**ACADEMIC REGULATIONS**

**COURSE STRUCTURE**

**AND**

**detailed syllabus**

for

**B.Tech Four Year Degree Course**

**(A-17 III & IV year)**

in

**Electrical AND ELECTRONICS engineering**

**(EEE)**

(Applicable for the batches admitted from 2017-2018)

****

**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, 2019**

**B. Tech – 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.

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**VISION**

To emerge as a premier center in Electrical & Electronics engaged in teaching, research and consultancy with focus on human values and professional ethics.

**MISSION**

1. To empower the students and provide the academic environment to pursue and attain competencies in their studies at undergraduate, post graduate and doctoral levels 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 service to 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 (PEOs) of B.Tech EEE**

1. **Preparation:** To prepare students to excel in postgraduate programmes or to succeed in electrical industry/technical profession through global, rigorous education.
2. **Core Competence:** To provide students with a solid foundation in mathematical, scientific and engineering fundamentals required to solve engineering problems and also to pursue higher studies.
3. **Breadth:** To train students with good scientific and engineering breadth so as to comprehend, analyze, design, and create novel products and solutions for the real life problems.
4. **Professionalism:** To inculcate in students’ professional and ethical attitude, effective communication skills, team work skills, multidisciplinary approach, and an ability to relate engineering issues to broader social context.
5. **Learning Environment**: To provide student with an academic environment aware of excellence, leadership, written ethical codes and guidelines, and the life-long learning needed for a successful professional career.

**Program Outcomes (POs) of B.Tech EEE**

1. Graduates will demonstrate knowledge of differential equations, vector calculus, complex variables, matrix theory, probability theory, physics, chemistry and electrical and electronics engineering.
2. Graduates will demonstrate an ability to identify, formulate and solve electrical engineering problems.
3. Graduate will demonstrate an ability to design electrical and electronic circuits and conduct experiments with electrical systems, analyze and interpret data.
4. Graduates will demonstrate an ability to design digital and analog systems and component.
5. Graduates will demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks.
6. Graduate will demonstrate skills to use modern engineering tools, software and equipment to analyze problems.
7. Graduates will demonstrate knowledge of professional and ethical responsibilities.
8. Graduate will be able to communicate effectively in both verbal and written form.
9. Graduate will show the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues.
10. Graduate will develop confidence for self education and ability for life-long learning.
11. Graduate who can participate and succeed in competitive examinations like GATE, GRE.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Program**  **Educational**  **objectives** | **Program Outcomes** | | | | | | | | | | |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** |
| **I** | **X** | **X** |  |  |  |  |  |  |  |  | **X** |
| **II** | **X** | **X** | **X** | **X** |  | **X** |  |  |  |  | **X** |
| **III** |  | **X** | **X** | **X** | **X** |  |  |  |  |  |  |
| **IV** |  |  |  | **X** |  |  | **X** | **X** | **X** |  |  |
| **V** |  |  |  |  |  |  |  |  | **X** | **X** |  |

**ACADEMIC REGULATIONS FOR B.TECH. REGULAR STUDENTS WITH EFFECT FROM THE**

**ACADEMIC YEAR 2017-18 (A-17)**

**1.0 Under-Graduate Degree Programme in Engineering & Technology (UGP in 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 2017-18 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 |
|  | Biotechnology |

**1.2. Credits (Semester system from I year onwards)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl.No.** | **Type of Subject** | **Periods / Week** | **Credits** |
| 1 | Theory | 03/04 | 03/04 |
| 2 | Practical | 02/03/04 | 01/02 |
| 3 | Engineering drawing - I | 01 L/04D (I year I Sem) | 03 |
| 4 | Engineering drawing - II | 01 L/02D (I year II Sem) | 02 |
| 5 | Group Project | 03 | 02 |
| 6 | Industry oriented Mini Project | 4 weeks in summer vacation at the end of III year – II sem | 02 |
| 7 | Project Phase -I | IV year – I sem | 02 |
| 8 | Technical Paper writing and seminar | Iyear – I sem to IV year II Sem\* | 01 each |
| 9 | Project Phase – II | IV year - II Sem | 12 |
| 10 | Comprehensive Viva Voce - I | At the end of II, III, IV year - II Sem\* | 01 |

\*According to the syllabus approved by the Academic Council as per Board of Studies recommendations.

**2.0 Eligibility for admission**

**2.1** Admission to the under merit rank obtained by

graduate programme shall be made either on the basis of the the qualified candidate in entrance test conducted by the

Telangana State Government (EAMCET) or the University 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.

**2.2** The medium of instructions for the entire under graduate programme 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.

Each semester is structured to provide 24 credits, totaling to 192 credits for the entire

B.Tech. programme.

Each student shall secure 192 credits (with CGPA ≥ 5) required for the completion of the under graduate programme and award of the B.Tech. degree.

**3.2 UGC/ AICTE** specified definitions/ descriptions are adopted appropriately for various

terms and abbreviations below.

**3.2.1 Semester scheme**

used in these academic regulations/ norms,

which are listed

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 by UGC and curriculum / course structure as suggested by AICTE are followed.

**3.2.2 Credit courses**

All subjects/ courses are to be registered by the student in a semester 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/ semester for theory/ lecture (L) courses.

One credit for two hours/ week/ semester for laboratory/ practical (P) courses or tutorials (T).

Courses like Environmental Science, Professional Ethics, Gender Sensitization lab and other student activities like NCC/NSO and NSS are identified as mandatory courses. These courses will not carry any credits.

**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 university has followed almost all the guidelines issued by AICTE/UGC.

