.8** A student detained **due to lack of credits, will be promoted to the next academic year only after acquiring the required credits as per academic regulations.**

**The academic regulations shall be applicable to a student whatever they are in force at the time of re-admission.**

**8.0 Evaluation - Distribution and weightage of marks**

8.1 The performance of a student in each semester shall be evaluated subject-wise for a maximum of 100 marks for a theory and 100 marks for every practical subject with 30 marks Continuous Internal Evaluations (CIE) and 70 marks for Semester End Examinations (SEE)

**Summer Break:** Internship-I and Internship-II will be organized during summer vacation of II-II and III-II and evaluation of the same will be carried out during lab examinations of III-I and IV-I.

In addition, there will be Group Project-I in III year I semester, Group Project-II in III year II semester, and Group Project-III in IV year I semester, Major project in IV year II semester will be evaluated for 100 marks.

**The pattern of continuous internal evaluation for Internship Project and Group Project is given below:**

|  |  |  |
| --- | --- | --- |
| **Sl. No** | **Description** | **Marks** |
| 1 | Abstract, Design, implementation and Presentation in front of Project Review Committee consisting of HoD, Senior faculty and Internal guides (Average) | 15 marks |
| 2 | Report | 05 marks |
| 3 | Evaluation by Internal Guide | 10 marks |
|  | **Total sessional marks** | **30 marks** |

Semester end examination - 70 marks

**Pattern of external evaluation for Internship Project and Group Project.**

|  |  |  |
| --- | --- | --- |
| **Sl. No** | **Description** | **Marks** |
| 1 | Final report | 10 marks |
| 2 | Presentation | 10 marks |
| 3 | Demonstration/defence of project | 50 marks |
|  | **Total sessional marks** | **70 marks** |

**Pattern of continuous internal evaluation for Major Project in IV year II semester is as follows:**

|  |  |  |
| --- | --- | --- |
| **Sl. No** | **Description** | **Marks** |
| 1 | Progress of Project work and the corresponding interim report as evaluated by Project Review Committee at the end of 6 weeks | 5 marks |
| 2 | Seminar at the end of 6 weeks | 5 marks |
| 3 | Progress of Project work as evaluated by Project Review Committee at the end of 11 weeks | 5 marks |
| 4 | Seminar at the end of 11 weeks | 5 marks |
| 5 | Evaluation by Project Review Committee at the end of 15 weeks and Final Project Report | 5 marks |
| 6 | Final presentation and defense of project | 5 marks |
|  | **Total** | **30 marks** |

**Pattern of External Evaluation for Major project - 70 Marks**

|  |  |  |
| --- | --- | --- |
| **Sl. No** | **Description** | **Marks** |
| 1 | Final Project Report | 10 marks |
| 2 | Presentation | 20 marks |
| 3 | Demonstration / Defense of Project before committee | 40 marks |
| 4 | **TOTAL** | **70 marks** |

8.2 For all the other theory and lab subjects the distribution of marks shall be 30 for Continuous Internal Evaluation (CIE) and 70 for the Semester End-Examination (SEE).

* 1. **Theory Subjects**

**8.3.1 Pattern for Continuous Internal Evaluation (CIE) 30 marks**

The following procedure is to be adopted for awarding internal marks of 30 for all the B. Tech. students from the **Academic Year 2020-2021**

The distribution of marks for continuous internal evaluation (30 marks) is shown below. Average of two Mid Tests will be taken for final award of marks.

|  |  |  |
| --- | --- | --- |
| a) | **Part – A** of Mid Test will have 10 questions | 5 marks |
| b) | **Part – B** of Mid Test will have 4 questions (1 from each unit and 4th question from any one unit or combination) and student has to answer 3 questions | 15 marks |
| c) | **Part – C** Mid Test Question Paper Will have 3 questions – One from each unit taken from assignment questions. Student has to answer 1 question out of 3 questions | 3 marks |
| d) | **Assignment– I** three questions from each unit (1,2,3 unit) – total of 9 questions to be submitted before first mid test.  **Similarly assignment – II**: will have three questions from each unit (4, 5, 6 units) total of 9 questions will be submitted before Mid Test II and average of two assignments will be considered. | 2 marks |
| e) | Attendance \* | 3 marks |
| f) | Class notes | 2 marks |
|  | **Total** | **30 marks** |

\* Three marks are awarded for each theory subject for the students who put in attendance in a graded manner as given below:

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Attendance Range** | **Marks Awarded** |
| 1. | 65 % and above but less than 75% | 1 |
| 2. | 75% and above and less than 85% | 2 |
| 3. | 85% and above | 3 |

Marks for attendance shall be added to each subject based on average of attendance of all subjects put together.

If any candidate is absent in any subject or mid-term examination, this student wishes to improve performance, a **third mid-test** will be conducted for that student by the Institution in the entire syllabus, on the same day of Semester End Examination (SEE) for 21/2 hours. That result will be treated as III mid test and average of better two of (mid test I,II,III) will be considered. III mid test will have Part-A (compulsory) and Part-B with essay type questions and three out of four questions are to be answered.

**b) Pattern for External Examinations - (70 marks)**

• There shall be external examination in every theory course and consists of two parts (Part-A & Part-B). The total time duration for this semester end examination will be 3 hours.

• **Part-A** shall have 20 marks, which is compulsory. It will have 10 short questions set with 2 marks each. There shall be atleast one question to each of the six units and two questions from units 1,2,3 and two questions from unit 4,5,6 and number of questions from any unit shall not exceed two.

• **Part-B** of the question paper shall have essay type questions for 50 marks and shall have 8 questions out of which any 5 are to be answered. At least one question must appear from each Unit. Seventh question must have 2 to 3 bits taken from 1st, 2nd, and 3rd units and 8th question also with 2 to 3 bits taken from 4th, 5th and 6th units, such that not more than 2 questions shall be from any one unit. All the questions carry equal marks.

**8.4**  **Pattern of Evaluation for Lab subjects** - **(100 marks)**

8.4.1 For practical subjects there shall be a continuous evaluation during the semester for 30 sessional marks and 70 marks for semester end examination. Out of the 30 marks for Continuous Internal Evaluation, the distribution of marks is as follows

|  |  |  |
| --- | --- | --- |
| **S. No** | **Item** | **Marks** |
| 1. | Day to Day work | 05 marks |
| 2. | Final Record and viva | 09 marks |
| 3. | Average of two tests including viva | 05 marks |
| 4. | Lab Based Project Report viva and demo | 08 marks |
| 5. | Attendance | 03 marks |
| **Total** | | **30 marks** |

8.4.2 The semester end examination for 70 marks for the lab subjects shall be conducted by an external examiner and an internal examiner appointed by the Chief Superintendent of Examinations of the college. The marks are distributed as follows:

|  |  |  |
| --- | --- | --- |
| **S. No** | **Item** | **Marks** |
| 1. | Procedure to experiment and Tabulation | 10 marks |
| 2. | Conduct of experiment, observation, Calculation | 30 marks |
| 3. | Results including graphs, discussions and conclusion | 20 marks |
| 4. | Viva voce and Record | 10 marks |
| Total | | 70 marks |

**8.4.3 In case computer based examinations**

|  |  |  |
| --- | --- | --- |
| **S. No** | **Item** | **Marks** |
| 1. | Flow chart and algorithms | 10 marks |
| 2. | Program writing and execution | 30 marks |
| 3. | Result and conclusions | 20 marks |
| 4. | Viva voce and Record | 10 marks |
| Total | | 70 marks |

8.5 **For the subject having design and / or drawing, (such as Engineering Drawing and Machine Drawing), the distribution shall be 30 marks for internal evaluation (10 marks for day-to-day work including drawing,3 marks for home assignment work, 12 marks for average of two internal tests and 2 marks for class notes 3 marks for attendance) and 70 marks for end semester end examination.**

There shall be two internal tests in a Semester and the average of the two shall be considered for the award of marks for internal tests.

Third test facility can be availed as mentioned above (8.3.1 (i) (a) and (b)

**8.6. Technical Seminar**

There shall be a technical seminar evaluated for 100 marks from I year I semester to II year II Semester. The evaluation is purely internal and will be conducted as follows:

|  |  |  |
| --- | --- | --- |
| **Sl.No** | **Description** | **Marks** |
| 1 | Literature survey, topic and content | 10 |
| 2 | Presentation including PPT | 10 |
| 3 | Seminar Notes | 05 |
| 4 | Interaction with audience after presentation | 05 |
| 5 | Final Report 3 copies | 10 |
| 6 | Class room participation | 05 |
| 7 | Punctuality in giving seminar as per Scheduled time and date | 10 |
| 8 | Mid Semester Viva (on the seminar topics completed up to the end of 9th week | 15 |
| 9 | End Semester Viva | 30 |
|  | **Total** | **100 Marks** |

Student must secure 40% i.e. 40 marks to be successful in sum total (Hundred Marks) in Technical Seminar.

**8.7 Comprehensive Test and Viva-voce:**

|  |  |
| --- | --- |
| **Comprehensive test and Viva Voce** | **The subjects studied in the Semester concerned related to branches concerned and for placements** |
| B.Tech I year I semester | I semester |
| B.Tech I year II semester | I and II semester |
| B.Tech II year I semester | I, II and III semester |
| B.Tech II year II semester | I, II, III and IV semester |
| B.Tech III year I semester | I, II, IIII, IV and V semester |
| B.Tech III year II semester | I, II, IIII, IV, V and VI semester |
| B.Tech IV year I semester | I, II, IIII, IV, V, VI and VII semester |

Two Mid tests, Two mid Viva voce, one External Comprehensive Test and one External Comprehensive Viva Voce.

**Allocation of marks :**

\*Comprehensive Test : 70 marks

\*\*Viva Voce : 30 marks

**Total : 100 marks**

\*Average of two best Mid Tests of Mid Test – I, Mid Test – II and Mid Test - III will be taken for 30 marks.

Total marks for Comprehensive Test will be 70.

The total sessional marks in this subject of Comprehensive Test and Viva Voce will be : 30 for sessionals and 70 for End Semester examination.

The grand total of marks for the subject of Comprehensive Test and Viva Voce will be 100. The student has to secure 40% of marks i.e. 40 marks in sum total of 100 marks to be successful in the subject.

8.8 The laboratory records and internal test papers shall be preserved in the respective departments as per the college norms and shall be produced to the Committee of the college or any external agency like AICTE, NAAC, JNTUH, NBA etc., as and when the same are called for.

8.9. There shall be a Internship 1 and Internship 2, in an Industry of their specialization. Students will register for this immediately after II year II semester end examination and III year II semester examinations and pursue it during summer vacation. Internship 1 and Internship 2 shall be submitted as a project report and presented before the committee in III year I semester and IV year I semester along with lab examination. This project report will be evaluated for 30 internal marks and 70 external marks. The committee consists of an external examiner, Head of the Department, Supervisor of the Internship project and Senior Faculty Member of the Department.

8.10 The laboratory marks and the internal marks awarded by the college are subject to scrutiny and scaled down by the Departmental committees wherever necessary. In such cases, the internal and laboratory marks awarded by the department will be referred to a committee. The committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendation of the committee is final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the college rules and produced before the visiting committees as and when they are asked for.

8.11. For mandatory courses like orientation course, cyber security, a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in sum total of continuous internal evaluation and external examination for passing the subject / course. These marks will be graded as per table given in 3.2.2.

**9.0 Grading procedure**

9.1 Marks will be awarded to indicate the performance of student in each theory subject, laboratory / practicals, seminar, Group Project 1,2,3, in the Major project and Comprehensive Test and Viva.

Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade shall be given.

**9.2** As a measure of the performance of student, a 10-point absolute grading system using the following letter grades (as per UGC / AICTE guidelines) and corresponding percentage of marks shall be followed:

|  |  |  |
| --- | --- | --- |
| **% of Marks Secured in a Subject / Course**  **(Class Intervals)** | **Letter Grade**  **(UGC Guidelines)** | **Grade Points (GP)** |
| Greater than or equal to 90% | O  (Outstanding) | 10 |
| 80% and less than 90% | A+  (Excellent) | 9 |
| 70% and less than 80% | A  (Very Good) | 8 |
| 60% and less than 70% | B+  (Good) | 7 |
| 50% and less than 60% | B  (Average) | 6 |
| 40% and less than 50% | C  (Pass) | 5 |
| Below 40% | F (FAIL) | 0 |
| Absent | Ab | 0 |

**9.3** A student obtaining ‘**F’** grade in any subject shall be deemed to have ‘**failed’** and is required to reappear as a ‘supplementary student’ in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

**9.4** A student who has not appeared for examination in any subject, ‘**Ab’** grade will be allocated in that subject, and student shall be considered ‘**failed’**. Student will be required to reappear as a ‘supplementary student’ in the semester end examination, as and when offered.

**9.5** A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

**9.6** A student earns grade point (GP) in each subject / course, on the basis of the letter grade secured in that subject / course. The corresponding ‘credit points’ (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

**Credit points (CP) = grade point (GP) x credits …. For a course**

**9.7** The student passes the subject / course only when **GP is not less than 5 (i.e. ‘C’ grade or above)**

**9.8** The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (CP) secured from all subjects / courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to two decimal places. SGPA is thus computed as

SGPA = { Ci Gi } / {  Ci } …. For each semester

**(i.e., upto and inclusive of S semesters, S 2),**

where ‘**N’** is the **total** number of subjects (as specifically required and listed under the course structure of the parent department) the student has ‘**registered’** i.e., from the 1st semester onwards upto and inclusive of the 8th semester, ‘j’ is the subject indicator index (takes into account the subjects from 1 to 8 semesters), CJ is the number of credits allotted to the Jth subjects and Gj represents the grade points (GP) corresponding to the letter grade awarded for that Jth subject.

After registration and completion of the first year first semester, SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

**Illustration of calculation of SGPA**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course / Subject** | **Credits** | **Letter**  **Grade** | **Grade**  **Points** | **Credit**  **Points** |
| Course 1 | 4 | A | 8 | 4 x 8 = 32 |
| Course 2 | 4 | O | 10 | 4 x 10 = 40 |
| Course 3 | 4 | C | 5 | 4 x 5 = 20 |
| Course 4 | 3 | B | 6 | 3 x 6 = 18 |
| Course 5 | 3 | A+ | 9 | 3 x 9 = 27 |
| Course 6 | 3 | C | 5 | 3 x 5 = 15 |
|  | 21 |  |  | 152 |

SGPA = 152/21 = 7.24

**Illustration of calculation of CGPA:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course / Subject** | | **Credits** | | **Letter Grade** | | **Grade Points** | | **Credit points**  **Points** | |
| **I Year I Semester** | | | | | | | | | |
| Course 1 | | 4 | | A | | 8 | | 4 x 8 = 32 | |
| Course 2 | | 4 | | A | | 9 | | 4 x 9 = 36 | |
| Course 3 | | 4 | | B | | 6 | | 4 x 6 = 24 | |
| Course 4 | | 3 | | O | | 10 | | 3 x 10 = 30 | |
| Course 5 | | 3 | | B+ | | 7 | | 3 x 7 = 21 | |
| Course 6 | | 3 | | A | | 8 | | 3 x 8 = 24 | |
| **I Year II Semester** | | | | | | | | | |
| Course 7 | 4 | | B+ | | | 7 | 4 x 7 = 28 | |
| Course 8 | 4 | | O | | | 10 | 4 x 10 = 40 | |
| Course 9 | 4 | | A | | | 8 | 4 x 8 = 32 | |
| Course 10 | 3 | | B | | | 6 | 3 x 6 = 18 | |
| Course 11 | 3 | | C | | | 5 | 3 x 5 = 15 | |
| Course 12 | 3 | | A+ | | | 9 | 3 x 9 = 27 | |
| Total Credits | | = 42 | |  | |  | | Total Credit Points =327 | |

CGPA = 327/42 = 7.79

**9.9** For merit ranking or comparison purposes or any other listing, **only** the ‘**rounded off’** values of the CGPAs will be used.

**9.10** For calculations listed in regulations 9.6 to 9.9, performance in failed subjects/ courses (securing **F** grade) will also be taken into account, and the credits of such subjects/courses will also be included in the multiplications and summations.

After passing the failed subject(s) newly secured letter grades will be taken into account for calculation of SGPA and CGPA.

However, mandatory courses will not be taken into consideration.

**10.0 Passing standards**

**10.1** A student shall be declared successful or ‘passed’ in a semester, if student secures a GP ≥ 5 (‘C’ grade or above) in every subject/course in that semester (i.e. when student gets SGPA 5.00 at the end of that particular semester); and a student shall be declared successful or ‘passed’ in the entire under graduate programme, only when gets a CGPA 5.00 for the award of the degree as required.

**10.2** After the completion of each semester, a grade card or grade sheet (or transcript) shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits, and grade earned etc.), credits earned, SGPA, and CGPA.

**11.0 Declaration of results**

**11.1** Computation of SGPA and CGPA are done using the procedure listed in 9.6 to 9.9.

**11.2** For final percentage of formula may be used.

**12.0 Award of degree** marks equivalent to the computed final CGPA, the following

**% of Marks = (final CGPA – 0.5) x 10**

**12.1** A student who registers for all the specified subjects/ courses as listed in the course structure and secures the total number of credits (with CGPA >5.0), within 8 academic years from the date of commencement of the first academic year, shall be declared to have ‘**qualified’** for the award of the B.Tech. degree in the chosen branch of Engineering as selected at the time of admission.

**12.2** A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.

**12.3** Students with final CGPA (at the end of the under graduate programme) 8.00 and above, and fulfilling the following conditions -

(i) Should have passed all the subjects/courses in ‘**first appearance’** within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.

(ii) Should have secured a CGPA > 8.00, at the end of each of semesters, starting from first year first semester onwards.

(iii) Should not have been detained or prevented from writing the end semester examinations in any semester due to shortage of attendance or any other reason, shall be placed in **‘FIRST CLASS WITH DISTINCTION’**, otherwise **FIRST CLASS** only.

**12.4** Students with final CGPA (at the end of the under graduate programme) ≥ 6.5 but < 8.00, shall be placed in ‘**FIRST CLASS’**.

**12.5** Students with final CGPA (at the end of the under graduate programme) ≥ 5.5 but < 6.5, shall be placed in ‘**SECOND CLASS’**.

**12.6** All other students who qualify for the award of the degree (as per item 12.1), with final CGPA (at the end of the under graduate programme) ≥ 5 but < 5.5, shall be placed in ‘**pass class**’.

**12.7** A student with final CGPA (at the end of the under graduate programme) < 5.00 will not be eligible for the award of the degree.

**12.8** Students fulfilling the conditions listed under item 12.3 alone will be eligible for award of ‘**university rank**’ and ‘**gold medal**’.

**13.0 Withholding of results**

**13.1** If the student has not paid the fees to the university / college at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and student will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases.

**14.0 Transitory regulations**

**14.1** A student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the degree programme, may be considered eligible for readmission to the same subjects / courses (or equivalent subjects/ courses, as the case may be), and same professional electives / open electives (or from set/category of electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the date of commencement of student's first year first semester).

A student admitted in one academic regulation and he is getting readmission in some other academic regulations, the college has to offer substitute / additional subjects based on the comparison of two academic regulations. The detail of substitute / additional subjects offered with the recommendations of board of studies of the concerned branch has to be given from time to time. The student will be governed by the academic regulations at the time of re-admission.

**15.0 Student transfers**

15.1There shall be no branch transfers after the completion of admission process.

15.2 The students seeking transfer to Sreenidhi Institute of Science and Technology ( SNIST) from various other Universities / institutions have to pass the failed subjects which are equivalent to the subjects of SNIST, and also pass the subjects of SNIST which the students have not studied at the earlier institution.

Further, though the students have passed some of the subjects at the earlier semesters of SNIST, the students have to study substitute subjects in SNIST and get sessional marks by attending 3rd mid test and paying requisite fee as per the rules.

15.3 The transferred students from other Universities/ institutions to SNIST who are on rolls to be provided one chance to write the CIE (internal marks) in the failed subjects and /or subjects not studied as per the clearance letter issued by the Institution.

15.4 The autonomous affiliated colleges have to provide one chance to write the internal examinations in the failed subjects and /or subjects not studied, to the students transferred from other universities / institutions to SNIST who are on rolls, as per the clearance (equivalence) letter issued by the University.

16.0 **Scope**

16.1 The academic regulations should be read as a whole, for the purpose of any interpretation.

16.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final and binding.

16.3 The Institution may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the date notified by the Institution.

**Academic Regulations for B.Tech.**

**(LATERAL ENTRY SCHEME)**

**w.e.f the AY 2021-22**

**1. Eligibility for award of B. Tech. Degree (LES)**

The Lateral Entry Scheme (LES) students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years failing which he will forfeit the seat.

**2.** The student shall register and secure for all the credits with CGPA ≥ 5 from II year to IV year B.Tech. programme (LES) as per the regulations for the award of B.Tech. degree. **Out of the total credits secured, the student can avail exemption up to 6 credits**, that is, one open elective subject and one professional elective subject or two professional elective subjects for B.Tech programme to improve the performance of the Grade point average.

**3.** The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech. However, the student can take **two more** years for appearing the examinations.

**4.** The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

**5. Promotion rules based on credits**

|  |  |  |
| --- | --- | --- |
| **S. No** | **Promotion** | **Conditions to be fulfilled** |
| 1 | Second year first semester to second year second semester | Regular course of study of second year first semester. |
| 2 | Second year second semester to third year first semester | (i) Regular course of study of second year second semester.  (ii) Must have secured at least 27 credits  out of 45 credits i.e., 60% of credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not. |
| 3 | Third year first semester to third year second semester | Regular course of study of third year first semester. |
| 4 | Third year second semester to fourth year first semester | (i) Regular course of study of third year second semester.  (ii) Must have secured at least 52 credits out of 87 credits i.e., 60% of credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not. |
| 5 | Fourth year first semester to fourth year second semester | Regular course of study of fourth year first semester. |

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

**MALPRACTICE RULES**

**DISCIPLINARY ACTION FOR MIS-CONDUCT OF STUDENTS DURING EXAMINATIONS**

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

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

|  |  |  |
| --- | --- | --- |
| 7. | Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall. | Expulsion from the examination hall and  cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. |
| 8. | Possess any lethal weapon or firearm in the examination hall. | Expulsion from the examination hall and  cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat. |
| 9. | If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8. | Student of the colleges expulsion from the  examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.  Person(s) who do not belong to the college will be handed over to police and, a police case will be registered against them. |
| 10. | Comes in a drunken condition to the examination hall. | Expulsion from the examination hall and  cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and UG major project and shall not be permitted for the remaining examinations of the subjects of that semester/year. |
| 11. | Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny. | Cancellation of the performance in that subject  and all other subjects the student has appeared including practical examinations and UG major project of that semester/year examinations. |

12. If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the university for further action to punishment award suitable.