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No.** | **Broad Course**  **Classification** | **Course Group/ Category** | **Course Description** |
| 1 | Foundation  Courses  (FnC) | BS – Basic Sciences | Includes mathematics, physics and chemistry subjects |
| 2 | ES - Engineering  Sciences | Includes fundamental Engineering subjects |
| 3 | HS – Humanities and  Social sciences | Includes subjects related to humanities, social sciences and management |
| 4 | Core Courses  (CoC) | PC – Professional  Core | Includes core subjects related to the parent discipline/ department/ branch of Engineering. |
| 5 | Elective Courses (EℓC) | PE – Professional  Electives | Includes elective subjects related to the parent discipline/ department/ branch of Engineering. |
| 6 | OE – Open Electives | Elective subjects which include inter- disciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering. |
| 7 | Core Courses | Project Work | B.Tech. project or UG project or UG major project |
| 8 | Industrial training/ Mini- project | Industrial training/ Internship/ UG Mini-project/ Mini-project |
| 9 | Seminar | Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering. |
| 10 | Minor courses | - | 1 or 2 Credit courses (subset of HS) |
| 11 | Mandatory  Courses (MC) | - | Mandatory courses  (non-credit) |

**4.0 Course registration**

**4.1** A ‘faculty advisor or counselor’ shall be assigned to a group of 15 students, who will advise student about the under graduate programme, its course structure and curriculum, choice/option for subjects/ courses, based on their competence, progress, pre-requisites and interest.

**4.2** The academic section of the college invites ‘registration forms’ from students before the beginning of the semester through ‘on-line registration’, ensuring ‘date and time stamping’. The on-line registration requests for any ‘current semester’ shall be **completed before the commencement of SEEs (Semester End Examinations) of the ‘preceding semester’**.

**4.3** A student can apply for **on-line** registration, **only after** obtaining the ‘**written approval**’

from faculty advisor/counselor, which should be submitted to the college academic section

through the Head of the Department. A copy of it shall be retained

Department, faculty advisor/ counselor and the student.

with Head of the

**4.4** A student may be permitted to register for the subjects/ courses of **choice** with a total of 24 credits per semester (minimum of 20 credits and maximum of 28 credits per semester and permitted deviation of ± 17%), based on **progress** and SGPA/ CGPA, and completion of the ‘**pre-requisites’** as indicated for various subjects/ courses, in the department course structure and syllabus contents. However, a **minimum** of 20 credits per semester must be registered to ensure the ‘**studentship**’ in any semester.

**4.5** Choice for ‘additional subjects/ courses’ to reach the maximum permissible limit of 28 credits (above the typical 24 credit norm) must be clearly indicated, which needs the specific approval and signature of the faculty advisor/ counselor.

**4.6** If the student submits ambiguous choices or multiple options or erroneous entries during

**on-line** registration for

the subject(s) / course(s) under a given/ specified course group/

category as listed in the course structure, only the first mentioned subject/ course in that category will be taken into consideration.

**4.7** Subject/ course options

exercised through **on-line** registration are final and **cannot** be

changed or inter-changed; further, alternate choices also will not be considered. However, if the subject/ course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats). Such alternate arrangements will be made by the head of the department, with due notification and time-framed schedule, within the **first week** after the commencement of class-work for that semester.

**4.8** Dropping of subjects/ courses may be permitted, only after obtaining prior approval from the faculty advisor/ counselor (subject to retaining a minimum of 20 credits), ‘**within a period of 15 days**’ from the beginning of the current semester.

**4.9 Open electives**: The students have to choose one subject each from (OE-I), (OE-II) and (OE-III) from the list of open electives given. However, the student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

**4.10 Professional electives**: students have to choose five professional electives from the list of professional electives given. However, the students may opt for professional elective subjects offered in the related area.

**5.0 Subjects/ courses to be offered**

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

**5.2** A subject/ course may be offered to the students, **only if** a minimum of 20 students (1/3 of the section strength) opt for it. The maximum strength of a section is limited to 80 (60 + 1/3 of the section strength).

**5.3** More than **one faculty member** may offer the **same subject** in any semester. However, selection of choice for students will be based on - ‘**first come first serve** basis and CGPA criterion’ (i.e. the first focus shall be on early **on-line entry** from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

**5.4** If more entries for registration of a subject come into picture, then the Head of Department concerned shall decide, whether or not to offer such a subject/ course for **two (or multiple) sections**.

**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 Environmental Science, Professional Ethics, Gender

Sensitization Lab, 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.

**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 registration for that semester shall stand cancelled. They will not be promoted to the**

**next semester.** They may seek re-registration 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.

**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 (26 out

of 75 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 UG mini-project and seminar, if 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 submit a report on UG mini-project, or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) does not present the seminar as required in the IV year I Semester, or (iii) secures less than 40% marks in UG mini-project/ seminar evaluations.

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

**7.3 Promotion Rules**

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Promotion** | **Conditions to be fulfilled** |
| 1 | First year first semester to first year second semester | Regular course of study of first year first semester. |
| 2 | First year second semester to second year first semester | i. Regular course of study of first year second semester.  ii. Must have secured at least 24 credits out of 48 credits i.e., 50% of credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not. |
| 3. | Second year first semester to second year second semester | Regular course of study of second year first semester. |
| 4 | 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 58 credits out of 96 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. |
| 5 | Third year first semester to third year 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 at least 86 credits out of 144 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. |
| 7 | Fourth year first semester to fourth year second semester | Regular course of study of fourth year first semester. |

**7.4** A student shall register for all subjects covering 192 credits as specified and listed in the

course structure, fulfills

all the attendance and academic requirements for 192 credits,

‘earn all 192 credits’ by securing SGPA 5.0 (in each semester) and CGPA (at the end of each successive semester) 5.0 to successfully complete the under graduate programme.

**7.5** After securing the necessary 192 credits as specified for the successful completion of the entire under graduate programme, the student can avail exemption of two subjects up to 6 credits, that is, one open elective and one professional elective subject or two professional elective subjects for optional drop out from these 192 credits earned; resulting in 186 credits for under graduate programme performance evaluation, i.e., the performance of the student in these 186 credits shall alone be taken into account for the calculation of

‘the final CGPA (at the end of under graduate programme, which takes the SGPA of the IV year II semester into account)’ , and shall be indicated in the grade card of IV year II semester. However, the performance of student in the earlier individual semesters, with the corresponding SGPA and CGPA for which grade cards have already been given will not be altered.

**7.6** If a student registers for some more ‘**extra subjects’** (in the parent department or other departments/branches of engg.) other than those listed subjects totaling to 192 credits as

specified in the course

structure of his department, the performances

in those ‘ **extra**

**subjects**’ (although evaluated and graded using the same procedure as that of the required

192 credits) will not be taken into account while calculating the SGPA and CGPA. For such ‘**extra subjects’** registered, % 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 regulations 6 and 7.1 – 7.5 above.