**Malpractices identified by squad or special invigilators**

1. Punishments to the students as per the above guidelines.

2. Punishment for institutions: (if the squad reports that the college is encouraging malpractices)

a. A show cause notice shall be issued to the college.

b. Impose a suitable fine on the college.

c. Shifting the examination centre from the college to another college for a specific period of not less than one year.

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**COURSE COMPONENT WISE CREDIT DISTRIBUTION**

**(SNIST-A20 Regulation Vs AICTE Model Curriculum)**

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No** | **Component** | **AICTE Credits** | **SNIST Credits** |
| 1 | HSM | 12 | 13 |
| 2 | BS | 26 | 30 |
| 3 | ES | 20 | 25 |
| 4 | PC | 53 | 61 |
| 5 | PE | 18 | 15 |
| 6 | OE | 18 | 6 |
| 7 | PSI | 11 | 14 |
| 8 | MC | Non-Credit | Non-Credit |
| **TOTAL CREDITS** | | **158** | **164** |

**Graphical Representation of the Component wise Credit Distribution of SNIST Vs AICTE**

|  |
| --- |
| Note: All End Examinations (Theory and Practical) are of Three hours duration. |
| **T – Tutorial L - Theory P/D – Practical/Drawing** |
| **C - Credits Int. - Internal Exam Ext. - External Exam** |
| **Course code Definitions** |
| BS- Basic Science Courses |
| ES- Engineering Science Courses |
| HS- Humanities and Social Sciences including Management courses |
| PC-EEE Professional core courses |
| PE -EEE Professional Elective courses |
| OE-EEE Open Elective courses |
| PS- Summer Industry Internship, Projects, Comprehensive Viva Voce, Technical Seminars. |

**SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY (AUTONOMOUS)**

**B.TECH IN ELECTRICAL AND ELECTRONICS ENGINEERING (EEE)**

**Course structure for B. Tech I Year I Semester EEE (2020-21)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl.No** | **Course Category** | **Dept Course** | **Course code** | **Name of the Course** | **L** | **T** | **P** | **C** | **Max Marks** | |
| **CIE** | **SEE** |
| 1. | BS | S&H | 8HC07 | Engineering Physics | 3 | 1 | 0 | 4 | 30 | 70 |
| 2. | ES | IT | 8FC01 | Problem Solving using C | 3 | 0 | 0 | 3 | 30 | 70 |
| 3. | BS | S&H | 8HC09 | Matrix Methods and Calculus (MMC) | 2 | 1 | 0 | 3 | 30 | 70 |
| 4. | ES | Mech | 8BC02 | Engineering Graphics | 1 | 0 | 4 | 3 | 30 | 70 |
| 5. | HSM | S&H | 8HC02 | Written communication skills | 1 | 0 | 0 | 1 | 30 | 70 |
| 6 | BS | S&H | 8HC65 | Engineering Physics lab | 0 | 0 | 2 | 1 | 30 | 70 |
| 7 | ES | IT | 8FC61 | Problem Solving using C Lab | 0 | 0 | 2 | 1 | 30 | 70 |
| 8 | HSM | S&H | 8HC62 | Written communication skills Lab | 0 | 0 | 2 | 1 | 30 | 70 |
| 9 | PSI | EEE | 8A191 | Technical Seminar - I | 0 | 0 | 2 | 1 | 100 | -- |
| 10 | BS | EEE | 8A181 | Comprehensive Test and Viva Voce – I | 1 | 0 | 0 | 1 | 30 | 70 |
| 11 | HS | S&H | 8HC18 | Orientation Course\* | 1 | 0 | 0 | 0 | Marks and  Grade will be given at the end of I year II semester | |
|  |  |  |  | Total |  |  |  | 19 |  |  |

\* a) Orientation Course for B. Tech I year I semester Students take place for 3 weeks duration covering the first Two Units

b) Orientation Course for B. Tech I year II semester Students take place for covering the remaining Four Units (Units III, IV, V, and VI).

**Course structure for B.Tech I Year II Semester EEE (2020-21)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl.No** | **Course Category** | **Dept Course** | **Course Code** | **Name of the Course** | **L** | **T** | **P** | **C** | **Max Marks** | |
|  |  |  |  |  |  |  |  |  | **CIE** | **SEE** |
| 1. | BS | S&H | 8HC04 | Engineering Chemistry | 3 | 1 | 0 | 4 | 30 | 70 |
| 2. | PC | EEE | 8A201 | Electrical Circuits and Networks-I | 2 | 1 | 0 | 3 | 30 | 70 |
| 3. | BS | S&H | 8HC11 | Advanced Calculus and Complex Variable (ACCV) | 3 | 1 | 0 | 4 | 30 | 70 |
| 4. | BS | S&H | 8HC08 | Basic Mathematics, Analysis and Reasoning (BMAR) | 2 | 1 | 0 | 3 | 30 | 70 |
| 5. | ES | MECH | 8BC01 | Workshop/Manufacturing processes | 1 | 0 | 0 | 1 | 30 | 70 |
| 6. | ES | CSE | 8EC01 | Data Structures and C++ | 3 | 0 | 0 | 3 | 30 | 70 |
| 7 | BS | S&H | 8HC63 | Engineering Chemistry lab | 0 | 0 | 2 | 1 | 30 | 70 |
| 8 | HSM | S&H | 8HC01 | Oral communication skills | 1 | 0 | 0 | 1 | 30 | 70 |
| 9 | ES | MECH | 8BC61 | Workshop/Manufacturing processes Lab | 0 | 0 | 2 | 1 | 30 | 70 |
| 10 | HSM | S&H | 8HC61 | Oral communication skills Lab | 0 | 0 | 2 | 1 | 30 | 70 |
| 11 | ES | CSE | 8EC61 | Data Structures (C / C++) Lab | 0 | 0 | 2 | 1 | 30 | 70 |
| 12 | BS | EEE | 8A282 | Comprehensive Test and Viva Voce – II | 1 | 0 | 0 | 1 | 30 | 70 |
| 13 | PSI | EEE | 8A292 | Technical Seminar - II | 0 | 0 | 2 | 1 | 100 | -- |
| 14 | HS | S&H | 8HC18 | Orientation Course\* | 2 | 0 | 0 | 0 | 30 | 70 |
| Grade evaluation | |
| Total | | | | |  |  |  | 26 |  |  |

\* a) Orientation Course for B. Tech I year I semester Students take place for 3 weeks duration covering the first Two Units

b) Orientation Course for B. Tech I year II semester Students take place for covering the remaining Four Units (Units III, IV, V, and VI).

**II Year – I Semester**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No** | **Course Category** | **Dept Course** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max Marks** | |
| **CIE** | **SEE** |
| 1 | BS | S&H | 8HC14 | Transform Techniques and Numerical Methods (TTNM) | 2 | 1 | --- | 3 | 30 | 70 |
| 2 | PC | ECE | 8CC02 | Digital Logic Design | 2 | -- | --- | 2 | 30 | 70 |
| 3 | PC | ECE | 8CC01 | Electronic Devices and Circuits | 2 | 1 | --- | 3 | 30 | 70 |
| 4 | PC | EEE | 8A302 | Electro Magnetic Fields | 2 | --- | --- | 2 | 30 | 70 |
| 5 | PC | EEE | 8A303 | Electrical Machines – I | 2 | --- | --- | 2 | 30 | 70 |
| 6 | PC | EEE | 8A304 | Electrical Circuits & Networks – II | 2 | --- | --- | 2 | 30 | 70 |
| 7 | ES | CSE | 8EC42 | Programming in Java | 2 | --- | --- | 2 | 30 | 70 |
| 8 | HSM | S&H | 8HC05 | Environmental Science and Ecology | 2 | --- | --- | 2 | 30 | 70 |
| 9 | PC | ECE | 8CC71 | Electronic Devices and Circuits Lab | --- | --- | 2 | 1 | 30 | 70 |
| 10 | PC | EEE | 8A371 | Electrical Circuits and Networks Analysis Lab | --- | --- | 2 | 1 | 30 | 70 |
| 11 | PSI | EEE | 8A393 | Technical Seminar - III | --- | --- | 2 | 1 | 100 | -- |
| 12 | BS | EEE | 8A383 | Comprehensive Test and Viva Voce – III | 1 | 0 | 0 | 1 | 30 | 70 |
|  | |  | **Total** | |  |  |  | **22** |  |  |

**II Year – II Semester**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Course Category** | **Dept Course** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max Marks** | |
| **CIE** | **SEE** |
| 1 | BS | S&H | 8HC16 | Probability and Statistics (P&S) | 2 | 1 | --- | 3 | 30 | 70 |
| 2 | PC | EEE | 8A405 | Electrical Machines – II | 2 | -- | --- | 2 | 30 | 70 |
| 3 | PC | EEE | 8A406 | Power System – I | 2 | -- | --- | 2 | 30 | 70 |
| 4 | PC | EEE | 8AC07 | Linear Control Systems | 3 | -- | --- | 3 | 30 | 70 |
| 5 | PC | ECE | 8CC05 | Analog Circuits | 2 | -- | --- | 2 | 30 | 70 |
| **6** | ES | IT | 8EC44 | Database System Concepts | 2 | -- | --- | 2 | 30 | 70 |
| **7** | HSM | S&H | 8HC17 | Universal Human Values | 2 | 1 | 0 | 3 | 30 | 70 |
| **8** | HSM | S&H | 8HC03 | Soft Skills | 1 | 0 | 2 | 2 | 30 | 70 |
| 9 | PC | EEE | 8A473 | Electrical Machines Lab – I | -- | -- | 2 | 1 | 30 | 70 |
| 10 | PC | ECE | 8CC74 | Analog Circuits Lab | --- | --- | 2 | 1 | 30 | 70 |
| 11 | PSI | EEE | 8A494 | Technical Seminar - IV | --- | --- | 2 | 1 | 100 | -- |
| 12 | BS | EEE | 8A484 | Comprehensive Test and Viva Voce – IV | 1 | 0 | 0 | 1 | 30 | 70 |
| 13 |  | EEE |  | Summer Break – Internship–I (4 weeks): Evaluation will be done along with 3-1 courses  (2 Internal Reviews (30 M) and External Evaluation (70M) in III year – I-Sem) | | | | | | |
|  | **Total** | | | |  |  |  | **23** |  |  |

**III Year – I Semester**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No** | **Course Category** | **Dept Course** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max Marks** | |
| **CIE** | **SEE** |
| 1 | PC | ECE | 8CC07 | IC Applications | 3 | -- | --- | 3 | 30 | 70 |
| 2 | PC | EEE | 8A508 | Electrical Machines – III | 3 | 1 | -- | 4 | 30 | 70 |
| 3 | PC | EEE | 8A509 | Power Electronics | 3 | 1 | -- | 4 | 30 | 70 |
| 4 | PC | EEE | 8A510 | Power Systems – II | 3 | 1 | -- | 4 | 30 | 70 |
| **5** | OE |  |  | Open Elective – I | 2 | -- | -- | 2 | 30 | 70 |
| 6 | HSM | MBA | 8ZC01 | Economics, Accountancy and Management Science | 2 | -- | --- | 2 | 30 | 70 |
| 7 | MC | IT | 8FC24 | Cyber Security | 2 | --- | --- | 0 | Grading | |
| 8 | PC | ECE | 8CC76 | IC Applications Lab | - | - | 2 | 1 | 30 | 70 |
| 9 | PC | EEE | 8A575 | Linear Control Systems and Simulation Lab | -- | -- | 2 | 1 | 30 | 70 |
| 10 | PSI | EEE | 8A586 | Evaluation of Summer Break - Internship-I  (2 Internal Reviews and External Evaluation) | -- | -- | -- | 1 | 30 | 70 |
|  | **Total** | | | | **18** | **3** | **4** | **22** | **270** | **630** |

**Open Elective – I**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
|  | Operating System Concepts | Computer |
| 8ZC22 | Basics of Entrepreneurship | Entrepreneurship |
| 8ZC05 | Banking Operations, Insurance and Risk Management | Finance |
| 8ZC25 | Basics of Indian Economy | Social Sciences |
|  | Design literacy and Design Thinking | Innovation and Design Thinking |

**III Year – II Semester**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No** | **Course Category** | **Dept Course** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max Marks** | |
| **CIE** | **SEE** |
| 1 | PC | ECM | 8DC05 | Microprocessors and Microcontrollers | 3 | -- | -- | 3 | 30 | 70 |
| 2 | PC | EEE | 8A611 | Switch Gear and Protection | 2 | 1 | --- | 3 | 30 | 70 |
| 3 | PC | EEE | 8A612 | Measurements & Instrumentation | 2 | 1 | -- | 3 | 30 | 70 |
| 4 | ES | MECH |  | Elements of Mechanical Engineering | 2 | --- | --- | 2 | 30 | 70 |
| 5 | ES | CSE | 8FC22 | Python Programming and Computer Algorithms | 3 | -- | -- | 3 | 30 | 70 |
| 6 | OE |  |  | Open Elective – II | 2 | -- | --- | 2 | 30 | 70 |
| 7 | MC | CSE | 8EC45 | Artificial Intelligence | 2 | -- | --- | 0 | Grading | |
| 8 | PC | EEE | 8A677 | Electrical Machines Lab – II | -- | -- | 2 | 1 | 30 | 70 |
| 9 | PC | EEE | 8A678 | Power Electronics & Simulation Lab | -- | -- | 2 | 1 | 30 | 70 |
| 10 | PSI | EEE | 8A696 | Group Project | --- | --- | 2 | 1 | 30 | 70 |
| 11 | ES | EEE | 8A686 | Comprehensive Viva Voce | 0 | 0 | 0 | 1 | 30 | 70 |
|  |  | EEE | Summer Break – Internship–II (4 weeks): Evaluation will be done along with 4-1 courses (2 Internal Reviews (30 M) and External Evaluation (70M) in IV year – I-Sem)) | | | | | | | |
|  | **Total** | | | | **16** | **2** | **6** | **20** | **300** | **700** |

**Open Elective – II**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
|  | Big Data Analytics | Computer |
| 8ZC23 | Advanced Entrepreneurship | Entrepreneurship |
| 8ZC19 | Entrepreneurship Project Management and Structured Finance | Finance |
| 8ZC26 | Basics of Polity and Ecology | Social Sciences |
|  | Co-Creation and Product Design | Innovation and Design Thinking |
| \* SWAYAM MOOCS Course: The department will identify the MOOCS Course from the available courses in SWAYAM portal for the semester | | |

**IV Year – I Semester**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S.No | **Course Category** | **Dept Course** | **Subject Code** | **Subject** | L | T | P/D | C | Max Marks | |
| CIE | SEE |
| 1 | PC | EEE | 8A714 | Power Systems Analysis and Control | 3 | -- | -- | 3 | 30 | 70 |
| 2 | PC | EEE | 8A716 | Drives & Utilization of Electrical Energy | 3 | -- | -- | 3 | 30 | 70 |
| 3 | PE | EEE |  | Professional Elective -I | 3 | -- | --- | 3 | 30 | 70 |
| 4 | PE | EEE |  | Professional Elective -II | 3 | -- | --- | 3 | 30 | 70 |
| 5 | PE | EEE |  | Professional Elective -III | 3 | -- | --- | 3 | 30 | 70 |
| 6 | OE |  |  | Open Elective – III | 2 | -- | -- | 2 | 30 | 70 |
| 7 | PSI | EEE | 8A787 | Evaluation of Summer Break - Internship-II (2 Internal Reviews and External Evaluation) | -- | -- | -- | 1 | 30 | 70 |
| 8 | PC | EEE | 8A781 | Electrical workshop | -- | -- | 2 | 1 | 30 | 70 |
| 9 | PC | EEE | 8A782 | Measurements & Instrumentation Lab | -- | -- | 2 | 1 | 30 | 70 |
| 10 | PC | ECM | 8DC71 | Microprocessors and Microcontrollers Lab | -- | -- | 2 | 1 | 30 | 70 |
|  | **Total** | | | | **17** | **0** | **6** | **21** | **300** | **700** |

**Professional Elective –I**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
| 8CC03 | Signals and Systems | Electronics |
| 8A725 | Advanced Control Systems | Control Systems |
| 8A731 | Smart Grid | Power Systems |
| 8A734 | HVDC and FACTS | Power Electronics |

**Professional Elective –II**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
| 8A715 | Renewable Energy Sources | Power Systems |
| 8CC09 | Digital Signal Processing | Electronics |
| 8A724 | Digital Control Systems | Control Systems |
| 8A737 | Advanced Power Electronics | Power Electronics |

**Professional Elective – III**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
| 8A729 | Power System Deregulation | Power Systems |
| 8A735 | Electrical and Hybrid Vehicles | Power Electronics |
| 8A739 | Optimal Control Systems | Control Systems |
|  | Communication Theory | Electronics |

**Open Elective – III**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
|  | Computer Networks | Computer |
| 8ZC24 | Product and Services | Entrepreneurship |
| 8ZC15 | Financial Institutions, Markets and Services | Finance |
| 8ZC27 | Indian History, Culture and Geography. | Social Sciences |
|  | Entrepreneurship & Business Design | Innovation and Design Thinking |

**IV Year – II Semester**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.**  **No.** | **Course Category** | **Dept Course** | **Subject**  **Code** | **Subject** | **L** | **T** | **P/D** | **C** | Max Marks | |
| CIE | SEE |
| **1** | PE | EEE |  | Professional Elective – IV | 3 | **--** | **--** | 3 | 30 | 70 |
| **2** | PE | EEE |  | Professional Elective – V | 3 | **--** | **--** | 3 | 30 | 70 |
| 3 | PSI | EEE |  | Major Project | --- | --- | 10 | 5 | 30 | 70 |
|  | **Total** | | | | **6** | **--** | **10** | **11** | **90** | **210** |

**Professional Elective – IV**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
| 8A728 | Power Quality | Power Electronics |
| 8A817 | High Voltage Engineering | Power Systems |
| 8A827 | Reactive Power Control & Management | Control Systems |
|  | Fundamentals of VLSI and Embedded Systems | Electronics |

**Professional Elective – V**

|  |  |  |
| --- | --- | --- |
| **Subject Code** | **Name of the subject** | **Stream** |
| 8A820 | Electrical Distribution Systems | Power Systems |
| 8A826 | Programmable Logic Controllers | Control Systems |
| 8A833 | Switched Mode Power Conversion | Power Electronics |
|  | Artificial Neural Networks | Electronics |

**L - Lectures; T - Tutorial; P/D - Practical / Drawing; C – Credit**

Note: All End Examinations (Theory and Practical) are of **Three** hours duration.

**B. Tech EEE A20 REGULATION ELECTIVE STREAMS**

**PROFESSIONAL ELECTIVE STREAMS**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P/D** | **C** |
| **3** | **0** | **0** | **3** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Professional Elective Streams** | **Professional Elective – I**  **(4-1)** | **Professional Elective – II**  **(4-1)** | **Professional Elective – III**  **(4-1)** | **Professional Elective – IV**  **(4-2)** | **Professional Elective – V**  **(4-2)** |
| **Power Systems** | Utilization of Electrical Energy | Renewable Energy Sources | Power System Deregulation | High Voltage Engineering | Electrical Distribution Systems |
| **Power Electronics** | HVDC and FACTS | Advanced Power Electronics | Power Semi-Conductor Drives | Electrical and Hybrid Vehicles | Switched Mode Power Conversion |
| **Control Systems** | Advanced Control Systems | Digital Control Systems | Optimal Control Systems | Reactive Power Control and Management | Programmable Logic Controllers |
| **Electronics** | Signals and Systems | Digital Signal Processing | Communication Theory | Fundamentals of VLSI and Embedded Systems | Artificial Neural Networks |

**OPEN ELECTIVES STREAMS**

|  |  |  |  |
| --- | --- | --- | --- |
| **L** | **T** | **P/D** | **C** |
| **2** | **0** | **0** | **2** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Open Elective Streams** | **Open Elective (OE)** | | | | | |
| **Code** | **OE – I (3-1)** | **Code** | **OE – II (3-2)** | **Code** | **OE – III (4-1)** |
| **Computer** |  | Operating System Concepts |  | Big Data Analytics |  | Computer Networks |
| **Entrepre neurship Stream** | 8ZC22 | Basics of Entrepreneu rship | 8ZC23 | Advanced Entrepreneur ship | 8ZC24 | Product and Services |
| **Social Sciences Stream** | 8ZC25 | Basics of Indian Economy | 8ZC26 | Basics of Polity and Ecology | 8ZC27 | Indian History, Culture and Geography. |
| **Finance Stream** | 8ZC05 | Banking Operations, Insurance and Risk Management | 8ZC19 | Entrepreneur ship Project Management and Structured Finance | 8ZC15 | Financial Institutions, Markets and Services |
| **Innovation and Design Thinking** |  | Design Literacy and Design Thinking |  | Co-Creation and Product Design |  | Entrepreneurs hip & Business Design |

**SWAYAM MOOCS Courses:**

The department will identify the MOOCS Course from the available courses in SWAYAM portal for the semester

**B.Tech. (EEE) III Year – I Sem**

**CODE: 8CC07 IC APPLICATIONS**

**L T P C**

**3 -- -- 3**

**Course Objectives**

* To maintain the right blend of theory and practice in analyzing and designing a wide variety of applications using IC 741 op-amps
* To acquaint the learners with a wide variety of Digital ICs families, and their applications in various digital circuits and systems.

**Course Outcomes: After studying this course, the students will be able to**

1. Demonstrate the concepts of Differential Amplifier and Operational Amplifier and their characteristics.
2. Design the basic circuits using Operational Amplifiers.
3. Explore, design and analyze Filters, Timers, Voltage Controlled Oscillator and Phase Locked Loop.
4. Demonstrate the design and analyze Oscillators, D/A Converters and A/D Converters, and IC regulators.
5. Classify and characterize the TTL/ECL Logic Families.
6. Explore the design of various logic gates using CMOS logic.

***Mapping of Course Outcomes with Program Outcomes***

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| CO1 | 3 |  | 2 | 3 |  |  |  |  | 2 |  |  |  |
| CO2 | 3 | 3 | 3 | 3 | 3 |  |  |  | 3 | 3 |  | 3 |
| CO3 | 3 | 3 | 3 |  | 2 |  |  |  | 3 | 3 |  | 3 |
| CO4 | 3 | 2 | 3 | 3 | 3 |  |  |  | 2 | 3 |  | 3 |
| CO5 | 3 | 2 |  |  | 3 |  |  |  |  |  |  | 2 |
| CO6 | 2 |  | 3 | 3 | 3 |  |  |  | 2 | 3 |  | 3 |

**UNIT – I: OPAMP & ITS CHARACTERISTICS**

Differential Amplifiers and its Characteristics, Op-Amp Block Diagram, Ideal OP-AMP Characteristics, DC and AC Characteristics. 741 Op-Amp and its Features and Characteristics. Parameters Measurement: Offset Voltage and Current, Slew Rate and CMRR. Frequency Compensation.

**UNIT – II: BASIC APPLICATIONS OF OP-AMPs**

Adder/Subtractor, Difference Amplifier, Instrumentation Amplifier, Differentiator, Integrator, V/I & I/V Converters, Comparators, Multivibrators, Square and Triangular Waveform Generators, Clippers, Clampers, Peak Detector, S/H circuit.

**UNIT – III: FILTERs, TIMERs & PLLs**

Filters: Introduction, Butterworth Filters- First and Second Order Active Filters- LPF, HPF, BPF, BRF. Introduction to 555 Timer, Functional Block, 555 timers as Monostable and Astable Multivibrators and Applications, Schmitt Trigger. Voltage Controlled Oscillator (IC 566), Phase Locked Loop.

**Applications: Design of visitors counter using 555 timer.**

**UNIT – IV: OSCILLATORS, D/A AND A/D CONVERTERS, IC REGULATORS**

Oscillators: Introduction, Design and Analysis of Wein Bridge, RC Phase shift Oscillators using op-amp. D/A Converters: Introduction, Characteristic Parameters, R-2R Ladder, Weighted Resistor, Inverter R-2R type D/A Converter, A/D Converters: Introduction, Characteristic Parameters, Counter Type, Dual Slope, Successive Approximation and Flash types A/D Converters, IC REGULATORS: Three terminal voltage regulators 7805, 7809, 7912, IC 723.

**UNIT – V: LOGIC FAMILIES**

Classification of IC Logic Families, Multi emitter transistor logic, Standard TTL NAND & NOR Gate-Analysis & TTL Open Collector Outputs, Tristate TTL. Unsaturated logic- ECL logic family, ECL Inverter/Buffer, ECL NOR/OR logic, Electrical characteristics of logic gates.

**UNIT – VI: MOS& CMOS LOGIC FAMILY**

NMOS & PMOS logic- Logic gates implementation, Passive pull up & active pull up .CMOS logic family- Design of logic gates and Boolean functions. CMOS Open Drain and Tristate Outputs. Comparison of Various Logic Families. IC interfacing, TTL driving CMOS & CMOS driving TTL.

**Applications: Design of 4x1 MUX using CMOS**

TEXT BOOKS

1. D. Roy Chowdhary, Linear Integrated Circuits , New Age Publications (P) Ltd, 2nd Edition, 2003.
2. Ramakanth A. Gayakwad, Op-Amps & Linear ICs, PHI, 1987.
3. John F. Wakerly, Digital Design Principles & Practices, PHI/ Pearson Education Asia, 3rd Ed., 2005.

***REFERENCES***

1. Sergio Franco, Design with Operational Amplifiers & Analog Integrated Circuits, McGraw Hill, 1988.
2. R.F. Coughlin & Fredrick Driscoll, Operational Amplifiers & Linear Integrated Circuits, PHI, 6th Edition.
3. K. Lal Kishore, Linear Integrated Circuit Application, Pearson Educations, 2005.
4. Millman, Micro Electronics, McGraw Hill, 1988.
5. C.G. Clayton, Operational Amplifiers, Butterworth & Company Publ. Ltd. Elsevier, 1971.

**B.Tech. EEE III year – I Sem**

**Code: 8A508 ELECTRICAL MACHINES - III**

**L T P C**

3 - 3

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| **x** | **x** |  |  | **x** |  |  |  | **x** |  |  |  |

**Corse Objective:**

It deals with the detailed analysis of Synchronous generators and motors which are the prime source of electrical power generation and its utilities. Also concerns about the different types of single phase motors which are having significant applications in house hold appliances and control systems.

**Course Outcomes:**

After completion of this course the students are able to

1. Explain the constructional details and generation of EMF.
2. Ex plain the causes for harmonics and its suppression and also armature reaction.
3. Evaluate the performance of alternator by different methods.
4. Explain how to operate the alternators in parallel for load sharing and how to control the reactive power.
5. Analyze and explain applications of synchronous motor.
6. Explain the various applications of single phase induction motor and special purpose motors.

**UNIT – I CONSTRUCTION AND PRINCIPLE OF OPERATION OF SYNCHRONOUS GENERATOR:**

Constructional Features, Armature windings, Integral slot and fractional slot windings, Distributed and concentrated windings, Distribution, Pitch and winding factors, E.M.F Equation.

**UNIT-II SYNCHRONOUS GENERATOR CHARACTERISTICS:**

Harmonics in generated E.M.F., Suppression of harmonics, Armature reaction, Leakage reactance, Synchronous reactance and impedance, Experimental determination, Phasor diagram, Load characteristics.

**UNIT – III REGULATION OF SYNCHRONOUS GENERATOR:**

Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods, Salient pole alternators, two reaction analysis, Experimental determination of Xd and Xq (Slip test) Phasor diagrams, Regulation of salient pole alternators.

**UNIT – IV PARALLEL OPERATION OF SYNCHRONOUS GENERATOR:**

Synchronizing alternators with infinite bus bars, synchronizing power torque, parallel operation and load sharing, Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form, Determination of sub-transient, Transient and steady state reactance’s.

**UNIT – V SYNCHRONOUS MOTORS:**

Principal of operation, Phasor diagram, Power flow equation, Variation of current and power factor with excitation, Power circles, Synchronous condenser, Hunting and its suppression, Methods of starting.

**UNIT – VI SINGLE PHASE AND SPECIAL MOTORS:**

Single phase induction motor, constructional features, double revolving field theory, elementary idea of cross, Field theory, Split-phase motors, and Shaded pole motor.

Principle & performance of A.C. Series motor, Universal motor, Stepper motor and reluctance motor.

**TEXT BOOKS**

1. Electric Machines – I.J. Nagrath & D.P. Kothari, Tata Mc Graw-Hill Publishers, 7th Edition.

2. Electrical Machines - P.S. Bimbra, Khanna Publishers.

**REFERENCES:**

1. The Performance and Design of A.C. Machines – M. G. Say, ELBS and Ptiman & Sons.

2. Electric Machinery – A.E. Fitzgerald, C. Kingsley and S. Umans, Mc Graw-Hill Companies, 5th edition.

3. Theory of Alternating Current Machinery - Langsdorf, Tata Mc Graw-Hill, 2nd edition.

4. Electromachanics - III (Synchronous and single phase machines) -S. Kamakashiah, Right Publishers.

**III year B.Tech – I Sem**

**Code: 8A509 POWER ELECTRONICS**

**L T P C**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| **x** | **x** | **x** |  |  |  |  |  | **x** |  |  |  |

**Course Objective:**

With the advent of semiconductor devices, Revolution is taking place in the power transmission distribution and utilization. This course introduces the basic concepts of power semiconductor devices, Converters and choppers and their analysis.

**Course Outcomes:**

After completion of this course the students are able to

1. Understand the construction and operation of various power semiconductor devices and analyze about the series and parallel operation of SCRs.
2. Analyze the operation of different configurations of single phase converters for different loads.
3. Analyze the operation of different configurations of three phase converters for different loads.
4. Explain the operation of different type’s choppers.
5. Explain the operation of inverter and applications of inverters.
6. Explain the working of an AC voltage controller and Cyclo-Converters for different configurations.

**UNIT – I POWER SEMI CONDUCTOR DEVICES:**

Thyristors, Silicon Controlled Rectifiers (SCR’s), BJT, Power MOSFET, Power IGBT, DIAC, TRIAC, GTO and their characteristics. Basic theory of operation of SCR, Static characteristics, Two transistor analogy, Turn on and turn off methods, Dynamic characteristics of SCR, Turn on and Turn off mechanism., SCR, UJT firing circuit, Series and parallel connections of SCR’s, Snubber circuit details, Specifications and Ratings of SCR’s, BJT, IGBT.

**UNIT – II SINGLE PHASE CONTROLLED CONVERTERS:**

Phase control technique, Single Phase Line commutated converters, Midpoint and Bridge connections; Half controlled and Fully controlled converters, Derivation of average load voltage and current with R and RL loads,

**UNIT – III THREE PHASE CONTROLLED CONVERTERS:**

Three phase half controlled and fully controlled bridge converters with R and RL loads, Effect of Source inductance, Waveforms, Numerical Problems.

**UNIT – IV CHOPPERS:**

Choppers, Time ratio control and Current limit control strategies, Step down choppers Derivation of load voltage and currents with R, RL and RLE loads, Step up Chopper, load voltage expression, Jones chopper and waveforms, Problems, Buck, Boost, Buck-Boost choppers.(Qualitative treatment).

**UNIT – V INVERTERS:**

Inverters, Single phase inverter, Half and Full bridge VSI & CSI inverters, Waveforms, Voltage control techniques for inverters, Three phase inverters with 120degrees and 180 degrees mode of conduction, Pulse width modulation techniques (Multiple Pulse and Sinusoidal), Numerical problems.

**UNIT –VI AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS:**

AC voltage controllers, Single phase two SCR’s in anti parallel with R and RL loads, Derivation of RMS load voltage, current and power factor wave forms, Firing circuits, Numerical problems, Cyclo converters, Single phase midpoint cyclo converters with Resistive and inductive load (Principle of operation only), Bridge configuration of single phase cyclo converter (Principle of operation only), Waveforms

**TEXT BOOKS:**

1. Power Electronics - P.S.Bimbhra, Khanna Publishers.

2. Power Electronics Circuits, Devices and Applications - M. H. Rashid, Prentice Hall of India, 2nd edition.

**REFERENCES:**

1. Power Electronics - Vedam Subramanyam, New Age International (P) Limited, Publishers.

2. Power Electronics - V.R. Murthy 1st edition, OXFORD University Press.

3. Power Electronics - P.C. Sen,Tata Mc Graw Hill Publishing.

4. Power Electronics - M. D. Singh & K. B. Kanchandhani, Tata Mc Graw Hill Publishing Company.

**III YEAR B.TECH – I SEM**

**CODE: 8A510 POWER SYSTEMS-II**

**L T P C**

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| **x** |  | **x** | **x** |  |  |  |  | **x** |  |  |  |

**Course Outcomes:**

1. Understand the importance of power factor and analyze the different methods of power factor and voltage control.
2. Analyze the factors affecting the economic aspects of power generation and tariff, different methods of tariff.
3. Learn about components of substation and different methods of grounding.
4. Learn about per unit system and symmetrical fault analysis.
5. Learn about symmetrical components, sequence impedances and unsymmetrical fault analysis.
6. Analyze different types of distribution systems.

**UNIT – I POWER FACTOR AND VOLTAGE CONTROL:**

Causes of low p.f, Methods of Improving p.f, Phase advancing and generation of reactive KVAR using static Capacitors, Most economical p.f. for constant KW load and constant KVA type loads, Numerical Problems.

Dependency of Voltage on Reactive Power flow, Methods of Voltage Control, Shunt Capacitors, Series Capacitors, Synchronous Capacitors, Tap changing and Booster Transformers

**UNIT-II ECONOMIC ASPECTS OF POWER GENERATION AND TARIFF METHODS:**

Load curve, Load duration and integrated load duration curves, Load, Demand, Diversity, Capacity, Utilization and plant use factors, Numerical Problems, Costs of Generation and their division into Fixed, Semi - fixed and Running Costs. Desirable Characteristics of a Tariff Method, Tariff Methods, Flat Rate, Block-Rate, Two-part, Three –part and power factor tariff methods and Numerical Problems.

**UNIT - III SUBSTATIONS & GROUNDING:**

Classification of Substations, Air insulated substations, Indoor & Outdoor substations, Substations layout showing the location of all the substation equipment, Bus bar arrangements in the sub-stations, Simple arrangements like single bus bar, sectionalized single bus bar, and Main and transfer bus bar system with relevant diagrams.

**Gas insulated substations (GIS):** Advantages of Gas insulated substations, Single line diagram of gas insulated substations, Comparison of Air insulated substations and Gas insulated substations.

**NEUTRAL GROUNDING:**

Grounded and Ungrounded Neutral Systems, Effects of Ungrounded Neutral on system performance, Methods of Neutral Grounding, Solid, Resistance, Reactance, Arcing Grounds.

**UNIT – IV SHORT CIRCUIT ANALYSIS:**

Per Unit System of Representation, Per Unit equivalent reactance network of a three phase Power System, Numerical Problems.

**SYMMETRICAL FAULT ANALYSIS**

Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors, Numerical Problems.

**UNIT-V SYMMETRICAL COMPONENT THEORY:**

Symmetrical Component Transformation, Positive, Negative and Zero sequence components: Voltages, Currents and Impedances.

Sequence Networks: Positive, Negative and Zero sequence Networks, Numerical Problems.

**UNSYMMETRICAL FAULT ANALYSIS:**

LG, LL, LLG faults with and without fault impedance, Numerical Problems

**UNIT-VI -GENERAL ASPECTS OF DISTRIBUTION SYSTEMS:**

**D.C. DISTRIBUTION SYSTEMS:**

Classification of Distribution Systems - Comparison of DC vs AC and Under-Ground vs Over - Head Distribution Systems- Requirements and Design features of Distribution Systems-Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

**A.C. DISTRIBUTION SYSTEMS:**

Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factor referred to receiving end voltage and with respect to respective load voltages.

**TEXT BOOKS**

1. A Text Book on Power System Engineering - M.L. Soni, P.V. Gupta, U.S. Bhatnagar and A. Chakraborti, Dhanpat Rai & Co. Pvt. Ltd.

2. Principles of Power Systems - V.K Mehta and Rohit Mehta S.CHAND& COMPANY LTD., New Delhi.

**REFERENCES:**

1. Electrical Power Systems - C.L. Wadhawa New Age International (P) Limited, Publishers.

2.Electrical Power Generation, Transmission and Distribution - S.N. Singh., PHI.

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**III Year B.Tech EEE - I Sem**

**CODE: 8ZC22 BASICS OF ENTREPRENEURSHIP**

**(OPEN ELECTIVE-I)**

**Course Objective:** The objective of the course is to make students understand the nature of Entrepreneurship, and its importance to business to the engineering students, which will allow them to get the required intuition and interest in starting their own start-up’s

**Course Outcomes:**

1. The students’ will acquire basic knowledge on Skills of Entrepreneurship.
2. The students’ will understand the techniques of selecting the customers through the process of customer segmentation.
3. Business Models and their validity are understood by the students’.
4. The basic cost structure and the pricing policies are understood by the students’.
5. The students’ will acquire knowledge about the project management and its techniques.
6. The students’ get exposure on marketing strategies for the Start up.

**Unit – I: Introduction to Entrepreneurship: -** Define Entrepreneurship, Entrepreneurship as a Career option, Benefits and Myths of Entrepreneurship, Success Rate of Entrepreneurs related to Experience and Family Backup, Characteristics, Qualities and Skills of Entrepreneurship, Entrepreneurial Propensity, Life as an Entrepreneur, Impact of Entrepreneurship on Economy and Society.

**Unit – II: Opportunity & Customer Analysis: -** Identify your Entrepreneurial Style, Identify Business Opportunities, Methods of finding and understanding Customer Problems, Process of Design Thinking, Identify Potential Problems, Customer Segmentation and Targeting, Customer Adoption Process, craft your Values Proportions, Customer-driven Innovation.

**Unit – III: Business Model & Validation: -** Types of Business Models, Lean approach, the Problem-Solution Test, Solution Interview Method, difference between Start-up Venture and Small Business, Industry Analysis, Identify Minimum Viable Product (MVP), Build-Measure-Lean Feedback loop, Product-market fit test.

**Unit – IV: Economics & Financial Analysis: -** Revenue sources of Companies, Income Analysis, and Costs Analysis - Product Cost and Operations Cost, basics of Unit Costing, Break Even Analysis Profit Analysis, Customer Value Analysis, different Pricing Strategies, advantages and disadvantage of various Sources of Finance, Investors Expectations, Return on Investment , Practice pitching to Investors and Corporate.

**Unit – V: Team Building & Project Management: -** Leadership Styles, Shared Leadership Model, Team Building in Venture, Role of good team in venture, Roles and Respondents, Explore collaboration tools and techniques- Brainstorming, Mind mapping. Importance of Project Management, Time Management, Workflow, Network Analysis Techniques – Critical Path Method, Project Evaluation Review Technique and Gantt chart.

**Unit – VI: Marketing & Business Regulations: -** Positioning, Positioning Strategies, building Digital presence and leveraging Social Media, Measuring effectiveness of Channels, Customer Decision-making Process, Sales Plans and Targets, Unique Sales Proposition (USP), Follow-up and close Sales. Business regulations of starting and operating a Business, Start-up Ecosystem, Government schemes.

**REFERENCES:**

1. Robert D Hisrich, Michael P Peters, Dean A Shepherd, Entrepreneurship, Sixth Edition, New Delhi, 2006.
2. Thomas W. Zimmerer, Norman M. Scarborough, Essentials of Entrepreneurship And Small Business Management, Fourth Edition, Pearson, New Delhi, 2006
3. Alfred E. Osborne, Entrepreneur’s Toolkit, Harvard Business Essentials, HBS Press, USA, 2005.
4. Madhurima Lall, Shikha Sahai, Entrepreneurship, Excel Books, First Edition, New Delhi, 2006.
5. S.S. Khanka, Entrepreneurial Development, S. Chand and Company Limited, New Delhi, 2007.
6. H. Nandan, Fundamentals of Entrepreneurship, Prentice Hall of India, First Edition, New Delhi, 2007.
7. S.R. Bhowmik, M. Bhowmik, Entrepreneurship-A tool for Economic Growth   And A key to Business Success, New Age International Publishers, First Edition, (formerly Wiley Eastern Limited), New Delhi, 2007.

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**III Year B.Tech EEE - I Sem**

**CODE: 8ZC05 BANKING OPERATIONS, INSURANCE AND RISK MANAGEMENT**

**(OPEN ELECTIVE-I)**

**Course Objective:** To make the students understand the concepts and principles of Indian Banking Business, Insurance Business and Capital market business products and services, which facilitate them to understand the nature of market

**Course Outcomes:**

1. Describe the new dimensions and products served by the banking system in INDIA.
2. Explain the credit control system and create awareness on NPA’s
3. Apply the knowledge of Insurance concepts in real life scenarios
4. Recognize the importance of regulatory and legal frame work of IRDA
5. Identify the risk management process and methods.
6. Calculate the diversity of risk and return

**UNIT I: INTRODUCTION TO BANKING BUSINESS:**

Introduction to financial services - History of banking business in India, Structure of Indian banking system: Types of accounts, advances and deposits in a bank. KYC norms, New Dimensions and products- E-Banking: Mobile-Banking, Net Banking, Digital Banking, Negotiable Instruments: Cheque system.

**UNIT II: BANKING SYSTEMS AND ITS REGULATION:**

**Banking Systems:** Branch Banking, Unit Banking, Correspondent Banking, Group Banking, Deposit Banking, Mixed Banking and Investment Banking - Banking Sector Reforms with special reference to Prudential Norms, Capital Adequacy Norms, Classification of Assets and NPA’s, Functions of RBI, Role of RBI in regulating Indian Banking. Banking Ombudsman scheme.

**UNIT III: INTRODUCTION TO INSURANCE:**

Introduction to insurance, Need and importance of insurance, principles of insurance, characteristics of insurance contract, branches of insurance and types of insurance: Life insurance and its products, General Insurance and its variants.

**UNIT IV: INSURANCE BUSINESS ENVIRONMENT:**

Procedure for issuing an insurance policy –Nomination - Surrender Value - Policy Loans – Assignment - Revivals and Claim Settlement; Insurance as a tax mitigation tool, Role of IRDA in Insurance Regulation.

**UNIT V: FINANCIAL MARKETS AND RISK MANAGEMENT:**

Introduction to Financial Markets: Money Market – Capital market; Introduction to Risk Management, meaning and classification of risks, Risk management process, Risk Management Approaches and Techniques.

**UNIT VI: DERIVATIVES AS A RISK MANAGEMENT TOOL:**

Introduction to Financial Derivatives, Advantages of Derivatives - types of Derivative Contracts - Forwards, Futures, Options and Swaps - Differences among Forwards, Futures and Option Contracts.

**References:**

1. Varshney, P.N., Banking Law and Practice, Sultan Chand & Sons, New Delhi.
2. General Principles of Insurance Harding and Evantly
3. Mark S. Dorfman: Risk Management and Insurance, Pearson, 2009.
4. Scott E. Harringam Gregory R. Nichanus: Risk Management & Insurance, TMH, 2009.
5. Geroge E. Rejda: Principles of risk Management & Insurance, 9/e, pearson Education. 2009.
6. G. Koteshwar: Risk Management Insurance and Derivatives, Himalaya, 2008.

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**III Year B.Tech EEE - I Sem**

**CODE: 8ZC25 BASICS OF INDIAN ECONOMY**

**(Common to all Branches)**

**(OPEN ELECTIVE-I)**

**Course objectives:** To provide basic knowledge relating to the Indian Economy thus making the students aware of the current aspects taking place in the Indian and world economy.

**Course Outcomes**:

1. Gain knowledge relating to Economics, various sectors and its growth
2. Will gain knowledge relating to various concepts of National income and related aggregates
3. Students will learn about Indian Industrial policy and benefits of LPG to India
4. Comprehend knowledge relating to Fiscal policy & Taxation system in India
5. Learn about inflation & business cycles.
6. Know about the BoP and its influence on economy.

**UNIT 1:** **INTRODUCTION TO ECONOMICS**:

Definition, Economics and economy, back ground of economy, sectors of the economy, types of economy, growth of economy, primary moving force of Economic growth in India, mixed economy.

**UNIT 2: NATIONAL INCOME AND RELATED AGGREGATES**

Aggregates related to National Income: Gross National Product (GNP), Net National Product (NNP), Gross and Net Domestic Product (GDP and NDP) - at market price, at factor cost; National Disposable Income (gross and net), Private Income, Personal Income and Personal Disposable Income; Real and Nominal GDP.

**UNIT 3: INDUSTRIAL POLICY & LIBERALIZATION OF ECONOMY**

Industrial policy in India, its objectives, Review of Industrial policies up to 1986, Industrial policy 1991 - causes of its implementation, benefits of Liberalization, privatization & Globalization to the Indian economy.