**7.7** A student eligible to appear in the end semester examination for any subject/ course, but

absent from it or failed (thereby failing to secure **‘C’** grade or above)

may 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 to be obtained in the SEE supplementary examination for evaluating performance in that subject.

**7.8** A student **detained in a semester due to shortage of attendance, may be re-admitted when the same semester is offered in the next academic year for fulfillment 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.

**7.9** A student detained **due to lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits.** The academic regulations under which student has been readmitted shall be applicable to him.

**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 a practical subject. In addition, industry-oriented mini-project, group project, Project Phase –I will also be evaluated for 100 marks, Project Phase – II for 200 marks, Technical Paper writing and Seminar and comprehensive viva for 100 marks each.

8.2 For all the subjects the distribution of marks shall be 25 for Continuous Internal Evaluation (CIE) and 75 for the Semester End-Examination (SEE).

**8.3 Theory Subjects**

1. **Pattern for Continuous Internal Evaluation** 
   1. **Subjects except Foreign languages (16+5+4=25 Marks)**

* There shall be two mid session examinations in every theory course. 16 **marks** are earmarked for each mid session examination. The marks shall be awarded considering the average of two mid session examination marks in each course. If any candidate is absent for any subject in a mid test and/or wishes to improve the performance, a Third Mid test will be conducted for the Student by the College in the entire syllabus on the same day of the main examination on payment fee as decided by the finance committee of SNIST. The result will be treated equal to Third mid test and average of better two tests will be considered. Each mid test will have compulsory questions without choice and long answer questions as detailed in the following paragraphs.
* The mid test is conducted for 64 marks reduced to 16 marks, test is for two hours duration consisting of two parts, i.e. Part ‘A’, and Part ‘B’.
* **Part–A:** Part Ashall have no choice and will have four short answer questions set for 16marks and reduced to 4 marks.
* **Part–B:** Part B of the question paper shall have subjective type questions set for 48 **marks** reduced to 12 marks and shall have 4 questions out of which 3 are to be answered. At least one question must appear from each unit and fourth question must be with 3 bits each bit from one unit
* Each Mid session examination in theory subjects will be restricted to three units, out of the total of 6 units of syllabus, i.e. Mid test – I will be on Units 1 to 3, Mid test – II will be on Units 4 to 6.
* Two assignments shall be given for a total weightage of 5 marks. Assignment-I is to be submitted before the first mid examination for award of 2 marks and for assignment-II which is to be submitted before the second mid test, for award of 2 marks. Students will be given back the assignment before mid session examinations. One mark is allotted for class notes which are to be signed by concerned teacher every fortnight.
* Five marks for each theory course shall be given for those 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 up to 82% | 2 |
| 3. | More than 82% and up to 90% | 3 |
| 4 | More than 90% | 4 |

* Marks for attendance shall be added to each subject based on average of attendance of all subjects put together.
* Award of final sessional marks: Attendance, average marks of two assignments, marks for class notes and mid-examination marks shall be added and the total marks are awarded as final sessional marks.

**(ii) Foreign languages**

|  |  |
| --- | --- |
| 2 written tests (Average of two to be taken) | 12 marks |
| Oral Comprehension | 04 marks |
| Assignment & Class notes | 05 marks |
| Attendance | 04 marks |

**b) Pattern for External Examinations (75 marks)**

* There shall be external examination in every theory course it shall 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 25 marks, which is compulsory. It will have 10 short questions out of which 5 questions are set with 3 marks each and another 5 questions are set with 2 marks
* Part-B of the question paper shall have subjective type questions for 50 marks and shall have 8 questions out of which 5 are to be answered. At least one question must appear from each Unit. . Seventh question must have 2 to 3 bits taking from 1st, 2nd, and 3rd units and 8th question also with 2 to 3 bits taken from 4th, 5th and 6th units. And not more than 2 questions from any one unit. All the questions carry equal marks.

**iv.** **Pattern of Evaluation for Lab subjects** **(100 marks)**

For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 75 marks for semester end examination. Out of the 25 marks for Continuous Internal Evaluation, the distribution is as follows

|  |  |  |
| --- | --- | --- |
| 1. | Day to Day work | 05 marks |
| 2. | Final Record and viva | 05 marks |
| 3. | Average of two tests including viva | 05 marks |
| 4. | Lab Based Project Report viva and demo | 06 marks |
| 6. | Attendance | 04 marks |
| Total | | 25 marks |

The semester end examination for 75 marks 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:

|  |  |  |
| --- | --- | --- |
| 1. | Procedure to experiment and calculation | 15 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 | | 75 marks |

**In case computer based examinations**

|  |  |  |
| --- | --- | --- |
| 1. | Flow chart and algorithms | 15 marks |
| 2. | Program writing and execution | 30 marks |
| 3. | Result and conclusions | 20 marks |
| 4. | Viva voce and Record | 10 marks |
| Total | | 75 marks |

8.5 For the subject having design and/or drawing, (such as Engineering Drawing I, Engineering Drawing II and Machine Drawing), the distribution shall be 25 marks for internal evaluation (10 marks for day-to-day work including drawing, home assignment work, 10 marks for average of two internal tests and 5 marks for attendance) and 75 marks for end semester 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 (5.3 (a) 1)

8.6 Group Project (25+75=100 Marks) – This can be Inter disciplinary

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 teacher(s) 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 25 marks of Continuous Internal Evaluation.

**The continuous internal evaluation shall consist of:**

|  |  |
| --- | --- |
| Day to day work | 10 marks |
| Report | 05 marks |
| Demonstration / presentation | 10 marks |
| Total sessional marks | 25 marks |
| Semester End Examination | 75 Marks |

The semester end examination will be carried out by a committee consisting of an external examiner, Head of the department or his nominee, a senior faculty member and the supervisor for 75 marks.

Student shall be deemed to have satisfied the requirement for the subject concerned, if the student secures not less than 35% marks in the semester end examination and minimum of 40% of marks in the sum total of the Continuous Internal Evaluation and semester end examination taken together.