**UNIT 4: FISCAL POLICY & TAXATION SYSTEM**

Fiscal policy- Definition, objectives, importance, setbacks, recent fiscal policy of India, Reforms to strengthen the fiscal policy in India. Taxation system in India, methods of taxation, a good tax system, VAT, GST, Reforms in taxation.

**UNIT 5: INFLATION & BUSINESS CYCLES**:

Inflation – Definition, types, effects of inflation on various segments of the population and sectors of the economy, measures to control inflation, Business cycles: Introduction, Depression, Recovery, Boom, and Recession.

**UNIT 6: BALANCE OF PAYMENTS**

Balance of payments account - meaning and components; balance of payments deficit-meaning. Foreign exchange rate - meaning of fixed and flexible rates and managed floating. Determination of exchange rate in a free market

**REFERENCES:**

1. Indian Economy, Datt & Mahajan, 70th Edition, Sultan Chand publishers.
2. Indian Economy, Misra & Puri, 33rd Edition, Himalaya publishing house.
3. Latest Budget document by Ministry of Finance
4. Latest Economic survey
5. 12th Five year plan
6. News articles in The Hindu, The Business Line

**III year B.Tech – I Sem**

**IC APPLICATIONS LAB**

**Code: 8CC76**

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**Prerequisites:** EDC, ECA, STLD.

**Course Objectives:**

The objectives of this course are

* To Design and analyze the various circuits and systems using IC 741 op-amp.
* To Design and analyze the various circuits and systems using Digital ICs.

**Course Outcomes**: After studying this course, the students will be able to

* An ability to explore the applications of IC 741 OP-AMP.
* An ability to design Active filters and its applications
* An ability to understand and implement generate square and Triangular waveforms using 555 Timers
* An ability to design D to A converters and its applications

***Mapping of Course Outcomes with Program Outcomes***

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***Syllabus Content***

**(IC Application Lab)**

**Design and testing of**

1. OP AMP Modes(-ve feed back) – Inverting ,Non inverting, Differential amp, Unity gain.
2. OP AMP Applications – Adders, Subtractor.
3. OP AMP Applications – Comparator Circuits.
4. OP AMP Applications – clipper Circuits.
5. Square wave generator using OP AMP
6. Triangular wave generator using OP AMP
7. Active Filter Applications – LPF, HPF (first order)
8. Oscillators-RC phase shift , wein bridge.
9. IC 555 Timer – Monostable
10. IC 555 Timer -Astable .
11. 4 bit DAC using OP AMP.
12. IC 723 voltage regulator

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**III year B.Tech – I Sem**

**Code: 8A575 LINEAR CONTROL SYSTEMS AND SIMULATION LAB**

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**Course Outcomes:** After completing this course, student shall be able to

* + - 1. An ability to explore the applications of control systems.
      2. An ability to explore the concepts of control systems.

**The following experiments are to be conducted:**

1. Time response of Second order system

2. Characteristics of Synchro

3. Programmable logic controller – Study and verification of truth tables of logic gates, simple

Boolean expressions and application of speed control of motor.

4. Effect of feedback on DC servo motor

5. Transfer function of DC motor

6. Lag and lead compensation – Magnitude and phase plot

7. Characteristics of magnetic amplifiers

8. Characteristics of AC servo motor

9. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.

10. Linear system analysis (Time domain analysis, Error analysis) using MATLAB and State space model for classical transfer function using MATLAB

11. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using MATLAB

**REFERENCE BOOKS:**

1. Simulation of Electrical and electronics Circuits using PSPICE –M.H. Rashid, M/s PHI Publications.

2. PSPICE A/D user’s manual – Microsim, USA.

3. MATLAB and its Tool Books user’s manual and – Mathworks, USA.

**III year B.Tech – I Sem**

**Code: 7586 SUMMER INDUSTRY INTERNSHIP – I**

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## *Course Objectives:*

To enhance the knowledge on selecting a project, learn related tools and enhance programming and communication skills for employability.

**Pre-Requisites:** All Courses till this semester

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

* Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
* Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
* Inculcate an enthusiasm to use the creative ideas to build the innovative projects and prototypes which are meeting the current needs of the market and society as a whole.
* Improve their communicative skills and team skills largely improve.
* Work as an individual and in a team.

A summer industry internship project shall be carried out by a group of students consisting of 2 to 3 in number during summer third year first semester at industries. This work shall be carried out under the guidance of the faculty assigned as internal guide as well as external guide at industry where students are carrying out summer industry internship project. Project shall consist of design, fabrication, software development or building of prototype. This can be of interdisciplinary nature also.

There will be 100 marks in total with 30 marks of internal evaluation and 70 marks of external

The **internal evaluation** shall consist of:

Day to day work (internal guide 10M

external guide : 5M) : 15 marks

Report : 05 marks

Demonstration / presentation (internal presentation

is evaluated by HOD, senior faculty and internal guide) : 10 marks

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30 marks

End examination : 70 Marks.

External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the internal guide.

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**III Year B.Tech – I Sem**

**Code: 7A595 TECHNICAL SEMINAR-V**

**COURSE OUTCOMES:**

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| 1 | Deliver lecture on emerging technologies. |
| 2 | Explain domain knowledge to resolve real time technical issues |
| 3 | Demonstrate ability to lead and explain concepts and innovative ideas. |
| 4 | Demonstrate team leading qualities. |
| 5 | Demonstrate public speaking and lifelong learning skills for higher studies and to pursue professional practice. |
| 6 | Exchange new information that would not have been available otherwise. |
| 7. | Develop debating and interview skills. |

**Procedure**:

1. Seminar in-charges shall highlight the significance of Technical Seminar in the first two sessions and enlighten the students on the utility of these seminars.
2. The slots, titles shall be decided upfront and seminar In-charge shall take signatures from students.
3. The same sheet shall be affixed in the respective classrooms and seminar register.
4. If any student fails to present his/her seminar on the given slot, to genuine reasons, they may be asked to present in the subsequent slot / week.
5. Progress of the seminars needs to be reviewed by the concerned HOD once in 15 days.
6. The evaluation for Technical Seminars has to be informed to students and displayed in the classrooms.
7. Report and presentation must contain topic, introduction, explanation, diagrams, tables, applications and conclusions.

**Distribution of Marks**

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| Day to day progress of the work | 15 marks |
| Final report and viva | 15 marks |
| Level of content | 20 marks |
| Presentation | 20 marks |
| Discussion & Involvement | 20 marks |
| Attendance | 10 marks |
| Total | 100 Marks |

**III year B.Tech – II Sem**

**Code: 8DC05 MICROPROCESSOR AND MICROCONTROLLERS**

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***Course Objectives:*** *In this course the student will learn*

1. *The microprocessor and microcontroller architecture, instructions set and procedures of programming.*
2. *Understand the assembly language programs, pin diagram and timing diagrams for 8086 & 8051.*
3. *Understand and practice the interfacing related applications of 8255 with 8086 and serial communication.*
4. *Learn the usage of multiple interrupts of 8051, USART architecture, RS232.*

***Course Outcomes:****After completing this course****,*** *Students will be able to*

1. *Understanding the concepts of 8086 Architecture*
2. *Understanding the concepts of Instruction set & developing skills in writing assembly language programs.*
3. *Ability to interface keyboard, stepper motor ADC, DAC to 8086 using 8255*
4. *Understanding the concepts of 8051 Architecture*
5. *Exploring the concepts of instruction set of 8051*
6. *Ability to interface LED, LCD, Keyboard DAC, ADC with 8051*

**UNIT – I: ARCHITECTURE OF 8086 MICROPROCESSOR:**

Memory segmentation, BIU and EU. General purpose registers. 8086 flag register and function of 8086 Flags. Pin diagram of 8086-Minimum mode and maximum mode of operation. Timing Diagram.

**UNIT – II: INSTRUCTION SET OF 8086:**

Addressing modes of 8086. Assembler directives. Simple programs, procedures, and macros. Assembly language programs involving logical, Branch & Call instructions, sorting, evaluation of arithmetic expressions, string manipulation. Introduction to DOS and BIOS interrupts.

***Applications: Design of an 8-bit Calculator***

**UNIT – III: INTERFACING WITH 8086:**

Interfacing with RAMs, ROMs along with the explanation of timing diagrams. 8255 PPI – various modes of operation. Interfacing with key boards, ADCs, and DACs Stepper Motor .Interrupt structure of 8086. Vector interrupt table. Interrupt service routines. 8259 PIC Architecture and interfacing cascading of interrupt controller and its importance.

***Applications: Interfacing of a Temperature sensor with 8086***

**UNIT – IV: THE 8051 ARCHITECTURE:**

Architecture of 8051 Micro controller, Memory Organization. Special Function Registers. Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts.

**UNIT – V: INSTRUCTION SET OF 8051:**

Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic, Jump and Call Instructions, Simple programs.

Programs based on Timer Interrupts, External Hardware Interrupts, Serial communication interrupts Timers and counters..

**UNIT – VI: APPLICATIONS OF 8051:**

Interfacing with keyboards, LEDs, 7 segment LEDs, LCDs, Interfacing with ADCs. Interfacing with DACs, Concept of Multiple Interrupts.

**TEXT BOOKS:**

1. Advanced microprocessor & Peripherals - A.K.Ray & K.M.Bhurchandi, TMH, 2000.
2. Microprocessors and interfacing – Douglas V. Hall, TMH, 2nd Edition, 1999.
3. 8051 Microcontroller–Kenneth J. Ayala, Penram International/ Thomson, 3rd Edition, 2005.
4. The 8051 Microcontroller And Embedded Systems Using Assembly And C – Mazidi, Pearson Education India, 2nd edition, 2008.

**REFERENCES:**

1. Micro computer systems, The 8086/8088 Family Architecture, Programming and Design – Y.Liu and G.A. Gibson, PHI, 2nd Edition.
2. 8051 Micro Controllers and Embedded Systems – Dr. Rajiv Kapadia, Jaico Publishers.

**III year B.Tech – II Sem**

**Code: 8A611 SWITCH GEAR AND PROTECTION**

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**Course Outcomes:**

1. Understand about power system transients and its effects.
2. Learn about protection against over voltages.
3. Learn about different types of circuit breakers and its importance.
4. Learn about different types of electromagnet relays.
5. Learn about different types of static relays.
6. Learn about generator, transformer and feeder protection.

**UNIT –I POWER SYSTEM TRANSIENTS**

Types of System Transients - Traveling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical Problems). Bewley’s Lattice Diagrams (for all the cases mentioned with numerical examples).

**UNIT – II PROTECTION AGAINST OVER VOLTAGES:**

Generation of Over Voltages in Power Systems, Protection against Lightning Over Voltages ,Valve type and Zinc-Oxide Lighting Arresters, Insulation Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt-Time Characteristics.

**UNIT – III CIRCUIT BREAKERS:**

Elementary principles of arc interruption, Restriking Voltage and Recovery voltages, Restriking Phenomenon, Average and Max. RRRV, Numerical Problems, Current Chopping and Resistance Switching, Types and Numerical Problems, Auto recloser’s.

Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum and SF6 circuit breakers. CB ratings and Specifications.

**UNIT – IV ELECTROMAGNETIC RELAYS:**

Principle of Operation and Construction of Attracted armature, Balanced Beam, Induction Disc and Induction Cup relays. Relays Classification, Instantaneous, DMT and IDMT types, Application of relays, over current, under voltage relays, Directional relays, Differential relays and Percentage Differential Relays.

Universal torque equation, Distance relays, Impedance, Reactance, Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison

**UNIT – V STATIC RELAYS:**

Static Relays, Static Relays verses Electromagnetic Relays. Amplitude and phase comparators, coincidence type phase comparators, static over current relay, definite over current relay, static directional over current relay, static impedance relay, static reactance relay, advantages and disadvantages of static relays, Microprocessor based relays.

**UNIT – VI GENERATOR, TRANSFORMER, FEEDER AND BUS-BAR PROTECTION:**

Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter turn fault Protection. Numerical Problems on % Winding Unprotected.

Protection of transformers, Percentage Differential Protection, Numerical Problem on Design of CT s Ratio, Buchholtz relay Protection.

Protection of Lines, Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay. Protection of Bus bars, Differential protection.

**TEXT BOOKS:**

1. Electrical Power Systems – C.L.Wadhwa, New Age international (P) Limited, Publishers, 3rd edition.

2. Protection and Switchgear- Bhavesh Bhalja, R. P. Maheshwari, N.G. Chothani, Oxford University Press, 1st edition.

3. Power System Protection and Switchgear – Badri Ram, D.N Viswakarma, TMH Publications.

**REFERENCES:**

1. Fundamentals of Power System Protection –Paithankar and S.R.Bhide.,PHI.

2. Art & Science of Protective Relaying – C R Mason, Wiley Eastern Ltd.

3. Switchgear and Protection – Sunil S Rao, Khanna Publlishers

4. A Text book on Power System Engineering – B.L.Soni, Gupta, Bhatnagar, Chakrabarthy, Dhanpat Rai & Co.

**III year B.Tech – II Sem**

**Code: 8A612 MEASUREMENTS & INSTRUMENTATION**

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**Course Objective:**

The basic principles of all measuring instruments and in measurement of electrical and non-electrical parameters viz., Resistance, Inductance, Capacitance, voltage, current Power factor, Power, Energy, Strain, Temperature, Torque, Displacement etc. and the different types of electrical and non electrical transducers. It introduces the different signal analyzers and oscilloscopes.

**Course Outcomes:** The student should be able to

1. Understand the principle of operation of different types of instruments viz., PMMC, moving iron type of instruments, the required characteristics of an instrument in general. The student demonstrates the ability to compensate for the errors in the instruments and to extend the range of the instruments.
2. Demonstrates the knowledge of Potential and Current transformers; the errors in them and the effect of having an open/short in the secondary circuits; Understand the principle of operation of Dynamometer and Moving-iron type of Power factor meters.
3. Comprehends the principle of operation of dynamometer type of Wattmeter and Induction type of Energy meter; use the wattmeter to measure the Active and Reactive power and demonstrates the ability to extend the range of them.
4. Identify and use different techniques of measurement of Resistance, Inductance and Capacitance values.
5. Understand the principle of operation of Different type of digital voltmeters, wave analyzers, spectrum analyzers and Cathode ray Oscilloscope.
6. Demonstrates the ability in characterizing the different types of transducers and uses them to measure Strain, Gauge Sensitivity, Displacement, Velocity, Acceleration, Force, Torque and Temperature.

**UNIT-I MEASURING INSTRUMENTS- INSTRUMENT TRANSFORMERS:**

Significance of Measurement, static characteristic of system- Linearity, Sensitivity, Precision, Accuracy - Classification - Deflecting, Control and Damping torques, Ammeters and Voltmeters, PMMC, Moving iron type instruments, Expression for the Deflecting torque and Control torque, Errors and Compensations, Extension of range using Shunts and Series resistance.

**UNIT –II: INSTRUMENT TRANSFORMERS**

Introduction, advantages, burden of instrument transformer, Current Transformer - errors in current transformer, Effect of secondary open circuit, Potential transformer- errors in potential transformer, Testing of current transformers with silsbee’s method.

Power Factor Meters: Type of P.F. Meters, Dynamometer and Moving iron type, 1- ph and 3-ph meters.

**UNIT –III MEASUREMENT OF POWER& ENERGY:**

Single phase dynamometer wattmeter-LPF and UPF-Double element and three element dynamometer wattmeter, Expression for deflecting and control torques, Extension of range of wattmeter using instrument transformers, Measurement of active and reactive powers in balanced and unbalanced systems, Single phase induction type energy meter, Driving and braking torques, Testing by phantom loading, Three phase energy meter .

**UNIT - IV MEASUREMENT OF RESISTANCE - MAGNETIC MEASUREMENTS- A.C. BRIDGES:**

Principle and operation of D.C. Crompton’s potentiometer, Standardization, Measurement of unknown resistance, current, voltage. Method of measuring low- Medium and High resistance, sensitivity of Wheatstone’s bridge, Carey Foster’s bridge, Kelvin’s double bridge for measuring low resistance, Measurement of high resistance, loss of charge method, Measurement of inductance, Quality Factor, Maxwell’s bridge, Hay’s bridge, Anderson’s bridge, Owen’s bridge. Measurement of capacitance and loss angle, Desauty Bridge, Wien’s bridge, Schering Bridge.

**UNIT-V DIGITAL VOLTMETERS- SIGNAL ANALYZERS- CRO:**

Digital voltmeters, Successive approximation, Ramp, Dual slope integration continuous balance type, Wave Analyzers, Frequency selective analyzers, Heterodyne, Application of Wave analyzers, Harmonic Analyzers, Total Harmonic distortion, spectrum analyzers, Basic spectrum analyzers, Spectral displays, Q meter and RMS voltmeters . CRO- Cathode Ray Tube (CRT), Screens, Probes, Applications of CRO, Measurement of frequency and phase using CRO, Block diagram.

**UNIT-VI MEASUREMENT OF NON-ELECTRICAL QUANTITIES:**

Transducers - Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers, Principle operation of Resistor, Inductor, LVDT and Capacitor transducers, LVDT Applications, Strain gauge and its principle of operation, Guage factor- Thermistors, Thermocouples, Piezo electric transducers, Photovoltaic, Photo conductive cells. Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Acceleration, Force, Torque, Measurement of Temperature.

**TEXT BOOKS:**

1. Electrical Measurements and measuring Instruments – E.W. Golding and F.C. Widdis, 5th Edition, Wheeler Publishing.

2. Transducers and Instrumentation– D.V.S Murthy, Prentice Hall of India, 2nd Edition.

3. A course in Electrical and Electronic Measurements and Instrumentation -A.K. Sawhney, Dhanpatrai & Co. 18th Edition.

**REFERENCES:**

1. Measurements Systems, Applications and Design – D O Doeblin- Tata MC Graw-Hill.

2. Principles of Measurement and Instrumentation – A.S Morris, Pearson /Prentice Hall of India.

3. Electronic Instrumentation- H.S. Kalsi Tata MC Graw – Hill Edition, 3rd Edition.

4. Modern Electronic Instrumentation and Measurement techniques – A.D Helfrick and W.D.Cooper, Pearson/Prentice Hall of India.

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**III Year II semester**

**CODE: 7FC03 PYTHON PROGRAMMING**

**(Common to all Branches)**

**(OPEN ELECTIVE-II)**

**Course Objectives:-**

After taking this course, you should be able to:

Use Python interactively, execute a Python script at the shell prompt, use Python types, expressions, and None, use string literals and string type, use Python statements (if...elif..else, for, pass, continue, . . . ), understand the difference between expressions and statements, understand assignment semantics, write and call a simple function., utilize high-level data types such as lists and dictionaries, understand the difference between mutable and immutable types, write a simple class and access methods and attributes, import and utilize a module, read from and write to a text file.

**Course Outcomes:**

CO1: Gains exposure towards Python versions and their specifications.

CO2: Build programs using primitive data types.

CO3: Write applications that include functions, modules, packages along with respective exceptional handling mechanism.

CO4: Writes applications using OO features of Python

CO5: Write applications using Files.

CO6: Hands on exposure on NumPy/Tkinter/Plotpy modules.

**UNIT -I:** **INTRODUCTION TO PYTHON:**

History, Features, Modes of Execution, Setting up path, working with Python Basic Syntax, Variable and Data Types, Operators. Conditional Statements (If, If- else, Nested if-else) Looping (for, While Nested loops) Control Statements (Break, Continue, Pass).

**Input-Output:** Printing on screen, Reading data from keyboard, Opening and closing file

**UNIT-II: FUNCTIONS:**

Defining a function, calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables

**String Manipulation**: Accessing Strings, Basic Operations, String slices, Function and Methods

**Lists:** Accessing list, Operations, Working with lists Function and Methods

**Tuple:** Accessing tuples, Operations, Working.

**Dictionaries:** Accessing values in dictionaries, working with dictionaries, Properties Functions and Methods.

**UNIT-III:** **MODULES:**

Importing module, Math module, Random module, Packages

**Exception Handling:** Exception, Exception Handling, except clause, Try? Finally clause User Defined Exceptions

**Unit-IV:** **Python- OOPs concept:**

Class and object, Attributes, Inheritance, Overloading Overriding, Data hiding.

**Regular expressions**: Match function, Search function, Matching VS Searching, Modifiers Patterns.

**Unit -V**:

Introduction to Files, File Handling, Working with File Structure, Directories, Handling Directories

**Unit -VI:**

Case Study with NumPy/PlotPy/SciPy/GUI Programming, Introduction, Tkinter programming, Tkinter widgets

**TEXT BOOK:**

1. [Apress]-Beginning Python. From Novice to Professional, 2nd ed. - [Hetland] (2008)

**REFERENCE BOOKS:**

1. Introduction to Computation and Programming using Python, Revised and Expanded Edition, John V. Guttag, The MIT Press.

2. Programming Python, Fourth Edition by Mark Lutz, O'Relly

3. Python Programming using problem solving approach, Reema Thareja, Oxford Higher Education.

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**L T P/D C**

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**B. Tech. IV Year I semester**

CODE: **8ZC23 ADVANCED ENTREPRENEURSHIP**

**(Common to all Branches)**

**(OPEN ELECTIVE – III)**

**Course Objective:**

The course is designed to impart the necessary managerial skills and tactics required for an emerging Entrepreneur for the Engineering students to enhance their prospects as an Entrepreneur.

**Course Outcomes:**

1. The Students’ gain knowledge on the stages of Startup and the turbulence environment it undergoes and the stages related to growth of the Startup.
2. The Students are exposed to the various business models and critically evaluating the effectiveness of the business models.
3. The students understand the method of business traction and the need of customer relationship management.
4. The students understand the various channels of revenue building and exploration of new revenue avenues.
5. The students understand the need of sales planning and sales management and also financial modeling
6. The students are exposed to the legal implications affecting the company’s prospects and the issues related to intellectual property rights.

**UNIT – I ORIENTATION TO GROWTH:**

Stages of a Startup Company, Infant Mortality of Startup’s, Sustaining the Phase of Launching, Entrepreneurial Propensity, Locus of Control, First Generation Entrepreneur, Growth Opportunities, Diversification and Expansion of Business, Growth Assessment, SWOT Analysis, Growth strategies adopted by ideal startup, Ansoff Growth Matrix, Six ways of Adjacencies for Growth. Case Study of Nike

**UNIT - II - EXPANDING CUSTOMER BASE:**

Customer Segmentation: Division of Market into Segments, Evaluating the profitability of Segments. Developing Business Model in relation to the current customers. Changing customer segments and revisit of business models. Evaluation of Business Models for new customer segments. Critical evaluation of business models Old Vs New. Risk of changing the Business Models. Analyzing the scalability of business model using Break Even Analysis.