**8.7 Industry oriented mini project (25+75=100 Marks)**

There shall be an industry-oriented mini-Project in their specialization that may be carried out in collaboration with an industry / R & D organization / Academic Institution, to be taken up during the vacation after III year II Semester examination. However, the mini project and its report shall be evaluated during IV year I Semester. The industry oriented mini project shall be evaluated for a total of 100 marks with 25 marks for internal assessment and 75 marks for semester end examination. The mini project must be submitted in report form and should be presented before a committee, consisting of an external examiner, Head of the department or his nominee, a senior faculty member of the department and supervisor of the mini project when IV year I semester end examinations are carried out.

**The pattern of Continuous Internal Evaluation** is as follows:

|  |  |
| --- | --- |
| Work in progress as evaluated by internal guide | 5 marks |
| Work in progress as evaluated by External guide | 5 marks |
| Report | 5 marks |
| Seminar presentation and defense of project | 10 marks |
| Total | 25 marks |

If the mini project is conducted within the college, the work in progress is evaluated by the supervisor for 10 marks.

**Student shall be deemed to have satisfied, if the student secures not less than 35% marks in the semester end examination and minimum of 40% of marks in the sum total of the Continuous Internal Evaluation and end examination taken together.**

**8.8. Project Phase -I (25+75=100 Marks)**

A project Phase I in fourth year first semester will be evaluated for 100 marks as follows. This is aimed at the students to identify and show progress in a project on which they are likely to continue for their project in final year second semester.

The Continuous Internal Evaluation shall consist of:

|  |  |
| --- | --- |
| Literature survey and presenting  seminar at the end of 6 weeks | 10 marks |
| Report | 05 marks |
| Demonstration / presentation  at the end of 12 weeks | 10 marks |
| Total sessionals marks | 25 marks |

Semester End Examination 75 marks

**Pattern of external evaluation for project Phase – I.**

|  |  |
| --- | --- |
| Final Project Report | 15 marks |
| Presentation | 10 marks |
| Demonstration / Defense of Project | 50 Marks |
| **Total** | **75 marks** |

**There shall be end semester evaluation in project phase – I. Student must secure 40% marks i.e. 30 marks out of 75 marks to be successful.**

**8.9. Project Phase – II (50+150=200 Marks)**

Out of total 200 marks for project work (in the final year second semester), 50 marks shall be for Continuous Internal Evaluation and 150 marks for the External Evaluation at the end of the Semester.

**The pattern of Continuous Internal Evaluation is as follows:**

**Division of marks for internal assessment – 50 marks**

|  |  |
| --- | --- |
| Progress of Project work and the corresponding interim report  as evaluated by internal guides at the end of 5 weeks | 05 marks |
| Seminar at the end of 5 weeks | 05 marks |
| Progress of Project work as evaluated by guides at the end of 10 weeks | 05 marks |
| Seminar at the end of 10 weeks | 05 marks |
| Evaluation by the Guides ( at the end of 15 weeks) | 10 marks |
| Final Project Report | 05 marks |
| Final presentation and defense of the project | 15 marks |
| Total | 50 marks |

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.

If the project is carried out internally the marks supposed to be given by external guide will be given by internal guide himself.

**Division of Marks for External Evaluation – 150 Marks**

**Pattern of External Evaluation for Project Phase -II**

|  |  |
| --- | --- |
| Final Project Report | 30 marks |
| Presentation | 20 marks |
| Demonstration / Defense of Project | 100 Marks |
| **Total** | **150 marks** |

Student shall be deemed to have satisfied, if the student secures not less than 35% marks in the semester end examination and minimum of 40% of marks in the sum total of the Continuous Internal Evaluation and semester end examination taken together. i.e 80 marks to be successful in this subject.

**8.10. Technical Paper writing & Seminars I to VIII (100 Marks) each**

There shall be a technical Paper writing &seminar evaluated for 100 marks in every Semester from I year I Sem to IV year II Sem\*. The evaluation is purely internal and will be conducted as follows:

Content : 20 marks

Presentation including PPT : 20 marks

Seminar Notes : 10 marks

Interaction : 10 marks

Report : 25 marks

Attendance : 10 marks

Punctuality : 05 marks

Total **100 marks**

\* According to the syllabus approved by the Academic Council as per Board of Studies recommendations

Student must secure 40% i.e. 40 marks to be successful

**8.11 Comprehensive Viva-voce (II-II, III-II and IV-II\*)**

There shall be comprehensive viva voce as stated above which will be evaluated for 100 marks. Out of 100 marks, 50 marks are internal and 50 marks are external. The evaluation is purely internal and will be conducted by a committee consisting of Head of the Department or his nominee and two senior teachers.

|  |  |
| --- | --- |
| First mid-sessional viva at the end of 5 weeks (Internal) | 25 marks |
| Second mid-sessional viva at the end of 10 weeks (Internal) | 25 marks |
| Final viva during practical examinations (External) | 50 marks |
| Total | 100 Marks |

\* According to the syllabus approved by the Academic Council as per Board of Studies recommendations

**8.12** The evaluation has to be carried out by two teachers independently and average be taken. The sessional marks awarded by the Department are not final. They are subject to scrutiny by a committee constituted by the college and scaling is done wherever necessary. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved in the respective departments as per the college norms and shall be produced to the Committee of the college or any external agency like NBA etc. as and when the same are called for.

**9.0 Grading procedure**

**9.1** Marks will be awarded

to indicate the performance of student in each theory subject,

laboratory / practicals, seminar, UG mini project and UG major project. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End

Examination, both taken grade shall be given.

together) as specified in item 8 above, a corresponding letter

**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** |
| 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 5 (‘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

where ‘i’ is the subject indicator index (takes into account all subjects in a semester), ‘N’

is the no. of subjects ‘**registered’** for the semester (as specifically required and listed

under the course structure of the parent department), Ci the no. of credits allotted to the

ith subject, and Gi represents the grade points (GP) corresponding to the letter grade awarded for that ith subject, and Gi represents the grade points (GP) corresponding to the letter grade awarded for that ith subject.

**9.9** The cumulative grade point average (CGPA) is a measure of the overall cumulative performance of a student in all semesters considered for registration. The CGPA is the

ratio of the total credit points secured by a student in all registered courses in all semesters, and the total number of credits registered in all semesters, and the total number of credits registered in all the semesters. CGPA is rounded off to two decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula.