**UNIT- III - TRACTION OF BUSINESS:**

Meaning of Business Traction, Business Traction Process, and Metrics to Measure Business Traction, Customer Retention, Customer Churning, Relationship Business, Customer Life Time Value, Identifying the unnecessary moves in business traction. Traction of Business using Bull’s-eye framework. Measuring the effectiveness of selected channels. Budgeting and Planning.

**UNIT- IV - GROWING REVENUES:**

Identifying Growing Revenues, stabilizing growing revenues, Developing additional revenues (licensing and franchising). Exploring New channels and Partnerships for growth revenues. Evaluating the Growth streams based on longevity. Lean Startup Canvas.

**UNIT V - SALES PLANNING & FINANCIAL MODELING:**

Understanding the consumer buying decision behavior, setting sales plans, sales targets, Art of pitching the sales, Selling process, Building a professional sales team , Sales Management. Price Sensitivity of the market. Optimization of cost and operational expenses. Financial modeling of the Venture, Assessment of competitors and Peer’s financial models.

**UNIT –VI - SUPPORT SYSTEM:**

Legal Management in Startups: Issues and Legal constraints effecting the business. Need for professional services: Legal consultancy and Accounting. Need for proper documentation for fool-proof administration of business. Intellectual Property rights and their importance. Business Mentoring, role of experts in managing business.

**REFERENCES:**

1. Entrepreneurship Rajeev Roy oxford ,2012
2. Entrepreneurship Development Khanka, ,S.Chand 2012
3. Small Scale industries and Entrepreneurship Vasanth Desai , Himalya publishing 2012
4. Robert Hisrich et al “enterpreneruship TMH 2012
5. Entrepreneurship Development Khanka, ,S.Chand 2012
6. Entrepreneurship Development B.Janikairam and M Rizwana

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**III Year II semester**

**CODE: 8ZC19 ENTREPRENEURSHIP, PROJECT MANAGEMENT AND STRUCTURED FINANCE**

**(OPEN ELECTIVE-II)**

**Course Objective:** The objective of the course is to make students understand the nature of Entrepreneurship, its importance and to create an awareness regarding the systematic planning and implementation of projects; highlight the components of structured finance and establish a framework of CMBS with respect to Servicing Agreements

**Course Outcomes:**

1. Students will understand the nature of Entrepreneurship and its importance
2. Will gain knowledge regarding project, its life cycle and organization
3. Will gain knowledge relating to project formulation and implementation
4. Comprehend the components of structured finance
5. Establish a framework of CMBS
6. Students will gain knowledge relating to the CRE Servicing

**UNIT I: CONCEPTS OF ENTREPRENEURSHIP:**

Definition of Entrepreneurship, Evolution of Entrepreneurship, Classification of Entrepreneurs**,** Characteristics of Entrepreneur**,** Selection of Product and the means required for starting an enterprise, Financing and Financial incentives available, Success rate of entrepreneurs – a case study.

**UNIT-II: BASICS OF PROJECT MANAGEMENT:**

Concept and characteristics of a project - types of projects - Objectives of project management - Project Organizational structure - Project life cycle - Challenges and problems of project management - Qualities & functions of a project manager.

**UNIT III: PROJECT FORMULATION AND IMPLEMENTATION:**

Generation of Project Ideas; Monitoring the environment; Preliminary Screening of Projects; Feasibility study; Project Selection. Detailed Project Report: Market, Technical, Financial and Economic aspects. Pre-requisites for Successful Project Implementation; Control of in-progress Projects (Gantt chart, PERT, CPM); Project Risk Management Process, Post-audit; Abandonment Analysis

**UNIT-IV: INTRODUCTION TO STRUCTURED FINANCE**:

Term Loans, Bonds/Debentures, Types of debentures, Issue of debt instruments. Structured Finance: Evolution, Securitization process, characteristics, and structured finance products (ABS, CDO, MBS, CDS)

**UNIT-V: COMMERCIAL MORTAGAGE LOAN BASICS**:

Definition and characteristics of CMBS, CMBS Vs other Mortgage Backed Securities, CMBS three level perspective: property level, loan level, bond level; Life cycle of commercial real estate loans – Loan cycle, Key players in loan cycle; Property types and characteristics, property performance.

**UNIT- VI: BASICS OF CRE SERVICING:**

Introduction to servicing, Role of the Servicer, Servicing approaches, Influence of technology, Ethics in commercial servicing, Servicing – sources of income, Overview of servicing agreements, Pooling & Servicing agreement, Sub servicing agreement.

**REFERENCES:**

1. H. Nandan, Fundamentals of Entrepreneurship, Prentice Hall of India, First Edition, New Delhi, 2007.
2. Jeffrey K. Pinto “Project Management”, 2nd edition, Pearson
3. Dhandapani Alagiri “Structured Finance – Concepts & Perspectives”, ICFAI University press.
4. Projects by Prasanna Chandra, McGraw-Hill Publishing Co. Ltd
5. Project Management: Systems approach to Planning Scheduling and Controlling, H. Kerzner.
6. The Complete Real Estate Documents by Mazyar M. Hedayat, John J. Oleary
7. The Fundamentals of Listing and Selling Commercial Real Estate - By Keim K. Loren (Author)

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**III Year II semester**

**CODE: 8ZC26 BASICS OF POLITY AND ECOLOGY**

**(Common to all Branches)**

**(OPEN ELECTIVE-II)**

**Course Objectives:**

To provide basic knowledge relating to the Ecology and Disaster Management, thus making the students appreciate the current aspects related to both Ecology and Disaster Management.

**Course outcomes:**

**CO1:** Comprehend knowledge relating to the conservation of the environment.

**CO2:** Learn about bio-diversity and climatic changes occurring in the environment.

**CO3:** Know about the international treaties, conventions and organizations active in the field of environmental protection.

**CO4**: To provide students an exposure to disasters, their significance and types.

**CO5**: To enhance awareness of institutional processes in the country

**CO6**: To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)

**UNIT I: ECOLOGY AND ENVIRONMENT:**

Environment-Origin, Evolution of Environment and its uses by Humans; Degradation of Natural Environment, Principles of Ecology; Composition and various types of Ecosystem; International Solar Alliance.

**UNIT II: BIO-DIVERSITY AND CLIMATE CHANGE:**

Classification of Biodiversity, Biodiversity loss, Methods of biodiversity conservation, Conservation of Natural Resources such as Soil, Land, Water and Energy. Sustainable Development and Cleaner Technology. Green house effect and Global Warming, Strategies to cope with Green House Effect, Desertification, Depletion of ozone layer.

**UNIT III: INTERNATIONAL TREATIES, CONVENTIONS & ORGANIZATIONS:**

Indian Board for Wildlife (IBW). United Nations Environmental Programme (UNEP), United Nations Framework Convention for Climate Change (UNFCCC). International Union for conservation of Nature and National Resources (IUCN), World Wide Fund for Nature (WWF).Montreal Protocol (1987), Kyoto Protocol (1997), Paris Agreement (2016).

**Unit IV: INTRODUCTION TO DISASTERS:**

Concepts and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks) Disasters – Classification, Causes, Impacts (including social, economic, political, environmental, health, psychosocial, etc.). Differential impacts – in terms of caste, class, gender, age, location, disability

**Unit V: DISASTER MANAGEMENT IN INDIA:**

Hazard and vulnerability profile of India. Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management; Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programs and legislation); Case studies.

**Unit VI: APPROACHES TO DISASTER RISK REDUCTION:**

Disaster cycle – its Analysis, Phases. Culture of safety, prevention, mitigation and preparedness; Community-based DRR: Structural and nonstructural measures, roles and responsibilities of community, Panchayati Raj Institutions / Urban Local Bodies (PRIs / ULBs), district administration, states, centre, and other stakeholders; Case studies.

**ESSENTIAL READINGS:**

* Environment and Ecology – Anil Kumar De and Arnab Kumar De, 2009, New Age International (P) Ltd.
* B. K. Khanna: “Disasters: All you wanted to know about”, New India Publishing Agency, New Delhi
* Amita sinvhal ,”Understanding earthquake disasters”TMH,2010

**SUGGESTED READINGS:**

* ICSE Environment Education for Class X – Dr. M.P. Mishra , 2009, S.Chand and Company
* Pradeep sanhi,Madhavi malalgoda and arya bandhu,”Diasaster risk reduction in south asia “PHI

**III year B.Tech – I Sem**

**Code: 8A678 POWER ELECTRONICS AND SIMULATION LAB**

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**Course Outcomes: After completing this course, student shall be able to**

1. Understand the concepts studied in theory subject.
2. Understand the applications of the concepts.

**The Experiments in Power Electronics Lab**

1. Study of Characteristics of SCR, MOSFET & IGBT

2. Gate firing circuits for SCR’s

3. Single Phase AC Voltage Controller with R and RL Loads

4. DC Jones chopper with R and RL Loads

5. Single Phase Parallel inverter with R and RL loads

6. Single Phase Cycloconverter with R and RL loads

7. Three Phase half controlled bridge converter with R-load

8. Single Phase series inverter with R and RL loads

9. PSPICE simulation of single-phase full converter using RLE loads and single-phase AC voltage controller using RLE loads.

10. PSPICE simulation of resonant pulse commutation circuit and Buck chopper.

11. PSPICE simulation of single phase Inverter with PWM control.

**REFERENCE BOOKS:**

1. Simulation of Electric and Electronic circuits using PSPICE – by M. H. Rashid, M/s PHI Publications.

2. PSPICE A/D user’s manual – Microsim, USA.

3. PSPICE reference guide – Microsim, USA.

4. MATLAB and its Tool Books user’s manual and – Math-works, USA.

**III year B.Tech – I Sem**

**Code: 8A677 ELECTRICAL MACHINES LAB – II**

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**Course Outcomes: After completing this course, student shall be able to**

* 1. Understand the concepts studied in theory subject.
  2. Understand the applications of the concepts.

**The following experiments are required to be conducted:**

1. O.C. & S.C. Tests on Single phase Transformer

2. Sumpner’s test on a pair of single phase transformers

3. Scott connection of transformers

4. No-load & Blocked rotor tests on three phase Induction motor

5. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods

6. V and Inverted V curves of a three—phase synchronous motor.

7. Equivalent Circuit of a single phase induction motor

8. Determination of Xd and Xq of a salient pole synchronous machine

9. Brake test on three phase Induction Motor

10. Regulation of three-phase alternator by Z.P.F. and A.S.A methods

**B. Tech. III Year II semester**

**Code: 8A696 GROUP PROJECT**

**L T P/D C**

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## ***Course Objectives:***

To acquire basic knowledge on selecting a project, learn related tools and enhance programming and communication skills for employability.

**Pre-Requisites:** All Courses till this semester

**Course Outcomes:**

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

* Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
* Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
* Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs of the market and society as a whole.
* Improve their communicative skills and team skills largely improve.
* Work as an individual and in a team.

A group project shall be carried out by a group of students consisting of 2 to 3 in number in third year first semester. This work shall be carried out under the guidance of the faculty assigned as internal guide and shall involve design, fabrication, software development or any other significant activity. This can be of interdisciplinary nature also.

There will be 100 marks in total with 30 marks of internal evaluation and 70 marks of external

The **internal evaluation** shall consist of:

Day to day work : 15 marks

Report : 05 marks

Demonstration / presentation : 10 marks

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30 marks

End examination : 70 Marks.

External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the supervisor.

**B. Tech. III Year II semester**

**Code: 8A686 COMPREHENSIVE VIVA- VOCE**

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## *Course Objectives:*

Prepare students in basics and advanced relevant courses to revise and face technical interviews for enhancing employability**.**

**Course Outcomes:**

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

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| 1. Assess the relevant courses they have undergone till the completion of that academic year. |
| 1. Comprehend the concepts in the core subjects and the elective subjects, to make them ready to face technical interviews which improve their employability skills. |

Comprehensive Viva Voce will be conducted in third year second semester for 100 marks. Out of 100 marks 30 marks are evaluated internally and 70 marks for external evaluation.

**Internal:**

Comprehensive Viva Voce is conducted twice in a semester and evaluated for 30 marks each and average will be considered for internal.

Internal Examination : 30 Marks

End examination : 70 Marks.

External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The end examination will be carried out by a committee consisting of an external examiner, head of the department, and subject experts.

**IV year B.Tech – I Sem**

**Code: 8A714 POWER SYSTEM ANALYSIS AND CONTROL**

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**OBJECTIVE:**

This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control and reactive power control.

**Course outcomes:**

1. Understand about importance of network matrices and usefulness in power system analysis.
2. Analyze the power system under different types of faults.
3. Analyze the power system under steady state condition for voltage and power flow calculations.
4. Analyze the power system for maintain constant frequency in single area.
5. Analyze the power system for maintain constant frequency in two area.
6. Analyze the power system for maintaining steady state and transient stability.

**UNIT -I POWER SYSTEM NETWORK MATRICES:**

Graph Theory: Definitions, Bus Incidence Matrix, YBus formation by Direct and Singular Transformation Methods, Numerical Problems*.*

**FORMATION OF ZBUS:** Partial network, Algorithm for the Modification of ZBus Matrix for addition element for the following cases: Addition of element from a new bus to reference, Addition of element from a new bus to an old bus, Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems), Modification of ZBus for the changes in network (Problems).

**UNIT – II LOAD FREQUENCY CONTROL SINGLE AREA:**

Speed governor, turbine, generator and power system simplified models, excitation system model, Necessity of keeping frequency constant. Definitions of Control area, Single area control, Block diagram representation of an isolated power system, Steady state analysis, Dynamic response, uncontrolled case.

**UNIT – III LOAD FREQUENCY CONTROL TWO AREA:**

Load frequency control of 2-area system, uncontrolled case and controlled case, tie-line bias control, Proportional plus Integral control of single area and its block diagram representation, steady state response, Load Frequency Control and Economic dispatch control.

**UNIT –IV POWER FLOW STUDIES:**

Necessity of Power Flow Studies, Derivation of Static load flow equations, Load flow solutions using Gauss Seidel Method, Acceleration Factor, Load flow solution with and without P-V buses, Algorithm and Flowchart. Numerical Load flow Solution for Simple Power Systems (Max. 3-Buses), Determination of Bus Voltages, Injected Active and Reactive Powers (Sample One Iteration only) and finding Line Flows/Losses for the given Bus Voltages.

Newton Raphson Method in Rectangular and Polar Co-Ordinates Form, Load Flow Solution with or without PV Busses, Derivation of Jacobian Elements, Algorithm and Flowchart. Decoupled and Fast Decoupled Methods, Comparison of Different Methods, DC load Flow.

**UNIT –V POWER SYSTEM STATE STABILITY ANALYSIS:**

Concepts of Steady State, Dynamic and Transient Stabilities, Steady State Stability Power Limit, Power Angle Curve and Determination of Steady State Stability and Methods to improve steady state stability, Derivation of Swing Equation, Determination of Transient Stability by Equal Area Criterion, Application of Equal Area Criterion, Critical Clearing Angle Calculation - Solution of Swing Equation: Point-by-Point Method, Methods to improve Stability, Application of Auto Reclosing and Fast Operating Circuit Breakers.

**UNIT-VI ECONOMIC OPERATION OF POWER SYSTEMS:**

Optimal operation of Generators in Thermal Power Stations, Heat rate Curve, Cost Curve, Incremental fuel and Production costs, Input-output characteristics, Optimum generation allocation with line losses neglected. Optimum generation allocation including the effect of transmission line losses, Loss Coefficients, General transmission line loss formula. Hydrothermal scheduling.

**TEXT BOOKS:**

1. Electrical Power Systems *–* C.L. Wadhwa, Newage International, 6th Edition.

*2.*  Modern Power System Analysis–I.J. Nagrath & D.P. Kothari, Tata Mc Graw Hill Publishing Company Ltd, 2nd edition.

3. Power System Analysis- T.K. Nagasarkar, M.S. Sukhija, Oxford University Press, 2nd edition.

**REFERENCES:**

1. Power System Analysis and Design *–* J. Duncan Glover and M.S. Sarma., THOMPSON, 3rd Edition.

2. Electric Energy systems Theory – O.I. Elgerd, Tata Mc Graw Hill Publishing Company Ltd., 2nd edition.

3. Power System Analysis *–* Grainger and Stevenson, Tata McGraw Hill.

4. Power System Analysis *–* Hadi Saadat, Tata Mc Graw Hill Publishing, 2nd Edition.

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**IV Year B.Tech – I Sem**

**CODE: 8A716 DRIVES & UTILIZATION OF ELECTRICAL ENERGY**

**L T P/D C**

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**Course Objective:**

This subject deals with the fundamentals of illumination and its classification and the electric heating and welding. It gives the detailed study of all varieties of Electric drives and their applications to electrical engineering.

**Course Outcomes:**

The student will able to:

1. Know the importance of different type of electric drives, selection of motor based on starting and running characteristics, required speed control, tolerance of temperature rise, Particular applications of electric drives, and understands different types of industrial loads, Continuous, Intermittent and variable loads etc.
2. Understanding about basic requirements of drives and discussed about different DC drives.
3. Discussed about different types of AC Drives.

4. Know the importance of advantages and methods of electric heating, and applications of resistance heating induction heating and dielectric heating.

5. Identify the core areas of illumination, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, and their applications & sources of light. Differentiate Discharge lamps of MV and SV lamps, tungsten filament lamps and fluorescent tubes, understands basic principles of light control, Types and design of lighting and flood lighting.

6. Understands System of electric traction and track electrification. Understand and Calculations of tractive effort, power, specific energy consumption for a given run, effect of varying acceleration and braking retardation, adhesive weight and coefficient of adhesion.

**UNIT – I DRIVE APPLICATIONS:**

Type of electric drives, Choice of motor, starting and running characteristics, Speed control, Temperature rise, Particular applications of electric drives, Types of industrial loads, Continuous, Intermittent and variable loads, Load equalization.

**Introduction to electric drives:** Advantages of Electric drives, Parts of Electrical Drives, Electric Motors, Power Modulators, Sources, Choice of Electric Drives and selection of drives for various applications.

**UNIT – II: DC DRIVES:**

**Dynamics of electrical drives:** Fundamental torque equation, components of load torque, speed-torque characteristics of loads, Nature and classification of load torques, speed-torque convention & multi- quadrant operation. Equivalent values of drive parameters, loads with rotational motion, loads with translational motion, measurement of moment of inertia, components of load torques. Steady state stability, dynamic stability, load equalization. Basic principles of closed-loop control.

**DC Motor Drives:** Speed control of DC motors using single-phase and three-phase fully controlled and half controlled rectifiers in continuous and discontinuous mode of operation. Single quadrant, two quadrant and four quadrant chopper controlled drives in continuous and discontinuous mode of operation.

**UNIT – III: AC DRIVES:**

**Induction Motor Drives:** Speed control of cage induction motor with *v/f* control; slip power recovery scheme, static Scherbius and Krammer methods. Variable frequency and variable voltage control using VSI and CSI. AC and DC dynamic breaking methods.

**Synchronous Motor Drives:** Speed control methods of synchronous motor drive.

**UNIT – IV ELECTRIC HEATING & WELDING:**

Advantages and methods of electric heating, Resistance heating induction heating and dielectric heating.

**Electric welding:**

Electric welding, resistance and arc welding, electric welding equipment, comparison between A.C. and D.C. Welding.

**UNIT – V VARIOUS ILLUMINATION METHODS**

Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light. Discharge lamps, MV and SV lamps – comparison between tungsten filament lamps and fluorescent tubes, Basic principles of light control, Types and design of lighting and flood lighting.

**UNIT – VI ELECTRIC TRACTION:**

System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor, Mechanics of train movement. Speed-time curves for different services – trapezoidal and quadrilateral speed time curves. Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and coefficient of adhesion.

**TEXT BOOKS:**

1. Utilization of Electric Power & Electric Traction - J.B. Gupta, S.K.Kataria & Sons, 9th edition.

2. Utilization of Electric Energy - E.Open Shaw Taylor Orient Longman, 2nd edition.

3. Art & Science of Utilization of electrical Energy - Partab, Dhanpat Rai & Sons, 2nd edition.

4. Fundamentals of Electric Drives – G K Dubey, Narosa Publications

**REFERENCES:**

1. Utilization of Electrical Power including Electric drives and Electric traction - N.V. Suryanarayana, New Age International (P) Limited, 1st edition.

2. Generation, Distribution and Utilization of electrical Energy - C.L. Wadhwa, New Age International (P) Limited, 1st revised edition.

3. Modern Power Electronics and AC Drives – B.K.Bose, PHI

**IV Year, B. Tech – I - Sem.**

**Code: 8CC03 SIGNALS AND SYSTEMS**

**(PROFESSIONAL Elective-I)**

**L T P C**

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After studying this course, the students will be able to

1. Understand the concepts of Signals, Classification of Signals, Signal Approximation and Orthogonal Functions.
2. Understand the concepts of Fourier series. Properties of Fourier series, Fourier Transforms and Properties of Fourier Transforms.
3. Understand the concepts of Systems, Classification of Systems, Filter Characteristics of Linear Systems, Ideal LPF, HPF and BPF Characteristics and Relationship between Bandwidth and Rise Time.
4. Understand the Concept of Convolution in Time Domain and Frequency Domain, Convolution Properties., Cross Correlation and Auto Correlation of Functions, Laplace Transforms, inverse Laplace Transforms and Region of Convergence (ROC) for Laplace Transforms.
5. Understand the concept of Sampling Theorem, Aliasing and Effect of under Sampling.
6. Understand the Concept of Z- Transform of a Discrete Sequence, Distinction Between Laplace, Fourier and Z Transforms and Region of Convergence in Z-Transform

**UNIT I: SIGNALS**

Signals. Classification of Signals. Periodic. Non-periodic. Energy and Power Signals. Exponential and Sinusoidal Signals. Concepts of Impulse Function. Unit Step Function. Signum Function.

**SIGNAL ANALYSIS -** Analogy between Vectors and Signals. Orthogonal Signal Space. Signal Approximation using Orthogonal Functions. Mean Square Error. Closed or Complete Set of Orthogonal Functions. Orthogonality in Complex Functions.

**Unit-II: FOURIER REPRESENTATION OF CONTINUOUS TIME SIGNALS**

**PERIODIC SIGNALS** - Fourier series. Properties of Fourier series. Dirichlet’s Conditions. Trigonometric. Exponential & Compact (Cosine) Fourier series. Fourier Spectrum.

**NON- PERIODIC SIGNALS -** Fourier Transforms. Deriving Fourier Transform from Fourier Series. Fourier Transform of Arbitrary Signal. Standard Signals. Fourier Transform of Periodic Signals. Properties of Fourier Transforms. Fourier Transforms Involving Impulse and Signum Functions. Introduction to Hilbert Transform.