**CGPA =** { Cj Gj } / {  Cj } …. For all S semesters registered

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

where ‘**M’** is the **total** no. 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 up to and inclusive of the 8th semester, ‘j’ is the subject indicator index (takes into account a subjects from 1 to 8 semesters), CJ is the no. 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** |
| **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

**9.10** For merit ranking or comparison purposes or any other listing, **only** the ‘**rounded off’**

values of the CGPAs will be used.

**9.11** 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 an 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 required number of 192 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 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’.

**12.4** Students with final CGPA (at the end of the under graduate programme) 6.50 but <

8.00, shall be placed in ‘**first class’**.

**12.5** Students with final CGPA (at the end of the under graduate programme) 5.50 but <

6.50, 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) 5.00 but < 5.50, 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).

**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 Sc. & Tech. 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.

15.3 The transferred students from other Universities/institutions to SNIST who are on rolls to be provide one chance to write the CBT (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 nternal 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 interpretation. 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.

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 2018-19**

**1. Eligibility for award of**

**B. Tech. Degree (LES)**

The 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 for 144 credits and secure 144 credits with CGPA ≥ 5 from II

year to IV year B.Tech. programme (LES) for the award of B.Tech. degree. **Out of the**

**144 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

resulting in 138 credits for B.Tech programme performance evaluation**.**

**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.

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

**5. Promotion rule**

|  |  |  |
| --- | --- | --- |
| **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 29 credits  out of 48 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 58 credits out of 96 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).

**MALPRACTICES RULES**

**DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS**

|  |  |  |
| --- | --- | --- |
|  | **Nature of Malpractice/Improper 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. |

xxii

|  |  |  |
| --- | --- | --- |
| 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. |

xxiii

**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 award suitable to punishment**

**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.

\* \* \* \* \*

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

**B.TECH IN ELECTRICAL AND ELECTRONICS ENGINEERING**

**COURSE STRUCTURE AND SYLLABUS (2017-18)**

**III Year – I Semester**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No.** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max Marks** | |
| **CIE** | **SEE** |
| 1 | 6ZC01 | Managerial Economics and Financial Analysis | 2 | 1 | --- | 2 | 25 | 75 |
| 2 | 6CC16 | Linear and Digital IC Applications | 3 | 1 | --- | 3 | 25 | 75 |
| 3 | 6A508 | Electrical Machines – III | 3 | 1 | -- | 3 | 25 | 75 |
| 4 | 6A509 | Power Electronics | 3 | 1 | -- | 3 | 25 | 75 |
| 5 | 6A510 | Power Systems – II | 3 | 1 | -- | 3 | 25 | 75 |
| 6 |  | **Open Elective – I** | 2 | 1 | -- | 2 | 25 | 75 |
| 7 | 6H576 | Quantitative Aptitude | -- | 1 | 1 | 1 | 25 | 75 |
| 8 | 6A574 | Group Project | -- | -- | 2 | 1 | 25 | 75 |
| 9 | 6CC79 | Linear and Digital IC Applications Lab | -- | -- | 3 | 2 | 25 | 75 |
| 10 | 6A575 | Control Systems & Simulation Lab | -- | -- | 3 | 2 | 25 | 75 |
| 11 | 6A595 | Technology Review and Seminar-I | --- | --- | 2 | 1 | 100 | --- |
| **Total** | | | **16** | **7** | **11** | **23** | **350** | **750** |

**Open Elective – I**

|  |  |
| --- | --- |
| 6CC57 | Fundamentals of Signals And Systems |
| 6FC32 | Data Base Systems |
| 6ZC20 | Product and Services |
| 6HC46 | Basic German Language |
| 6EC26 | SAP-I : SAP ABAP workbench fundamentals |
| 6ZC22 | Basics of Entrepreneurship |
| 6ZC25 | Basics of Indian Economy |
| 6ZC05 | Banking Operations, Insurance and Risk Management |

**III Year – II Semester**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max Marks** | |
| **CIE** | **SEE** |
| 1 | 6GC49 | Intellectual Property Rights | 1 | -- | -- | 1 | 25 | 75 |
| 2 | 6DC05 | Microprocessor and Microcontrollers | 3 | 1 | -- | 3 | 25 | 75 |
| 3 | 6A611 | Switch Gear and Protection | 3 | 1 | --- | 3 | 25 | 75 |
| 4 | 6A612 | Measurements & Instrumentation | 3 | 1 | -- | 3 | 25 | 75 |
| 5 |  | **Professional Elective -I** | 3 | 1 | --- | 3 | 25 | 75 |
| 6 |  | **Open Elective – II** | 2 | 1 | --- | 2 | 25 | 75 |
| 7 |  | **Open Elective – III** | 2 | 1 | -- | 2 | 25 | 75 |
| 8 | 6H677 | Logical Reasoning | --- | 1 | 1 | 1 | 25 | 75 |
| 9 | 6HC74 | Effective English Communication & Soft Skills | 1 | -- | -- | 1 | 25 | 75 |
| 10 | 6A676 | Comprehensive Viva-Voce- II | -- | -- | -- | 1 | 50 | 50 |
| 11 | 6A677 | Electrical Machines Lab – II | -- | -- | 3 | 2 | 25 | 75 |
| 12 | 6A678 | Power Electronics & Simulation Lab | -- | -- | 3 | 2 | 25 | 75 |
| 13 | 6A696 | Technology Review and Seminar -II | --- | --- | 2 | 1 | 100 | --- |
| **Total** | | | **17** | **9** | **11** | **25** | **425** | **875** |

**Professional Elective –I**

|  |  |
| --- | --- |
| 6A625 | Advanced Control Systems |
| 6A636 | Special Electrical Machines |
| 6A617 | High Voltage Engineering |
| 6CC15 | Fundamentals of Digital Signal Processing |
| 6A633 | Switched Mode Power Conversion |

**Open Elective – II**

|  |  |
| --- | --- |
| 6EC67 | Operating System Concepts |
| 6HC41 | Basic French Language |
| 6EC27 | SAP-II : SAP ABAP workbench concepts |
| 6BC13 | Principles of Operation Research |
| 6ZC24 | Innovations and Design Thinking |
| 6ZC26 | Basics of Polity and Ecology |
| 6ZC19 | Entrepreneur, Project Management & Structured Finance |

**Open Elective – III**

|  |  |
| --- | --- |
| 6HC51 | Basic Spanish Language |
| 6FC33 | Data Analytics |
| 6BC10 | Manufacturing Processes |
| 6ZC23 | Advanced Entrepreneurship |
| 6ZC27 | Indian History, Culture and Geography |
| 6ZC21 | General Management and Entrepreneurship |
| 6ZC15 | Financial Institutions, Markets and Services |

**Note:** Industry Oriented Mini Project will be conducted by all students in summer vacation of III / IV B.Tech, II – Semester for a period of One Month. The report must be submitted in IV / IV B.Tech I –Semester and will have to be defended. Marks allotted are “100” and Two Credits are provided.

**IV Year – I Semester**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.**  **No.** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max Marks** | |
| **CIE** | **SEE** |
| 1 | 6ZC02 | Management Science | 3 | - | --- | 3 | 25 | 75 |
| 2 | 6A714 | Power Systems Analysis and Control | 3 | 1 | -- | 3 | 25 | 75 |
| 3 | 6A713 | Power Semi Conductor Drives | 3 | 1 | -- | 3 | 25 | 75 |
| 4 | 6A716 | Utilization of Electrical Energy | 2 | 1 | --- | 2 | 25 | 75 |
| 5 |  | **Professional Elective – II** | 3 | 1 | -- | 3 | 25 | 75 |
| 6 |  | **Professional Elective – III** | 3 | 1 | -- | 3 | 25 | 75 |
| 7 | 6A779 | Project Phase –I | -- | 1 | 3 | 3 | 100 | --- |
| 8 | 6A780 | Industry Oriented Mini Project | -- | -- | -- | 2 | 25 | 75 |
| 9 | 6A781 | Electrical workshop | -- | -- | 3 | 1 | 25 | 75 |
| 10 | 6DC71 | Microprocessor and Microcontrollers Lab | -- | -- | 3 | 2 | 25 | 75 |
| 11 | 6A782 | Measurements & Instrumentation Lab | -- | -- | 3 | 2 | 25 | 75 |
| 12 | 6A797 | Technology Review and Seminar-III | --- | --- | 2 | 1 | 100 | --- |
|  | | | **17** | **7** | **14** | **28** | **450** | **750** |

**Professional Elective –II**

|  |  |
| --- | --- |
| 6A715 | Renewable Energy Sources |
| 6A739 | Sensors and Actuators |
| 6DC52 | Embedded Systems |
| 6A737 | Advanced Power Electronics |
| 6A731 | Smart Grid |
| 6A738 | EHV – AC Transmission |

**Professional Elective - III**

|  |  |
| --- | --- |
| 6A718 | Optimization Techniques |
| 6A734 | HVDC & FACTS |
| 6A724 | Digital Control Systems |
| 6A728 | Power Quality |
| 6DC53 | Introduction to VLSI |

**IV Year – II Semester**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No.** | **Subject Code** | **Subject** | **L** | **T** | **P/D** | **C** | **Max Marks** | |
| **CIE** | **SEE** |
| 1 |  | **Professional Elective – IV** | 3 | 1 | -- | 3 | 25 | 75 |
| 2 |  | **Professional Elective – V** | 3 | 1 | --- | 3 | 25 | 75 |
| 3 | 6A883 | Project Phase –II | --- | --- | 20 | 12 | 50 | 150 |
| 4 | 6A884 | Comprehensive Viva-voce-III | --- | --- | --- | 1 | 50 | 50 |
| 5 | 6A898 | Technology Review and Seminar-IV | --- | --- | 2 | 1 | 100 | --- |
| **Total** | | | **6** | **2** | **22** | **20** | **250** | **350** |

**Professional Elective – IV**

|  |  |
| --- | --- |
| 6A820 | Electrical Distribution Systems |
| 6A822 | Electrical Machine Design |
| 6EC21 | Neural Networks |
| 6A829 | Power System Deregulation |

**Professional Elective – V**

|  |  |
| --- | --- |
| 6A727 | Reactive Power Control & Management |
| 6A826 | Programmable Logic Controllers |
| 6A841 | Power System Reliability and Planning |
| 6A830 | Real Time Control of Power Systems |

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

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

**III year B.Tech. – I Sem**

**Code: 6ZC01 MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

**L T P C**

**2 1 - 2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  | **x** |  |  |  |  |  |  | **x** |  |

**Course Objective:** To make the students understand the concepts and principles of Business Economics at micro level and basic principles of Financial Accounting and Analysis, which facilitate them in making better planning and decision?

**Course Outcomes:**

1. Understand the basics of Business Economics at Micro level and Demand analysis in particular.
2. Understand Production patterns and various Costs involved.
3. Understand different types of Markets, Business organizations and Pricing strategies.
4. Enrich students with basic concepts of Financial Accounting.
5. Understand basic concepts of Depreciation and Final accounts.
6. Increase Competence of Analyzing Financial Statements.

**UNIT I: INTRODUCTION TO MANAGERIAL ECONOMICS**

Definition, Nature and Scope of Business Economics–Demand Analysis: Demand Determinants, Law of Demand and its exceptions, Elasticity of Demand and Demand Forecasting.

**UNIT II: THEORY OF PRODUCTION AND COST ANALYSIS**

Production Function – Isoquants and Isocosts, Internal and External Economies of Scale, Laws of Returns. Cost Analysis: Cost concepts, different types of costs, cost control and cost efficiency, Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems).

**UNIT III: INTRODUCTION TO MARKETS**

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Pricing strategies, transfer pricing and performance measurement, Price-Output Determination in case of Perfect Competition and Monopoly

**UNIT IV: FUNDAMENTALS OF FINANCIAL ACCOUNTING**

Definition of Accounting, Concepts and conventions, principles of Double-Entry system, Book Keeping, Overview of books of original records Journal, Ledger and Subsidiary books

**UNIT V: DEPRECIATION OF FIXED ASSETS AND FINAL ACCOUNTS**

Depreciation, Depreciation of fixed assets, Methods of Depreciation – Straight line method and Diminishing Balance method

Classification of revenue and capital expenses, Trial Balance, Final Accounts - Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments.

**UNIT VI: RATIO ANALYSIS**

Introduction to Ratio analysis – Leverage ratios – Liquidity ratios – Turnover ratios – Profitability ratios, Du-pont chart. (Simple problems)

**TEXT BOOK:**

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.