***Applications: Implementation of Signum function in Matlab.***

**Unit-III: SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS**

Systems. Classification of Systems.Linear System. Impulse Response (IR) of a Linear System. Linear Time Invariant (LTI) System. Linear Time Variant (LTV) System. Transfer Function of a LTI System. Filter Characteristics of Linear Systems. Distortion Less Transmission Through a System. Signal Bandwidth. System Bandwidth. Ideal LPF, HPF and BPF Characteristics. Causality and Poly-Wiener Criterion for Physical Realization. Relationship between Bandwidth and Rise Time.

**Unit-IV: CONVOLUTION AND CORRELATION OF SIGNALS**

Concept of Convolution in Time Domain and Frequency Domain. Graphical Representation of Convolution. Convolution Properties. Cross Correlation and Auto Correlation of Functions. Properties of Correlation Function. Energy Density Spectrum. Parseval’s Theorem. Power Density Spectrum. Relation between Auto Correlation Function and Energy/Power Spectral Density Function. Relation between Convolution and Correlation.

**LAPLACE TRANSFORMS -** Review of Laplace Transforms. Partial Fraction Expansion. Inverse Laplace Transform. Concept of Region of Convergence (ROC) for Laplace Transforms. Constraints on ROC for Various Classes of Signals. Properties of LT. Relation between LT and FT of a Signal. Laplace Transform of Certain Signals using Waveform Synthesis. Laplace Transform of a Periodic Signals.

***Applications: Pole-zero calculation of 1 KHz Butterworth filter.***

**Unit-V: SAMPLING**

Sampling Theorem. Graphical and Analytical Proof for Band Limited Signals. Impulse(Ideal) Sampling. Natural(Chopped) Sampling and Flat Top(S&H) Sampling. Reconstruction of Signal from its Samples. Effect of Under Sampling . Aliasing. Introduction to Band Pass Sampling.

***Applications: Design of 8 KHz audio sampler***

**Unit-VI: Z–TRANSFORMS**

Fundamental Difference between Continuous and Discrete Time Signals. Discrete Time Signal Representation using Complex Exponential and Sinusoidal Components. Periodicity of Discrete Time using Complex Exponential Signal. Concept of Z- Transform of a Discrete Sequence. Distinction Between Laplace, Fourier and Z Transforms. Region of Convergence in Z-Transform. Constraints on ROC for Various Classes of Signals. Inverse Z-Transform. Properties of Z-Transforms. Introduction to Discrete Time Systems.

**Applications: DT Systems Analysis and Synthesis.**

**TEXT BOOKS:**

1. Linear Systems and Signal Processing – B.P Lathi, Oxford Publications.

2. Signals and Systems – A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

**REFERENCES:**

1. Signals & Systems – Simon Haykin and Van Veen,Wiley, 2nd Edition.

**IV Year – I Sem. B.Tech**

**Code: 8A725 ADVANCED CONTROL SYSTEMS**

**(PROFESSIONAL ELECTIVE-I)**

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**L T P C**

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**Objective:**

This subject deals with state space, describing function, phase plane and stability analysis including controllability and observability. It also deals with modern control and optimal control systems.

**Course outcomes:**

Students will be able to

* + 1. Understand the controllability and observability.
    2. Understand the phase plane analysis.
    3. Understand the stability analysis.
    4. Know about Effect of state feedback on controllability and observability.
    5. Understand the minimization of functional of single function
    6. Study about formulation of optimal control problem

**UNIT – I STATE SPACE ANALYSIS**

State Space Representation, Solution of State Equation, State Transition Matrix, Canonical Forms – Controllable Canonical Form, Observable Canonical Form, Jordan Canonical Form.

**CONTROLLABILITY AND OBSERVABILITY**

Tests for controllability and observability for continuous time systems – Time varying case, minimum energy control, time invariant case, Principle of Duality, Controllability and observability form Jordan canonical form and other canonical forms.

**UNIT – II DESCRIBING FUNCTION ANALYSIS**

Introduction to nonlinear systems, Types of nonlinearities, describing functions, describing function analysis of nonlinear control systems.

**PHASE-PLANE ANALYSIS**

Introduction to phase-plane analysis, Method of Isoclines for Constructing Trajectories, singular points, phase-plane analysis of nonlinear control systems.

**UNIT-III STABILITY ANALYSIS**

Stability in the sense of Lyapunovs, Lyapunov’s stability and Lypanov’s instability theorems. Direct method of Lypanov for the Linear and Nonlinear continuous time autonomous systems.

**UNIT – IV MODAL CONTROL**

Effect of state feedback on controllability and observability, Design of State Feedback Control through Pole placement. Full order observer and reduced order observer.

**UNIT-V CALCULUS OF VARIATIONS**

Minimization of functional of single function, Constrained minimization. Minimum principle. Control variable inequality constraints. Control and state variable inequality constraints. Euler Lagrangine Equation.

**UNIT-VI OPTIMAL CONTROL**

Formulation of optimal control problem. Minimum time, Minimum energy, minimum fuel problems. State regulator problem. Output regulator problem. Tracking problem, Continuous-Time Linear Regulators.

**TEXT BOOKS:**

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition,1996.

**REFERENCES:**

1. Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998

2. Control Systems Engineering by I.J. Nagarath and M.Gopal, New Age International (P) Ltd.

3. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw-Hill Companies, 1997.

4. Systems and Control by Stainslaw H. Zak , Oxford Press, 2003.

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**B.Tech IV Year – I Sem.**

**Code: 8A731 SMART GRID**

**(PROFESSIONAL ELECTIVE-II) L T P C**

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**UNIT – I INTRODUCTION TO SMART GRID:**

What is Smart Grid, Working definitions of Smart Grid and Associated Concepts –Smart Grid

Functions-Traditional Power Grid and Smart Grid –New Technologies for Smart Grid – Advantages –Indian Smart Grid –Key Challenges for Smart Grid.

**UNIT – II SMART GRID ARCHITECTURE:**

Components and Architecture of Smart Grid Design –Review of the proposed architectures for Smart Grid. The fundamental components of Smart Grid designs –Transmission Automation – Distribution Automation –Renewable Integration

**UNIT – III TOOLS AND TECHNIQUES FOR SMART GRID:**

Computational Techniques –Static and Dynamic Optimization Techniques –Computational Intelligence Techniques –Evolutionary Algorithms –Artificial Intelligence techniques.

**UNIT – IV DISTRIBUTION GENERATION TECHNOLOGIES:**

Introduction to Renewable Energy Technologies –Micro grids –Storage Technologies –Electric Vehicles and plug –in hybrids –Environmental impact and Climate Change –Economic Issues.

**UNIT – V COMMUNICATION TECHNOLOGIES AND SMART GRID:**

Introduction to Communication Technology –Synchro Phasor Measurement Units (PMUs) –Wide Area Measurement Systems (WAMS).

**UNIT – VI CONTROL OF SMART POWER GRID SYSTEM:**

Load Frequency Control (LFC) in Micro Grid System –Voltage Control in Micro Grid System – Reactive Power Control in Smart Grid. Case Studies and Test beds for the Smart Grids.

**TEXT BOOKS:**

1. Stuart Borlase, Smart Grids, Infrastructure, Technology and Solutions, CRC Press, 2013

2. Gil Masters, Renewable and Efficient Electric Power System, Wiley-IEEE Press, 2004.

3. A.G. Phadke and J.S. Thorp, ―Synchronized Phasor Measurements and their Applications, Springer Edition, 2010.

4. T. Ackermann, Wind Power in Power Systems, Hoboken, NJ, USA, John Wiley, 2005.

**IV year B.Tech – I Sem**

**CODE: 8A734 HVDC & FACTS**

**(PROFESSIONAL ELECTIVE-I)**

**L T P C**

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**Objectives**:

Understand operating principles of HVDC systems and control aspects.

* + Deals with analysis of harmonics, filters, reactive power and power flow
  + Understand concepts and control aspects of FACTS devices.

**Course Outcomes**: The student will be able to

* 1. Acquire the knowledge to compare AC and HVDC systems in terms of power transmission and stability.
  2. Acquire knowledge on analysis of harmonics, filters, reactive power and power flow in HVDC systems.
  3. Acquire knowledge in improving the transmission capability and stability of the power system by applying FACTS controllers.

**UNIT – I: INTRODUCTION**:

Comparison of AC and DC transmission systems, application of DC transmission, types of DC links, typical layout of a HVDC converter station. HVDC converters, pulse number, analysis of Graetz circuits with and without overlap, converter bridge characteristics.

**UNIT – II: CONVERTER & HVDC SYSTEM CONTROL**:

Principles o DC Link Control – Converters Control Characteristics – system control hierarchy, firing angle control current and extinction angle control starting and stopping of DC link.

**UNIT-III: HARMONICS, FILTERS AND REACTIVE POWER CONTROL**:

Introduction, generation of harmonics, AC and DC filters. Reactive Power Requirements in steady state, sources of reactive power, Power Flow Analysis in AC/DC Systems: Modeling of DC/AC converters, Controller Equations – Solutions of AC/DC load flow – Simultaneous method-Sequential method,

**UNIT-IV: Introduction to FACTS**:

Flow of power in AC parallel paths and meshed systems, basic types of FACTS controllers, brief description and definitions of FACTS controllers.

**UNIT –V: STATIC SHUNT COMPENSATORS:**

Objectives of shunt compensation, methods of controllable VAR generation, static VAR compensators, SVC and STATCOM, comparison between SVC and STATCOM.

**UNIT –VI: STATIC SERIES COMPENSATORS**:

GCSC, TSSC, TCSE & SSSC, Objectives of series compensator, Variable impedance type series compensators, Basic operating control schemes, Power angle characteristics, Control range and VA rating, External control.

Combined Compensators: Introduction, unified power flow controller (UPFC), basic operating principle, independent real and reactive power flow controller, control structure.

**TEXT BOOKS**:

1. HVDC Transmission – S Kamakshaiah, V. Kamaraju, Tata Mc. Graw Hill Publications, 1st Edition, 2011.

2. Understanding FACTS – Concepts and Technology of Flexible AC Transmission Systems” Narain G. Hingorani, Laszlo Gyugyi, Wiley India publications, 2011.

3. HVDC Transmission – J. Arrillaga, IEE, 2nd Edition, 1998.

4. Direct Current Transmission - E.W. Kimbark, Volume 1, John Wiley & Sons, 1971.

**IV year B.Tech – I Sem**

**Code: 8A715 RENEWABLE ENERGY SOURCES**

**(Professional Elective – II)**

**L T P C**

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**Course Objectives:**

Becomes familiar with solar energy, its radiation, Collection, storage and application and also gets introduced to other forms of Renewable Energy sources viz., the Wind energy, Biomass energy, geothermal energy and ocean energy.

**Course Outcomes:**

The student should be able to

1. Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment; define and understand the terms describing the different angles that one may incur in setting up a solar panel and be able to use the instruments for measuring solar radiation.
2. Demonstrates the knowledge of different techniques of solar collection and storage.
3. The student becomes familiar with the different types of horizontal and vertical axis wind mills and understands the performance characteristics of the same. The student also demonstrates the knowledge of different Bio-gas digesters and factors influencing its yield.
4. Aware of the potential of geothermal energy in India and will be able to characterize different types of geothermal wells.
5. Aware of the different methods of kinetic energy extraction from Ocean waves and tides and thermal energy extraction from Oceans.
6. Demonstrates the knowledge of Direct Energy Conversion in different phenomena viz., Joule Thomson effect, Seebeck effect, Peltier effect etc. and the principle of operation of Fuel Cells.

**UNIT – I -PRINCIPLES OF SOLAR RADIATION**:

Role and potential of new and renewable source, The solar energy option, Environmental impact of solar power, Physics of the sun, the solar constant, Extraterrestrial and terrestrial solar radiation, Solar radiation on titled surface, Instruments for measuring solar radiation and sun shine, Solar radiation data.

**UNIT-II- SOLAR ENERGY COLLECTION STORAGE AND APPLICATIONS**: Flat plate and concentrating collectors, Classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Different methods, Sensible, Latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

**UNIT – III WIND ENERGY**:

Sources and potentials, Horizontal and vertical axis windmills, Performance characteristics, Betz criteria

**BIO-MASS**: Principles of Bio-Conversion, Anaerobic/aerobic digestion, Types of Bio-gas digesters, Gas yield, Combustion characteristics of bio-gas, Utilization for cooking, I.C. Engine operation and economic aspects.

**UNIT – IV GEOTHERMAL ENERGY**:

Resources, types of wells, methods of harnessing the energy, Potential in India.

**UNIT-V OCEAN ENERGY**:

OTEC, Principles utilization, Setting of OTEC plants, Thermodynamic cycles. Tidal and wave energy, Potential and conversion techniques, Mini-hydel power plants and their economics.

**UNIT-VI DIRECT ENERGY CONVERSION**:

Need for DEC, Carnot cycle, Limitations, principles of DEC. Thermoelectric generators, seebeck, Peltier and joul Thomson effects, Figure of merit, materials, Applications, MHD generators, Principles, Dissociation and ionization, Hall effect, Magnetic flux, MHD accelerator, MHD Engine, Power generation systems, Electron gas dynamic conversion, economic aspects. Fuel cells – principles - Faraday’s law’s - Thermodynamic aspects - selection of fuels and operating conditions.

**TEXT BOOKS:**

1. Non-Conventional Energy Sources - G.D. Rai

2. Renewable Energy Technologies - Ramesh & Kumar /Narosa.

**REFERENCES:**

1. Renewable energy resources - Tiwari and Ghosal/ Narosa.

2. Non-Conventional Energy - Ashok V Desai /Wiley Eastern.

3. Non-Conventional Energy Systems - K Mittal /Wheeler

4. Solar Energy - Sukhame

**L T P/D C**

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**IV Year B.Tech – I Sem**

**CODE: 8CC09 DIGITAL SIGNAL PROCESSING**

**(PROFESSIONAL ELECTIVE-II)**

After studying this course, the students will be able to

1. Distinguish between CT and DT signals and systems and understand the growing need of DSP and study the concepts of discrete time signals and systems.
2. Represent periodic DT signals as a Fourier series; non-periodic DT signals as a Fourier Transform and use a powerful mathematical tool called DFT.
3. Compute the Fourier Transform of DT signals using the FFT algorithms.
4. Realize a digital filter in several forms and structures for a given transfer function H (z).
5. Distinguish IIR and FIR filters; Design each type by several methods once the desired specifications are given.
6. Understand the need and implement the multirate sampling techniques.

**UNIT I: INTRODUCTION**:

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

**UNIT II: DISCRETE FOURIER SERIES**:

Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT. Relation between Z-transform and DFS

**UNIT III: FAST FOURIER TRANSFORMS**:

Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

**UNIT IV: REALIZATION OF DIGITAL FILTERS**:

Review of Z-transforms, Applications of Z – transforms, solution of difference equations of digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function.

**UNIT V: IIR DIGITAL FILTERS**:

Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples: Analog-Digital transformations

FIR DIGITAL FILTERS: Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

**UNIT VI: MULTIRATE DIGITAL SIGNAL PROCESSING**:

Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion. Applications of Multirate signal processing. Introduction to DSP Processors

**TEXT BOOKS:**

1. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006
2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.

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**IV Year B.Tech – I Sem.**

**Code: 7A724 DIGITAL CONTROL SYSTEMS**

**(Professional Elective – II)**

**L T P C**

**3 - - 3**

**Objective:**

This subject deals with different mathematical methods of optimization.

**Course outcomes:**

Students will be able to

1. Understand the Sampling And Reconstruction.
2. Understand the Z – Transforms.
3. Understand the State Space Analysis.
4. Know about Stability Analysis.
5. Understand the Design Of Discrete Time Control System By Conventional Methods.
6. Study about State Feedback Controllers And Observers.

**UNIT – I SAMPLING AND RECONSTRUCTION**

Introduction, Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

**UNIT-II THE Z – TRANSFORMS**

Introduction, Linear difference equations, pulse response, Z – transforms, Theorems of Z – Transforms, the inverse Z – transforms, Modified Z- Transforms.

**Z-PLANE ANALYSIS OF DISCRETE-TIME CONTROL SYSTEM**

Z-Transform method for solving difference equations; Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane.

**UNIT – III STATE SPACE ANALYSIS**

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and its Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations.

**CONTROLLABILITY AND OBSERVABILITY**

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function

**UNIT – IV STABILITY ANALYSIS**

Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stability test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

**UNIT– V DESIGN OF DISCRETE TIME CONTROL SYSTEM BY CONVENTIONAL METHODS**

Transient and steady – State response Analysis – Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers.

**UNIT – VI STATE FEEDBACK CONTROLLERS AND OBSERVERS**

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman’s formula. State Observers – Full order and Reduced order observers.

**TEXT BOOKS:**

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition

**REFERENCES:**

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.

2. Digital Control and State Variable Methods by M.Gopal, TMH.

**IV Year B.Tech – I Sem.**

**Code: 8A737 ADVANCED POWER ELECTRONICS**

**(Professional Elective – II)**

**L T P C**

**3 - - 3**

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**UNIT – I - MODERN POWER SEMICONDUCTOR DEVICES:**

Modern power semiconductor devices- MOS turn off Thyristor (MTO)-Emitter Turn off Thyristor (ETO) – Integrated Gate- Commutated Thyristor (IGCT) – MOS – controlled Thyristors (MCTs) – Static Induction Circuit – comparison of their features.

**UNIT – II - PHASE CONTROLLED RECTIFIERS:**

Principle of phase controlled converter operation, single phase full converters, dual converters, three phase full and semi converters, reactive power, power factor improvements – extinction angle control, symmetrical angle control and PWM control.

**UNIT – III - DC-DC CONVERTERS:**

Study of class – A, B, C, and D choppers, non – isolated DC-DC converters, buck boost, buck-boost converters under continuous and discontinuous conduction operation.

**UNIT – IV – ISOLATED DC-DC CONVERTERS:**

Isolated DC-DC converters forward, fly-back, push-pull, half-bridge and full –bridge converters Relationship between I / P and O/P voltages. Expression for filter inductor and capacitors.

**UNIT – V** - **INVERTERS:**

Single phase and three – phase inverters, 1200 and 1800 modes of operation, PWM techniques: single, multiple and sinusoidal PWM techniques, selective harmonic elimination, space vector modulation, current source inverter, multi- Current source inverter, techniques for reduction of harmonics.

**UNIT –VI – MULTILEVEL INVERTERS:**

Diode clamped multi level inverters, capacitors clamped multilevel inverters, cascaded H bridge inverter, SPWM, SVPWM and other modulation techniques, applications of multilevel inverters, techniques for reduction for harmonics.

**TEXT BOOKS:**

1. Power Electronics – Circuits, Devices & Applications: M.H.Rashid, PHI

2. Power Electronics: Converters, Applications: Ned Mohan, T.M. Undeland, William P.Robbins, John Wiley & Sons.

**REFERENCES:**

1. Switch Mode Power Supply Handbook: Keith H.Billing, MC Graw Hill International Edition 1996.

2. Switching Power supply Design: Abrahan L.Pressman, Mc.Graw Hill International Second Edition, 1996.

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**IV Year B.Tech – I Sem**

**Code: 8A729 POWER SYSTEM DEREGULATION**

**(PROFESSIONAL ELECTIVE-III)**

**UNIT – I: OVERVIEW OF KEY ISSUES IN ELECTRIC UTILITIES**:

Introduction –Restructuring models –Independent system operator (ISO) –Power Exchange -Market operations –Market Power –Standard cost –Transmission Pricing –congestion Pricing –Management of Inter zonal/Intra zonal Congestion.

**UNIT- II: OASIS: OPEN ACCESSES SAME-TIME INFORMATION SYSTEM:**

Structure of OASIS -Posluing of Information –Transfer capability on OASIS –Definitions Transfer Capability Issues –ATC –TTC –TRM –CBM calculations –Methodologies to calculate ATC

**UNIT – III: ELECTRICITY PRICING:**

Introduction –electricity Price Volatility Electricity Price Indexes –challenges to Electricity Pricing –Construction of Forward Price Curves –Short-time Price Forecasting.

**UNIT – IV: POWER SYSTEM OPERATION IN A COMPETITIVE ENVIRONMENT:**

Introduction –Operational Planning Activities of ISO-The ISO in Pool Markets –The ISO in Bilateral Markets –Operational Planning Activities of a Genco

**UNIT – V: ANCILLARY SERVICES MANAGEMENT:**

Introduction –Reactive Power as an Ancillary Service –a review –Synchronous Generators as Ancillary Service Providers.

**UNIT – VI: RELIABILITY AND DEREGULATION:**

Reliability Analysis, The network Model, Reliability Costs, Hierarchical Levels, Reliability and Deregulation, Performance Indicators

**TEXT BOOKS:**

1. 1. Kankar Bhattacharya, Math H.J. Boller, JaapE.Daalder, Operation of Restructured Power System, Klum, er Academic Publisher –2001.
2. 2. AshikurBhuiya: Power System Deregulation: Loss Sharing in Bilateral Contracts and Generator Profit Maximization, Publisher VDM Verlag, 2008.
3. 3. Mohammad Shahidehpour, and Muwaffaqalomoush, Restructured Electrical Power systems, Marcel Dekker, Inc. 2001.
4. 4. Loi Lei Lai; ―Power system Restructuring and Deregulation, Jhon Wiley & Sons Ltd., England.

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**IV Year B.Tech – II Sem**

**Code: 7A835 ELECTRICAL AND HYBRID VEHICLES**

**(PROFESSIONAL ELECTIVE-IV)**

# Course Outcome:

After learning the course the students should be able to:

1. Understand working of Electric Vehicles and recent trends
2. Analyze different power converter topology used for electric vehicle application
3. Develop the electric propulsion unit and its control for application of electric vehicles

**UNIT – I: ELECTRIC AND HYBRID ELECTRIC VEHICLES:**

Configuration of Electric Vehicles, Performance of Electric Vehicles, Traction motor characteristics, Tractive effort and Transmission requirement, Vehicle performance, Tractive effort in normal driving, Energy consumption Concept of Hybrid Electric Drive Trains, Architecture of Hybrid Electric Drive Trains, Series Hybrid Electric Drive Trains, Parallel hybrid electric drive trains

**UNIT – II: ENERGY STORAGE FOR EV AND HEV:**

Energy storage requirements, Battery parameters, Types of Batteries, Modeling of Battery, Fuel Cell basic principle and operation, Types of Fuel Cells, PEMFC and its operation, Modeling of PEMFC, Super Capacitors

**UNIT – III: ELECTRIC PROPULSION:**

EV consideration, DC motor drives and speed control, Induction motor drives, Permanent Magnet Motor Drives, Switch Reluctance Motor Drive for Electric Vehicles, Configuration and control of Drives

**UNIT – IV: DESIGN OF ELECTRIC AND HYBRID ELECTRIC VEHICLES**

Series Hybrid Electric Drive Train Design: Operating patterns, control strategies, Sizing of major components, power rating of traction motor, power rating of engine/generator, design of PPS

**UNIT – V: PARALLEL HYBRID ELECTRIC DRIVE TRAIN DESIGN:**

Control strategies of parallel hybrid drive train, design of engine power capacity, design of electric motor drive capacity, transmission design, energy storage design

**UNIT – VI: POWER ELECTRONIC CONVERTER FOR BATTERY CHARGING**

Charging methods for battery, Termination methods, charging from grid, The Z-converter, Isolated bidirectional DC-DC converter, Design of Z- converter for battery charging, High-frequency transformer based isolated charger topology, Transformer less topology

**REFERENCE BOOKS:**

1. M. Ehsani, Y. Gao, S. Gay and Ali Emadi, Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, CRC Press, 2005
2. Iqbal Husain, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003
3. Sheldon S. Williamson, Energy Management Strategies for Electric and Plug-in Hybrid Electric Vehicles, Springer, 2013.
4. C.C. Chan and K.T. Chau, Modern Electric Vehicle Technology, OXFORD University Press, 2001.
5. Chris Mi, M. Abul Masrur, David Wenzhong Gao, Hybrid Electric Vehicles Principles And Applications With Practical Perspectives, Wiley Publication, 2011.

**IV year B.Tech – I Sem**

**CODE: 8A739 OPTIMAL CONTROL SYSTEMS**

**(PROFESSIONAL ELECTIVE-III)**

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**UNIT I:**

An overview of optimization problem - concepts and terms related to optimization - constrained and unconstrained problems and their solutions using different techniques.

**UNIT II**

Convex set and convex function - convex optimization problem - quadratic optimization problem - Karush - Kuhn - Tucker (KKT) necessary and sufficient conditions for quadratic programming problem.

**UNIT III**

Interior point method for convex optimization - linear programming - primal and dual problems and basic concept of multi - objective optimization problem. Concept of functional, different types of performance indices, Euler - Lagrange equation.

**UNIT IV**

Calculus of variation to optimal control problem - Fundamental concepts, functionals of a single function, functional involving several independent functions, necessary conditions for optimal control, linear regulator problems. Linear quadractic regulator, remarks on weighting matrices, solution of Riccati equation.

**UNIT V & VI**

Frequency domain interpretation of linear quadratic regulator, robustness studies. Dynamic programming, Pontrygin’s minimum principle, time optimal control, concept of system and signal norms, statement of problem and its solution.

**TEXT BOOKS**:

1. Jasbir S. Arora, Introduction to optimum design, Elesevier, 2005.

2. A Ravindran, K.M. Ragsdell, and G.V. Reklaitis, Engineering optimization : Methods and applications, Wiley India Edition.

3. Donald E.Kirk, Optimal Control Theory an Introduction, Prentice - Hall Network series – First edition, 1970.

**REFERENCE BOOKS:**

1. D.S. Naidu, Optimal control systems, CRC Press, First edition, 2002.

2. Arturo Locatelli, Optimal control: An Introduction, Birkhauser Verlag, 2001.

3. S.H.Zak, Systems and Control, Indian Edition, Oxford University, 2003.

4. Niclas Anreasson, Anton Evgrafov and Michael Patriksson, An introduction to continuous optimization, Overseas Press (India) Pvt. Ltd.

**IV year B.Tech – I Sem**

**CODE: 8CC34 COMMUNICATION THEORY**

**(PROFESSIONAL ELECTIVE-III)**

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**UNIT I: Amplitude modulation**

Introduction to Analog Communications, Need for Modulation, Amplitude Modulation-Time Domain, Generation of AM Waves: Square Law Modulator, Detection of AM Waves: Envelope Detector, Double sideband suppressed carrier and single sideband modulation, Time domain representation of DSB-SC and SSB-SC signals, . Comparison of AM techniques, Commercial Applications of AM.

**Unit-II: Angle modulation**

Types of Angle Modulation, Frequency modulation-Narrowband FM and wideband FM, Time domain representation of FM and PM, Relationship between FM and PM signals, Generation of FM signals- direct (parametric variation method) and indirect (Armstrong method) methods, Detection of FM signals , Comparison of FM & AM, Commercial Applications of FM,PM.

**Unit-III: transmitters and recievers**

Radio Transmitters, Classification of Transmitters, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter.

Radio Receiver**-**types-Tuned Radio Frequency receivers and super-heterodyne receivers, RF section and characteristics, Intermediate frequency, Image frequency and its rejection ratio, receiver characteristics- Automatic gain control, Commercial AM & FM band specifications

**Unit-IV: ELEMENTS OF DIGITAL COMMUNICATION SYSTEMS**

Model of Digital Communication Systems, Advantages of digital communication systems, Digital Representation of Analog signal, Sampling Theorem.

**PULSE CODE MODULATION:**

Analog Pulse Modulation: PAM generation and demodulation, PWM, PPM, Comparison of analog pulse modulations, PCM Generation and Reconstruction, Quantization Noise, Non uniform Quantization, DPCM, DM, TDM

**Unit-V: DIGITAL MODULATION TECHNIQUES**

Introduction, Amplitude Shift Keying, ASK Modulator, Non-coherent and Coherent ASK Detector, Frequency Shift Keying, FSK Modulator, Non-coherent and Coherent FSK Detector, Phase Shift Keying, BPSK, Coherent PSK Detection, DPSK, Comparison of Digital modulation systems. Introduction to Multiple access techniques

**Unit-VI: SOURCE CODIG AND CHANNEL CODING**

Introduction, Advantages, Shannon’s theorem for Channel capacity, Huffman coding, Shannon-Fano coding, Error detection and correction capabilities of Linear Block Codes, Decoding, Convolution Codes: Encoding using state, tree and trellis, Decoding using viterbi diagrams.

**TEXT BOOKS:**

1. B. P. Lathi, *Modern Analog and Digital Communication*, 3rd Ed., Oxford University Press

2. K. Sam Shanmugham*, Digital and Analog Communication Systems*, John Wiley & Sons

3. Simon Haykin*, Digital communications* -, John Wiley, 2005

4. H. Taub and D. Schilling*, Principles of Communication Systems* –, TMH, 2003

5. A. Bruce Carlson, & Paul B. Crilly, “*Communication Systems – An Introduction to Signals & Noise in Electrical Communication”*,McGraw-Hill International Edition, 5th Edition, 2010.

**REFERENCES:**

1. John Proakis*, Digital Communications* –, TMH, 1983.
2. Singh & Sapre, Communication *Systems Analog & Digital* –, TMH, 2004.
3. Sklar: *Digital Communication*, 2nd Ed., Pearson Education
4. “Digital Communications”, J.S Chitode, Technical publication, Pune

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**B. Tech. IV Year I semester**

**CODE: 8ZC15 FINANCIAL INSTITUTIONS, MARKETS AND SERVICES**

**(OPEN ELECTIVE – III)**

**Course Objective:** The objective of the course is to provide to students an understanding of Financial Markets, the major Institutions involved and the Services offered within this framework.

**Course Outcomes:**

1. This unit enables the students to understand the financial structure and the financial sector reforms after 1991.
2. The unit gives the exposure on the role of RBI and the Regulating and credit policies adopted by the RBI.
3. The students get awareness on the role of Non-Banking financial institutions and the role of financial institutions in India.
4. The unit educates the students to know the role of regulatory bodies like SEBI and also to know the capital and money market instruments
5. The unit equips the students to understand about the asset fund based financial services
6. The students will get exposure about the investment banking and merchant banking.

**UNIT I: INTRODUCTION:**

The structure of financial system, Equilibrium in financial markets, Indicators of Financial Development, Financial system and Economic Development, Financial Sector Reforms after 1991.

**UNIT II: BANKING INSTITUTIONS**:

Structure and Comparative performance, Functions and Role of RBI, Competition, Interest rates, Spread; Bank Capital Adequacy norms; Banking Innovations – BPLR to Base rate, Core Banking System, Financial Inclusion, Current rates: Policy rates, Reserve Ratios, Exchange rates, Lending/ Deposit rates.

**UNIT III: NON BANKING FINANCIAL INSTITUTIONS:**

Structure and functioning of Unit Trust of India and Mutual Funds, Growth of Indian Mutual funds and their Regulation, Role of AMFI. Performance of Non-Statutory Financial Organizations: IFCI, IRBI, NABARD, SIDBI and SFCs.

**UNIT IV: FINANCIAL AND SECURITIES MARKETS**:

Role and functions of SEBI, Structure and functions of Call Money Market, Government Securities Market – T-bills Market, Commercial Bills Market, Commercial paper and Certificate of Deposits; Securities Market – Organization and Structure, Listing, Trading and Settlement, SEBI and Regulation of Primary and Secondary Markets.

**UNIT V: ASSET/FUND BASED FINANCIAL SERVICES:**

Lease Finance, Consumer Credit and Hire purchase Finance, Factoring - Definition, Functions, Advantages, Evaluation, Forfeiting, Bills Discounting, Housing Finance, Venture Capital Financing. Fee-based Advisory services: Stock Broking, Credit Rating.

**UNIT VI: INVESTMENT BANKING AND MERCHANT BANKING**:

Investment Banking: Introduction, Functions and Activities, Underwriting, Banker to an Issue, Debenture Trustees and Portfolio managers, Challenges faced by Investment Bankers.

Merchant Banking: Definition, Merchant Banks Vs Commercial Banks, Services of Merchant Banks.

**REFERENCES:**

1. L.M. Bhole: Financial Institutions and Markets, TMH, 2009.
2. E. Gordon, K. Natarajan: Financial Markets and Services, Himalaya Publishing House, 2013.
3. Vasant Desai: Financial Markets and Financial Services, Himalaya,2009
4. Pathak: Indian Financial Systems, Pearson, 2009
5. M.Y. Khan: Financial Services, TMH, 2009.
6. S. Gurusamy: Financial Services and System, Cengage,2009
7. Justin Paul and Padmalatha Suresh: Management of Banking and Financial Services, Pearson, 2009.
8. Gomez, Financial Markets, Institutions and Financial Services, PHI, 2012.
9. R M Srivatsava: Dynamics of Financial Markets and Institutions in India, Excel, 2013.

**L T P/D C**

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**B. Tech. IV Year I semester**

**CODE: 8ZC27 INDIAN HISTORY, CULTURE AND GEOGRAPHY**

**(Common to all branches)**

**(OPEN ELECTIVE – III)**

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**Course Objectives**: To equip the students with necessary knowledge relate to ancient, medieval and modern Indian and its culture and also facts relating to existence of earth.

**Course Outcomes**:

1. To appreciate and understand our Indian History, Culture and Indian heritage.
2. To understand secularism of our country.
3. To appreciate and understand the social reformers who brought revolutionary changes in Indian society.
4. To understand earth evolution and world climatic change.
5. To understand India Oceanography,
6. Able to enhance and understand Indian monsoons, Indian agriculture.

**UNIT I: ANCIENT INDIAN HISTORY**

Fundamental Unity of Indian Harappan and Vedic Civilization – Evolution of Caste System – ainism and Buddhism – Gandhara Art., Political unification of India under Mauryas and Guptas, Historical evolution of Satavahanas., Contribution of Pallavas and Cholas to Art – Chola Administrative Systems .

**UNIT II: MEDIEVAL INDIA AND CULTURE**

Influence of Islam on Indian Culture – The Sufi, Bhakthi and Vishnavite movements, Historical Achievements of Vijayanagara Rulers, Contribution of Shershah and Akbar to the evolution of administration system in India – Cultural Development under Mughals.

**UNIT III: MODERN INDIA**

Western Impact on India – Introduction of Western Education – Social and Cultural awakening and social reform movements – Raja Rama Mohan Roy – Dayananda Saraswathi – Theosophical Society – Ramakrishna Paramahamsa and Vivekananda – Iswara Chandra Vidyasagar and Veeresalingam – Emancipaition of women and struggle against Caste. Rise of Indian Nationalism – Mahatma Gandhi – Non Violence and Satyagraha – Eradication of untouchability – Legacy of British rule.

**UNIT IV:** **GEO MORPHOLOGY AND CLIMATOLOGY**

The Origin and Evolution of the Earth, Interior of the Earth, Distribution of Oceans and Continents, Minerals and Rocks, Geomorphic Processes, Landforms and their Evolution Composition and Structure of Atmosphere, Solar Radiation, Heat Balance and Temperature.  
Atmospheric Circulation and Weather Systems, World Climate and Climate Change.

**UNIT V: OCEANOGRAPHY**

Water (Oceans), Movements of Ocean Water, Physical features of India viz., The Mountains in the North , The Northern Plains, The Peninsular Plateau, The Great Indian Desert, The Coast; and The Islands.

**UNIT VI: PHYSICAL FEATURES OF INDIA AND INDIA’S MONSOON**

India’s monsoon, winter, summer (pre-monsoon), rainy (monsoon), autumn (post-monsoon), Indian Agriculture, Agriculture and colonialism, Indian Agriculture after Independence Major Crops and yields, Horticulture, Organic farming.

**REFERENCES:**

1. Sharma .R.S., (2011).Indian Ancient past., Oxford Publications.
2. Nitin Singhaniya.,(2017). Indian Culture and Heritage., Publisher: Mcgraw TestPrep., Second Edition.
3. Certificate of Physical and Human Geography, Goh Cheng Leong, Oxford University Press.
4. Bipin Chandra.(2000). India’s Struggle for Independence., Penguin Global Publishers
5. Saveendra Singh: Physical Geograpghy.,Prayag Pustak Bhavan ISBN-10: 8186539298, 1st Edition Number of Pages : 641 Pages Publication : Year 2006.
6. Majumdar, R. C. et al. *An Advanced History of India* London: Macmillan. 1960. ISBN 0-333-90298-X
7. Basham, A.L: The wonder that was India, New York: Grove Press, 1954. (OUP, Madras 1983)
8. Basham, A.L: Cultural heritage of India, Vols.I to IV, Oxford University Press, Delhi, 1975.

**B. Tech. IV Year I Semester**

**CODE: 8A787 SUMMER INDUSTRY INTERNSHIP – II**

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## *Course Objectives:*

To enhance the knowledge on selecting a project, learn related tools and enhance programming and communication skills for employability.

**Pre-Requisites:** All Courses till this semester

**Course Outcomes:**

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

* Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
* Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
* Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs of the market and society as a whole.
* Improve their communicative skills and team skills largely improve.
* Work as an individual and in a team.

A summer industry internship project shall be carried out by a group of students consisting of 2 to 3 in number during summer fourth year first semester at industries. This work shall be carried out under the guidance of the faculty assigned as internal guide as well as external guide at industry where students are carrying out summer industry internship project. Project shall consist of design, fabrication, software development or building of prototype. This can be of interdisciplinary nature also.

There will be 100 marks in total with 30 marks of internal evaluation and 70 marks of external

The **internal evaluation** shall consist of:

Day to day work (internal guide 10M

external guide : 5M) : 15 marks

Report : 05 marks

Demonstration / presentation (internal presentation

is evaluated by HOD, senior faculty and internal guide) : 10 marks

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30 marks

End examination : 70 Marks.

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External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The end examination will be carried out by a committee consisting of an external examiner, head of the department, a senior faculty member and the supervisor.

**III year B.Tech – II Sem**

**Code: 8A781 ELECTRICAL WORKSHOP**

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**Course Outcomes:**

1. Ability to understand how a power contactor works and basic control circuit.

2. Ability to connect properly a basic interlocking circuit

3. Ability to analyze importance of star- Delta Starter

4. Ability to develop an inching circuit.

5. Ability to analyze role and importance of interlocking of group of drives

6. Ability to Study different protections to a motor..

7. Ability to know various parts in a three-phase motor

8. Ability to analyze single phase motors.

9. Ability to Differentiate protections given as under voltage and over voltage to a DOL starter.

10. Ability to test transformer oil and know its usefulness as insulator and as heat absorber.

**The list of Experiments:**

1. Direct On-Line Starter

2. Forward And Reverse Starter Wiring And Testing

3. Star-Delta Starter Wiring and Testing Suitable For 5 Ho Motor

4. Inching (Jogging) Circuit for Ac Motor

5. Interlocking Of Group of Drives

6. Study of Phase Failure Relay (Single Phase Preventer)

7. 3-Phase Squirrel Cage Induction Motor Dismantling, Assembling and Testing

8. 1-Phase Capacitor Start Capacitor Run Induction Motor Dis-Mantling, Assembling and Testing

9. Wiring Undervoltage Relay To A Dol Starter

10. Testing Of Dielectric Strength of Transformer Oil

**III year B.Tech – II Sem**

**Code: 8DC71 MICROPROCESSORS AND MICROCONTROLLERS LAB**

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***Course Objectives:***

*a. Familiarize the architecture of 8086 processor, assembling language programming and interfacing with various modules.*

*b. The student can also understand of 8051 Microcontroller concepts, architecture, programming and application of Microcontrollers.*

*c. Student able to do any type of VLSI, embedded systems, industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.*

***Course Outcomes:***

* *Analyze and apply working of 8086.*
* *Compare the various interface techniques. Analyze and apply the working of 8255, 8279,8259, 8251, 8257 ICs and design and develop the programs.*
* *Learning the Communication Standards.*

**Cycle - I**

Introduction to MASM/TASM, KIEL IDE, Familiarization with 8086, 8051 Kits

**8086 ALP using kit and MASM**

1. Basic arithmetic and logical operations

2. Code conversion decimal arithmetic programs

3. String manipulation programs

4. Display a message on the screen of a computer using DOS / BIOS interrupts.

**Cycle – II**

**Following peripherals and interfacing experiments to be implemented on 8086 and 8051 kits**

1. A/D and D/A interfacing

2. Serial interfacing with PC

3. Keyboard and display interfacing

4. Stepper motor controller

5. Traffic light controller

6. Real Time clock interface with 8051 using 12C

**IV year B.Tech – I Sem**

**Code: 8A782 MEASUREMENTS AND INSTURMENTATION LAB**

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**Objectives of the Course:**

Energy can neither be created nor destroyed; it can be transformed from one form into another. Out of all the forms of energies (which are available) electrical energy occupies top position in the hierarchy. So measurement of electrical quantity plays a vital role in the field of Engineering and Technology. In this lab students will be able to measure practically different electrical parameters and calibrate the meters.

**Course Outcomes:**

1. To draw the graph between the distance and EMF for linear variable differential transformer and to measure the displacement.
2. To measure 3-Ф reactive power using single phase wattmeter.
3. To determine the value of given capacitor and to obtain its dissipation factor, and also the values of the resistance and inductance of a given coil.
4. To determine the percentage of error of a given single phase energy meter.
5. To measure the parameters of a choke coil using 3-voltmeter & 3-ammeter methods
6. To determine the percentage ratio error and the phase angle error of the given transformer by comparison with another current transformer whose errors are known.
7. To determine the value of the resistance of the given wire using Kelvin’s double bridge.
8. To apply Crompton’s DC potentiometer to, Calibrate a PMMC type ammeter. Voltmeter
9. To calibrate a given 1-Ф power factor meter by phantom loading.
10. To calibrate a given LPF watt meter by phantom loading.
11. To measure the 3-phase power with two number of CTs and a single wattmeter.

**The following experiments are required to be conducted**

* + 1. Calibration and Testing of single phase energy Meter
    2. Calibration of dynamometer power factor meter
    3. Crompton D.C. Potentiometer – Calibration of PMMC ammeter and PMMC voltmeter
    4. Kelvin’s double Bridge – Measurement of resistance – Determination of Tolerance.
    5. Measurement of % ratio error and phase angle of given C.T. by comparison.

1. Schering Bridge & Anderson Bridge.
2. Measurement of 3 phases reactive power with single-phase wattmeter.
3. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.
4. Calibration LPF wattmeter – by Phantom testing
5. Measurement of 3 phase power with single watt meter and 2 No’s of C.T.
6. LVDT and capacitance pickup – characteristics and Calibration.

**IV Year B.Tech – I Sem**

**Code: 8A783 POWER SYSTEMS SIMULATION LAB**

**L T P C**

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**Course Objective:**

Understand the concepts and develop of formation of Y-bus and Z-bus, Guass Seidal method, SIMULINK model for a single area load frequency problem, three phase inverter, automatic voltage regulator, Lag compensator.

**Course Outcomes:**

Students will able to

1. Ability to write a program for formation of Y-bus and Z-bus.

2. Ability to write a program for a power flow study on a given power system network using Guass Seidal method.

3. Ability to Develop a SIMULINK model for a single area load frequency problem.

4. Ability to develop a program to solve swing equation.

5. Ability to simulate single phase and three phase full converter.

6. Ability to Develop a SIMULINK model for a two area load frequency problem

7. Ability to simulate a three phase inverter

8. Ability to develop a program for PID controller.

9. Ability to Develop a SIMULINK model for a automatic voltage regulator.

10. Ability to Design a Lag compensator through SIMULINK.

**Conduct any 10 Experiments**

1. Formation of Y-bus, Z-bus and Y bus formation using Sparsity technique.

2. Power flow study on a given power system network using Guass-Seidal method for 5bus system, IEEE 14bus system and IEEE 30bus system.

3. A SIMULINK model for a single area load frequency problem and simulate with and without controller.

4. Develop a program to solve swing equation.

5. a) Simulation of three Phases full converter using RL & E loads.

b) Simulation of Single Phase full converter using RL & E loads.

6. A simulink model for a two area load frequency problem and Simulate with and without controller.

7. Simulation of 3-phase inverter with PWM controller.

8. Program for PID controller.

9. A SIMULINK model for automatic voltage regulator with and without Controller.

10. Design a Lag compensator through SIMULINK.

**IV year B.Tech – II Sem**

**Code: 8A728 POWER QUALITY**

**(PROFESSIONAL ELECTIVE – IV)**

**L T P C**

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***UNIT – I: TERMS & DEFINITIONS***:

General Classes of Power Quality Problems, Transients, Long Duration Voltage Variations, Short-Duration Voltage Variations, Voltage Imbalance, Waveform Distortion, Voltage Fluctuations, Power Frequency Variations, Power Quality Terms.

***UNIT – II: VOLTAGE SAGS & INTERRUPTIONS***:

Sources of Sags and Interruptions, Estimating Voltage Sag Performance, Fundamental Principles of Protection, Solutions at the End-User Level, Evaluating the Economics of Different Ride-Through Alternatives, Motor Starting Sags, Utility System Fault-Clearing Issues.