**REFERENCES:**

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k | l |
| x | x | x | x | x |  |  |  | x | x |  | x |

**B.Tech. (EEE) III Year – I Sem.**

**LINEAR AND DIGITAL IC APPLICATIONS**

**L T P C**

**3 1 - 3**

**Code: 6CC14**

**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**

* Demonstrate the concepts of Differential Amplifier and Operational Amplifier and their characteristics.
* Design the basic circuits using Operational Amplifiers.
* Explore, design and analyze Filters, Timers, Voltage Controlled Oscillator and Phase Locked Loop.
* Demonstrate the design and analyze Oscillators, D/A Converters and A/D Converters.
* Classify and characterize the various Logic Families.
* Explore the combinational and sequential logic ICs in design of various digital systems.

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a | b | c | d | e | f | g | h | i | j | k | l | m |
| 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 | 2 |
| CO5 | 3 | 2 |  |  | 3 |  |  |  |  |  |  | 2 |  |
| CO6 | 2 |  | 3 | 3 | 3 |  |  |  | 2 | 3 |  | 3 | 2 |

**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**

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, IC 1408 DAC. A/D Converters: Introduction, Characteristic Parameters, Counter Type, Dual Slope, Successive Approximation and Flash types A/D Converters.

**UNIT – V**

**LOGIC FAMILIES**

Classification of IC Logic Families. Standard TTL NAND & NOR Gate-Analysis & Characteristics, TTL Open Collector Outputs. Tristate TTL. MOS & CMOS Logic, Open Drain and Tristate Outputs. ECL. Comparison of Various Logic Families. IC interfacing, TTL driving CMOS & CMOS driving TTL.

**UNIT – VI**

**TTL-74XX Series ICs: COMBINATIONAL AND SEQUENTIAL CIRCUITS**

Decoders. Priority Encoders, Multiplexers, Arithmetic Circuit ICs-Parallel Binary Adder. Flip-flops- D flip-flop, JK flip-flop, T flip-flop and Master-slave JK flip-flop. Synchronous and Asynchronous Counters. Decade counters. Universal Shift Register.

**Applications: Design of Digital clock**

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.

**III year B.Tech – I Sem**

**Code: 6A508 ELECTRICAL MACHINES - III**

**L T P C**

3 1 3

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **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: 6A509 POWER ELECTRONICS**

**L T P C**

3 1 3

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **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: 6A510 POWER SYSTEMS-II**

**L T P C**

3 1 3

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **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.

**III Year, B. Tech – I - Sem.**

**Code: 6CC57 FUNDAMENTALS OF SIGNALS AND SYSTEMS**

**(Open Elective-I)**

**L T P C**

2 1 2

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **X** | **X** | **X** |  | **X** |  |  |  |  |  |  |  |

**Course Objectives:**

*To study the concepts of signals and systems their characterization in the Time as well as frequency domains*

***COURSE OUTCOMES:***

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

1. *Understand the concepts of signals, comparison of signals, orthogonal signal space and the concepts of impulse, step and signum functions.*
2. *Apply the orthogonality properties to understand the Fourier methods of signal analysis- Fouries series and Fourier Transforms.*
3. *Understand the concepts of systems, their characterization in the Time as well as Transformed domains.*
4. *Understand and apply the mathematical tools, such as Convolution, Correlation and the Laplace transform, to analyze signals and systems.*
5. *Determine the sampling frequency for any low pass and band pass signals applying the sampling theorem.*
6. *Distinguish between continuous and Discrete time signals and systems. Apply the concepts of Z-Transforms in the analysis of DT signals and systems.*

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a | b | c | d | e | f | g | h | i | j | k | L | m |
| CO1 | 3 |  | 2 | 3 | 3 |  |  |  | 3 | 3 |  | 2 | 3 |
| CO2 | 3 |  | 2 | 3 | 3 |  |  |  | 3 | 3 |  | 2 | 3 |
| CO3 | 3 |  | 2 | 3 | 3 |  |  |  | 3 | 3 |  | 2 | 3 |
| CO4 | 3 |  | 2 | 3 | 3 |  |  |  | 3 | 3 |  | 2 | 3 |
| CO5 | 3 |  | 2 | 3 | 3 |  |  |  | 3 | 3 |  | 2 | 3 |
| CO6 | 3 |  | 2 | 3 | 3 |  |  |  | 3 | 3 |  | 2 | 3 |
| Overall | 3 |  | **2** | **3** | **3** |  |  |  | **3** | **3** |  | **2** | **3** |

**UNIT I**

**Signals:** Signals. Classification of Signals. Even, Odd, 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.

***Applications: The concepts of orthogonality find applications in DSP, DIP, DC, Design of experiments and so on.***

**Unit-II**

**Fourier Representation of Continuous Time Signals**

**Periodic Signals**- Fourier Series, Dirichlet’s Conditions. Trigonometric. Exponential Fourier series. Fourier Spectrum.

**Non- Periodic Signals -** Fourier Transforms. Fourier Transform of Arbitrary Signal. Standard Signals. Fourier Transform of Periodic Signals. Properties of Fourier Transforms. Fourier Transforms Involving Impulse and Signum Function Energy Density Spectrum, Parseval’s Theorem. Introduction to Hilbert Transform.

***Applications: Knowledge of signal bandwidth is necessary in the design of a filter; in the determination of the carrier frequency and also the sampling frequency and analog communication.***

**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.

***Applications: The concept of system bandwidth is applied in the design of a practical filter or system.***

**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... Relation between Convolution and Correlation. Detection of periodic signals in the presence of Noise by Auto and Cross Correlations.

**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. Initial and final value theorems, Relation between LT and FT of a Signal. Laplace Transform of Certain Signals using Waveform Synthesis. Laplace Transform of Periodic Signals.

***Applications: These math tools are required in the design, analysis and implementation of various filters, LT signals and systems .***

**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: Sampling techniques are applied in the conversion of analog to digital conversion***

**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. Initial and final value theorems. Introduction to Discrete Time Systems.

***Applications: Analysis and Synthesis of DT signals and systems.***

**Text Books**

1. Signals, Systems and Communications- B. P. Lathi, BSP.

2. Signal processing and Linear Syustems - B. P. Lathi, BSP.

3. Signals and Systems – Anand Kumar

**References**

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

2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2ndEdn.