(Chapter-2: 2.2 to 2.10 and Chapter-3: 3.1 to 3.7)

***UNIT –III: TRANSIENT OVER VOLTAGES***:

Sources of Transient over Voltages, Principle of over Voltage Protection, Devices for Over Voltage Protection, Utility Capacitor-Switching Transients, Utility System Lightning Protection, Managing Ferro-resonance, Switching Transient Problems with Loads, Computer Tools for Transient Analysis.

***UNIT – IV: FUNDAMENTALS OF HARMONICS***:

Harmonic Distortion, Voltage Versus Current Distortion, Harmonics Versus Transients, Power System Quantities under Non-sinusoidal Conditions, Harmonic Indices, Harmonic Sources from Commercial Loads, Locating Harmonic Sources, System Response Characteristics, Effects of Harmonic Distortion, Inter-harmonics.

(Chapter-4: 4.1 to 4.8 and Chapter-5: 5.1 to 5.11)

***UNIT – V: LONG DURATION VOLTAGE VARIATIONS***:

Principles of Regulating the Voltage, Devices for Voltage Regulation, Utility Voltage Regulator Application, Capacitors for Voltage Regulation, End-User Capacitor Application, Regulating Utility Voltage with Distributed resources, Flicker.

***UNIT – VI: POWER QUALITY MONITORING***:

Monitoring Considerations, Historical Perspective of Power Quality Measuring Instruments, Power Quality Measurement Equipments, Assessment of Power Quality Measurement Data, Application of Intelligent Systems, Power Quality Monitoring Standards. (Chapter-7: 7.1 to 7.7 and Chapter-11: 11.1 to 11.6)

1. **TEXT BOOK**:
2. 1.“***Electrical Power Systems Quality***” By Roger C. Dugan, Mark F. Mcgranaghan, Surya Santoso & H.Wayne Beaty, 2nd Edition, TMH Education Private Ltd., New Delhi.

**REFERENCES:**

1. Power System Quality Assessment, J.Arrilaga, N.R.Watson, S.Chen, John Wiley & Sons.

2. Understanding Power Quality Problems: Voltage Sags & Interruptions, M.H.J. Boller IEEE, 1999

**IV year B.Tech – II Sem**

**Code: 8A817 HIGH VOLTAGE ENGINEERING**

**(PROFESSIONAL ELECTIVE-IV)**

**L T P C**

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**Course Objective :**

This subject deals with the detailed analysis of Breakdown occur in gaseous, Liquids and solid dielectrics. Information about generation and measurement of High voltage and current. In addition the High voltage testing methods are also discussed.

**Course Outcomes:**

1. Learn about applications of different insulating materials.
2. Learn about breakdown in gas, liquid and solid insulating materials.
3. Analyze different methods of generation and measurement of high voltages.
4. Study about high voltage phenomenon and insulation coordination.
5. Study about non destructive testing of material and electrical apparatus.
6. Learn about different tests done on different electrical equipments.

**UNIT - I INTRODUCTION TO HIGH VOLTAGE TECHNOLOGY AND APPLICATIONS:**

Electric Field Stresses, Gas / Vacuum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control, Applications of insulating materials in transformers, Rotating machines, Circuit breakers, Cable power capacitors and bushings.

**UNIT – II BREAK DOWN IN GASEOUS, LIQUID AND SOLID DIELECTRICS:**

Gases as insulating media, Collision process, Ionization process, Townsend’s criteria of breakdown in gases, Paschen’s law. Liquid as Insulator, Pure and commercial liquids, Breakdown in pure and commercial liquids.

Intrinsic breakdown, electromechanical breakdown, Thermal breakdown, Breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, Solid dielectrics used in practice.

**UNIT – III GENERATION AND MEASUREMENT OF HIGH VOLTAGES AND CURRENTS:**

Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators.

Measurement of High Direct Current voltages, Measurement of High Voltages Alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements.

**UNIT – IV OVER VOLTAGE PHENOMENON AND INSULATION CO-ORDINATION:**

Natural causes for over voltages, Lightning phenomenon, Over voltage due to switching surges, system faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems.

**UNIT – V NON-DISTRUCTIVE TESTING OF MATERIAL AND ELECTRICAL APPARATUS:**

Measurement of D.C Resistively, Measurement of Dielectric Constant and loss factor, Partial discharge measurements.

**UNIT – VI HIGH VOLTAGE TESTING OF ELECTRICAL APPARATUS:**

Testing of Insulators and bushings, Testing of Isolators and circuit breakers, Testing of cables, Testing of Transformers, Testing of Surge Arresters, Radio Interference measurements.

**TEXT BOOKS:**

1. High Voltage Engineering **–** M.S. Naidu and V. Kamaraju, TMH Publications, 3rd Edition.

2. High Voltage Engineering Fundamentals **–** E. Kuffel, W.S. Zaengl, J. Kuffel by Elsevier, 2nd Edition.

**REFERENCE BOOKS:**

1. High Voltage Engineering **–** C.L. Wadhwa, New Age Internationals (P) Limited.

2. High Voltage Insulation Engineering **–** Ravindra Arora, Wolfgang Mosch, New Age International (P) Limited.

**B.Tech IV Year – II Sem.**

**Code: 8A827 REACTIVE POWER CONTROL & MANAGEMENT**

**(Professional Elective-IV)**

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**Objective:**

This subject deals with reactive power control and management.

**Course outcomes:**

Students will be able to

* + 1. Understand the load compensation.

1. Understand the Steady – State Reactive Power Compensation in Transmission System.
2. Understand the Reactive Power Coordination.
3. Know about Demand Side Management.
4. Understand the User Side Reactive Power Management
5. Study about Reactive Power Management in Electric Traction Systems and Arc Furnaces.

**UNIT-I: LOAD COMPENSATION**

Objectives and specifications – reactive power characteristics – inductive and capacitive approximate biasing – Load compensator as a voltage regulator – phase balancing and power factor correction of unsymmetrical loads- examples.

**UNIT-II: STEADY – STATE REACTIVE POWER COMPENSATION IN TRANSMISSION SYSTEM**

Uncompensated line – types of compensation – Passive shunt and series and dynamic shunt compensation –examples.

**Transient state reactive power compensation in transmission systems:**

Characteristic time periods – passive shunt compensation – static compensations- series capacitor compensation –compensation using synchronous condensers – examples

**UNIT-III: REACTIVE POWER COORDINATION**

Objective – Mathematical modeling – Operation planning – transmission benefits – Basic concepts of quality of power supply – disturbances- steady –state variations – effects of under voltages – frequency –Harmonics, radio frequency and electromagnetic interferences.

**UNIT-IV: DEMAND SIDE MANAGEMENT**

Load patterns – basic methods load shaping – power tariffs- KVAR based tariffs penalties for voltage flickers and Harmonic voltage levels.

**Distribution side Reactive power Management:**

System losses –loss reduction methods – examples – Reactive power planning – objectives – Economics Planning capacitor placement – retrofitting of capacitor banks.

**UNIT-V: USER SIDE REACTIVE POWER MANAGEMENT**

KVAR requirements for domestic appliances – Purpose of using capacitors – selection of capacitors – deciding factors – types of available capacitor, characteristics and Limitations.

**UNIT-VI: REACTIVE POWER MANAGEMENT IN ELECTRIC TRACTION SYSTEMS AND ARC FURNACES:**

Typical layout of traction systems – reactive power control requirements – distribution transformers- Electric arc furnaces – basic operations- furnaces transformer –filter requirements – remedial measures –power factor of an arc furnace.

**REFERENCES:**

1. Reactive power control in Electric power systems by T.J.E. Miller, John Wiley and sons, 1982.

2. Reactive power Management by D.M. Tagare, Tata McGraw Hill, 2004.

**B.Tech IV Year – II Sem.**

**CODE: 8CC35 FUNDAMENTALS OF VLSI AND EMBEDDED SYSTEMS**

**(Professional Elective-IV)**

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***Prerequisites:*** *STLD, Programming concepts of any language*

***Course Objectives:***

*The objectives of this course are*

* *To provide basic knowledge in embedded system design using Embedded C.*
* *To introduce syntax, lexical conventions, data types and memory related to Verilog HDL.*
* *To design, test and implementation of the digital hardware using various modeling styles.*

***Course Outcomes****: After studying this course, the students will be able to*

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| *CO1* | *Understand levels of design description, concurrency, simulation and synthesis.* |
| *CO2* | *Apply language constructs, data types, operators available in verilog HDL.* |
| *CO3* | *Design combinational logic and sequential logic in gate level modeling.* |
| *CO4* | *Demonstrate the use of development software for a particular application and choosing appropriate OS.* |
| *CO5* | *Understanding and building basic embedded system using 8051.Understanding its design* |
| *CO6* | *Design of embedded systems and implementation of switch reading.* |

**UNIT – I: LANGUAGE CONSTRUCTS AND CONVENTIONS:**

Introduction, Keywords, Identifiers, White Space, Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators. Verilog Module structure.

**UNIT – II: MODELING AT DATA FLOW LEVEL:**

Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators.

**BEHAVIORAL MODELING:** Introduction, Initial Construct, Always Construct, Assignments with delays, Blocking and Non blocking Assignments

**UNIT – III: MODELING AT DATA FLOW LEVEL:** Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators.

**BEHAVIORAL MODELING:** Introduction, Initial Construct, Always Construct, Assignments with delays, Blocking and Non blocking Assignments

**UNIT – IV: PROGRAMMING EMBEDDED SYSTEMS IN C**

Introduction ,What is an embedded system, Which processor should you use, Which programming language should you use, Which operating system should you use, How do you develop embedded software, Conclusions

**UNIT – V: The 8051 Architecture:**

Architecture of 8051 Micro controller, Memory Organization. Special Function Registers. Input /Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input /Output, Interrupts.

**UNIT – VI: READING SWITCHES**

Introduction, Basic techniques for reading from port pins, Example: Reading and writing bytes, Example: Reading and writing bits (simple version), Example: Reading and writing bits (generic version),

**ADDING STRUCTURE TO THE CODE**

Introduction, Object-oriented programming with C, The Project Header (MAIN.H), The Port Header (PORT.H), Example: Restructuring the ‘Hello Embedded World’ example, Example: Restructuring the goat-counting example, Further examples, Conclusions

**TEXT BOOKS:**

1. T.R. Padmanabhan and B. Bala Tripura Sundari, Design through Verilog HDL – WSE, 2004 IEEE Press.
2. Embedded C - Michael J. Pont, 2nd Ed., Pearson Education, 2008

**REFERENCE BOOKS:**

1. J. Bhaskar, A Verilog Primier, BSP, 2003.
2. PICmicro MCU C-An introduction to programming, The Microchip PIC in CCS C - Nigel Gardner

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**IV Year B.Tech – II Sem**

**CODE: 8A820 ELECTRICAL DISTRIBUTION SYSTEMS**

**(PROFESSIONAL ELECTIVE – V)**

**L T P C**

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**Course Objective:**

This course is an extension of Power System I& II. Knowledge of distribution system modeling, and understanding of various factors like coincidence factor, contribution factor, loss factor etc helps in how loads effects the system .Various models of feeders & substations and location of faults and protective devices gives awareness to students their usage in practical applications.

**Course Outcomes:**

By the end of the unit the student will be able to

1. Know the importance of terms used in distribution system such as load factor, loss factor etc and how these are interred related.
2. Know the importance of different voltages in primary & secondary distribution systems and types of feeders in our country.
3. Identify the importance of location of optimal sub –station through theoretical methods.
4. Calculate power loss and voltage drop in balanced lines and derivations connected with these.
5. Understand various types of protective devices and where and how these are used and the general procedure to coordinate protective devices.
6. Understand the importance of power factor voltage control and how to improve it with various types of correction equipments and best location for them in a system so as to give optimum results.

**UNIT – 1 GENERAL CONCEPT**

Introduction to distribution systems, Load modeling and characteristics. Coincidence factor, contribution factor loss factor - Relationship between the load factor and loss factor. Classification of loads (Residential, Commercial, Agricultural and Industrial) and their characteristics.

**UNIT – II DISTRIBUTION FEEDERS**

Design Considerations of Distribution Feeders: Radial and loop types of primary feeders, Voltage levels, Feeder loading; Basic design practice of the secondary distribution system.

**UNIT – III SUBSTATIONS**

Location of Substations: Rating of distribution substation, Service area within primary feeders. Benefits derived through optimal location of substations.

**UNIT – IV SYSTEM ANALYSIS** Voltage drop and power-loss calculations: Derivation for voltage drop and power loss in lines, Manual methods of solution for radial networks, Three phase balanced primary lines.

**UNIT – V PROTECTION & CO-ORDINATION**

Objectives of distribution system protection, Types of common faults and procedure for fault calculations. Protective Devices: Principle of operation of Fuses, Circuit Reclosures, line sectionalizes and circuit breakers.

Coordination of Protective Devices: General coordination procedure.

**UNIT – VI POWER FACTOR IMPROVEMENT & VOLTAGE CONTROL**

Capacitive compensation for power-factor control. Different types of power capacitors, Shunt and series capacitors, Effect of shunt capacitors (Fixed and switched),

Power factor correction, capacitor allocation - Economic justification - Procedure to determine the best capacitor location.

Voltage Control: Equipment for voltage control, Effect of series capacitors, Effect of AVB / AVR, line drop compensation.

**TEXT BOOK:**

1. “Electric Power Distribution system, Engineering” – Turan Gonen, Mc Graw-hill 2nd edition.

2. Electric Power Distribution – A.S. Pabla, Tata Mc Graw-hill, 4th edition.

**REFERENCES:**

1. Electrical Power Distribution and Automation – S.Sivanagaraju, V.Sankar, Dhanpat Rai publishers. Rai & Co, 1st edition.

1. Electrical Power Distribution Systems – V.Kamaraju, Right Publishers, 2nd edition.

**IV Year B.Tech – II Sem.**

**Code: 8A826 PROGRAMMABLE LOGIC CONTROLLERS**

**(Professional Elective – V)**

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**L T P C**

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**UNIT – I**: PLC: Characteristics, Operation, function, Types of PLC, Architecture Of PLC Applications of PLC, PC v/s PLC.

**UNIT –II:** Overview of I/O system. Classification: serial, parallel, discrete, analog special. Direct I/O, Parallel I/O, Serial I/O, discrete input modules: DC input, AC input, Rectifier with filter, Isolation, logic section. Discrete output modules: operating principals, Analog input modules: single ended, differential input, Common AC source, isolation, protection. Configuration, power line conditioner.

**UNIT – III**: Ladder diagram: of logic gates, multiplexer, Ladder diagram for different logical conditions or logical equations or truth table, Timers: types of timer, Characteristics. Function of timer in PLC. Classification of a PLC timer. Ladder diagram using timer, PLC counter. Ladder diagram using counter.

**UNIT – IV:** Introduction of Management Hierarchy of an industry. Industrial control process . Parallel and Serial communication interface. Simplex, Half duplex, full duplex. RS 232- DB-25 connector, DB-9 connector, RS 422, EIA 485 interface, Introduction of industrial network. Bus topology, Ring topology, Star topology, Tree topology.

**UNIT – V**: basic Concept, History and Hierarchy of DCS, Functions of each level. Advantages and Disadvantages, Architecture of SCADA .Working of SCADA.

**UNIT – VI**: PLC, DCS and SCADA suitability .Applications: Thermal power plant, Irrigation and Cement factory.

**TEXT BOOKS:**

* + - 1. Programmable Logic Controllers and Industrial Automation an Introduction Mitra, Madhuchanda; Gupta, Samarjit Sen Param International Publishing (India) Pvt. Ltd., New Delhi, Latest edition.

1. 2. Programmable logic controllers: principles and applications Webb, John W.; Reis, Ronald A. PHI Learning Pvt. Ltd. New Delhi, Latest edition.
2. 3 Programmable logic controls: principles and applications NIIT PHI Learning Pvt. Ltd. New Delhi, Latest edition.
3. 4. Practical SCADA for Industry Bailey, David; Wright, Edwin Newnes , Burlington, MA

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**IV Year B.Tech – II Sem.**

**Code: 8A833 SWITCH MODE POWER CONVERSION**

**(Professional Elective – V)**

**L T P C**

**3 - - 3**

**Course Objective:**

Understand the concepts of buck, boost converters, voltage, current fed converters, phase modulation technique, buck, boost, design of drive circuits for switching devices and mechanisms of loop stabilization.

**Course Outcomes:**

Students will able to

1. Describe Basic topologies of buck, boost converters, buck-boost converters, and cuk converter.
2. Explain Voltage mode and current mode control of converters.
3. Explain types of resonant converters, methods of control and phase modulation technique.
4. Explain Application of state-space averaging to switching converters.
5. Understand Design of filter inductor & capacitor, and power transformer.
6. Understand mechanisms of loop stabilization.

**UNIT- I: DC/DC CONVERTERS:**

Basic topologies of buck, boost converters, buck-boost converters, and cuk converter, isolated DC/DC converter topologies—forward, and fly-back converters, half and full bridge topologies, modeling of switching converters.

**UNIT –II: CURRENT MODE AND CURRENT FED TOPOLOGIES:**

Voltage mode and current mode control of converters, peak and average current mode control, its advantages and limitations, voltage and current fed converters.

**UNIT – III: RESONANT CONVERTERS:**

Need for resonant converters, types of resonant converters, methods of control, phase modulation technique with ZVS in full-bridge topology, series resonant converter and resonant transition converter.

**UNIT – IV: CONVERTER TRANSFER FUNCTIONS:**

Application of state-space averaging to switching converters, derivation of converter transfer functions for buck, boost, and fly-back topologies.

**UNIT – V: POWER CONVERTER DESIGN:**

Design of filter inductor & capacitor, and power transformer, Ratings for switching devices, current transformer for current sensing, design of drive circuits for switching devices, considerations for PCB layout.

**UNIT –VI: CONTROLLER DESIGN:**

Introduction, mechanisms of loop stabilization, shaping E/A gain vs. frequency characteristic, conditional stability in feedback loops, stabilizing a continuous mode forward converter and discontinuous mode fly-back converter, feed-back loop stabilization with current mode control, the right-half plane zero.

**TEXT BOOKS:**

1. Ned Mohan Tore M. Undeland: Power Electronics: Converters, Applications, and Design, Edition3, John Wiley & Sons, 2007.

2. Abraham I. Pressman, Switching Power Supply Design‖, Mc Graw Hill International, Second Edition, 1999.

3. P.C. Sen: Modern Power Electronics, S. Chand-2004.

4. Andrzej M. Trzynadlowski Introduction to Modern Power Electronics, 2nd Edition, illustrated Publisher John Wiley & Sons, 2010.

5. Muhammad H. Rashid, Power electronics hand book, ISBN: 81 8147 367 1.

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**IV Year B.Tech – II Sem.**

**CODE: 8C831 ARTIFICIAL NEURAL NETWORKS**

**(Professional Elective – V)**

**L T P C**

**3 - - 3**

The student who has completed this course will

CO1- Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations

CO2- Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation and learning.

CO3- Demonstrate awareness and a fundamental understanding of Expert Systems and its applications

CO4- Demonstrate fundamental understanding of models of machine learning.

CO5- Apply basic principles of supervised learning

CO6- Apply basic principles of unsupervised learning

**UNIT 1: FOUNDATIONS FOR AI**

AI: Application areas, AI Basics - Search techniques Depth First Search, Breadth First Search, Divide and Conquer, Greedy Method, A\*, AO\*, Branch and Bound, Gradient Descent, NN basics (Perceptron and MLP, FFN, Back propagation), Knowledge and Reasoning.

**UNIT II: ARTIFICIAL NEURAL NETWORKS**

Use of ANN, Evolution of NN, Biological Neuron, Basics of ANN, Activation Function, McCulloh-Pitts Neuron Model.

**UNIT III: EXPERT SYSTEM**

Need and Justification for ES, Characteristics and Components of ES, Expert System Development, Application and Case Studies.

**UNIT IV: FOUNDATIONS FOR ML**

ML Fundamentals &amp; Techniques overview, Basics of Vectors and Matrices, Data Preprocessing,

Machine Learning terminology, ML Classification - Model Assumptions, Probability estimation, Required data processing M-estimates, Feature selection: Mutual information K-Nearest Neighbors

**UNIT V: SUPERVISED LEARNING**

Linear Regression, Logistic Regression, Decision Tree and issues, Bayesian Classification, Hidden Mark, Case Based Reasoning

**UNIT VI: UNSUPERVISED LEARNING**

Clustering Types and Methods, Expectation Maximization, Self Organizing Maps, Adaptive Resonance Theory

**TEXT BOOKS**

1. Artificial Intelligence And Machine Learning By VINOD CHANDRA S.S., ANAND HAREENDRAN S., PHI Learning India, 2014, ISBN-978-81-203-4934-6

2. Machine Learning by Vincy Joseph Anuradha Srinivasaraghavan, 2019,Wiley India Pvt Ltd., ISBN – 978-81- 265-7851-1

3. Artificial Intelligence Making a System Intelligent by Dr. Nilakshi Jain, 2019,Wiley India Pvt Ltd., ISBN – 978- 81-265-7994-5

**REFERENCE BOOKS**

1. Artificial Intelligence: A Modern Approach, by Stuart Russell and Peter Norvi, Stuart Russell and Peter Norvig, 2010. Pearson Education, Inc. ISBN: 978-0-13-604259-4

2. Artificial Intelligence (3rd Edition)by Patrick Henry Winston

3. Pattern Recognition and Machine Learning by Christopher M Bishop.

**IV Year B.Tech – II Sem**

**CODE: 8A883 MAIN PROJECT**

**L T P/D C**

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## *Course Objectives:*

To enhance the knowledge on selecting a project, learn related tools and enhance programming and communication skills for employability.

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

1. Develop plans with relevant people to achieve the project's goals
2. Break work down into tasks and determine handover procedures
3. Identify links and dependencies, and schedule to achieve deliverables
4. Estimate the human and physical resources required, and make plans to obtain the necessary resources
5. Allocate roles with clear lines of responsibility and accountability with team spirit.

6.     Design and develop the software or prototype to meet societal needs

A project shall be carried out by a group of students consisting of 2 to 3 in number in fourth year second semester. This work shall be carried out under the guidance of the faculty assigned as internal guide and shall involve design, fabrication, software development or any other significant activity. This can be of interdisciplinary nature also.

Out of total 100 marks for project work (in the final year second semester), 30 marks shall be for Internal Evaluation and 70 marks for the External Evaluation at the end of the Semester.

External Evaluation of the project (viva-voce) shall be conducted by a committee appointed by the Chief Superintendent. The committee consists of an external examiner, HOD, a Senior Faculty Member and Internal Guide.

**Division of marks for internal assessment – 30 marks**

**Division of Marks for External Evaluation – 70 Marks**