3. Linear Systems and Signal Processing - B. P. Lathi, Oxford University Publications.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  |  |  |  |  | **x** |  |  | **x** |  |

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

**CODE: 6ZC20 PRODUCT AND SERVICES**

**(open elective-i)**

**L T P C**

2 1 2

**Course Objectives**: This course helps to provide the basic concepts of Product and Services. This course will enable the students to study areas of basic insights in product management and Services Design.

**Course Out Comes**:

1. The students will be introduced to basic concepts of product.
2. Will enlighten the students with the process of new product development and stages in the process.
3. Will help the students understand the concept of product testing, product planning and the preparatory groundwork for launching a new product
4. Will help the students to understand the nature of services, its differences with the goods and the application of marketing principles for services.
5. Will enlighten the students to understand the attributes of a good service design and the tools for producing and distributing the services.
6. To make the students understand about the importance of quality of services and also introduce some measurement scales to evaluate the service quality.

**UNIT- I: PRODUCT AS A COMMERCIAL FACTOR**

Product concept: premarketing, product definition, product dimensions. Product classification- by its nature, by final use by reasons for purchase, by consumer groups.

**UNIT- II: PRODUCT INNOVATION**

New products-What is a new product, Concept, Reasons, Succeed and failure factors, Launch process, Opportunities identification, Idea generation Systems, Evaluation, Check list, Financial analysis, Product concept.

**UNIT- III: PRODUCT MANAGEMENT**

Concept test, Product testing, Pre-launch, Market test, Final evaluation “Stage / Gate Process” A sequence system for a product launch. Product planning and development-Product planning, Price planning, Bake even point analysis, Communications Planning, Advertising Planning, Distribution planning

**UNIT - IV: INTRODUCTION TO SERVICE:**

Meaning and Definition of Service, Characteristics of Services, Classification of Service, Five levels of Service, Service verses Physical Goods, 7 P’s for Marketing of Services, Marketing Mix for Tourism, Hospitality, Education, and Health Industry.

**UNIT – V: SERVICE PROCESS DESIGN:**

Challenges & Critical Success Factors, Distribution Methods for Service, Process of Service Delivery, Tools for Service Design, Customer involvement in the Production Process, Tools for Innovation, Role of Intermediaries, Attributes of a Good Design.

**UNIT – VI: QUALITY OF SERVICE:**

Definition of Service Quality, Elements of Service Quality, Service Quality Measuring Tools; SERVQUAL Scale, Service Quality Gap Analysis, Objective Service Metrics, Cost of Quality in Service. Challenges and Problems of Service Quality in Inida.

**ESSENTIAL READINGS:**

1. Dr. S.L. Gupta, Product Management, Wisdom Publications
2. C.Merle Crawford ,New Product Management
3. Valarie A.Zeithaml & Mary Jo-Bitner: Services Marketing—Integrating Customer Focus Across the Firm, 3/e, Tata McGraw Hill, 2007.
4. Thomas J.Delong & Asish Nanda: Managing Professional Servies—Text and Cases, McGraw-Hill International, 2006.
5. Christopher Lovelock: Services Marketing People, Technology, Strategy, Fourth Edition, Pearson Education, 2006

**III Year B.Tech I semester**

**SAP-I: SAP ABAP Workbench Fundamentals**

**(Open Elective – I)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** | **m** |
|  |  |  |  | **x** |  |  |  |  |  | **x** |  | **x** |

**Code: 6EC26 L T P/D C**

**2 1 - 2**

|  |  |  |
| --- | --- | --- |
| **Course Objective** | | |
| 1. Understand the SAP NetWeaver AS fundamentals 2. Work with the ABAP Workbench tools 3. Write simple ABAP programs 4. Understand the ABAP Dictionary | | |
| **Course Outcomes** | | |
| 1. To acquire through knowledge of SAP Net weaver architecture, ABAP fundamentals (like language elements, modularization, ABAP dictionary) 2. To write simple ABAP programs and reports 3. To be able to debug and analyze errors and performance of programs | | |
| **Unit** | **Content** | **Hours** |
| 1 | I**ntroduction to enterprise resource planning(ERP)** | 4 |
| 1. ERP explained 2. System wide concepts 3. SAP applications and components 4. Sample end to end business process |
| 2 | **SAP Net weaver application server fundamentals** | 8 |
| 1. SAP systems and SAP applications portfolio 2. SAP Graphical User Interface and Navigation in AS ABAP systems 3. System core 4. Communication and integration technologies |
| 3 | **ABAP Work bench foundations - Part 1** | 10 |
| 1. ABAP Program processing 2. ABAP Work bench tools 3. ABAP Language basics, open SQL 4. Modularization techniques |
| 4 | **ABAP Work bench foundations - Part 2** | 10 |
| 1. Complex data objects, structures and internal tables 2. Data modeling and Data retrieval 3. Classic ABAP reports 4. Program analysis tools 5. Program calls and memory management |
| 5 | **ABAP Dictionary** | 10 |
| 1. Domains, Data elements and structures 2. Transparent tables, Pool tables and cluster tables 3. Input Checks 4. Dictionary object dependencies 5. Changes in table structure 6. Views 7. Search Helps |
| 6 | **Classical UI Programming** | 10 |
| 1. Selection Screens 2. Screens ( Dynpros) |

**TEXTBOOKS:**

* 1. ABAP Workbench Fundamentals, Part 1, SAP India
  2. ABAP Workbench Fundamentals, Part 2, SAP India

**REFERENCES:** www. training.sap.com/in/en

**III year B.Tech – I Sem**

Code: 6HC46 (Open Elective – I)

**Basic German Language**

**L T P/D C**

**2 1 - 2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  |  | **x** | **x** |  |  | **x** | **x** |  | **x** |

**Unit –I**

* Definite and Indefinite articles(including negation)
* Noun: Gender and Plural forms, cases (nominative, accusative, dative & genitive)

**Unit –II**

* Verb: Strong and Weak verbs, Verbs with separable and inseparable prefixes, modal verbs, position of verb in the main and subordinate clauses, auxiliary verbs, reflexive verbs in accusative and dative cases, imperative constructions

**Unit –III**

* Pronouns: personal, possessive, reflexive, interrogative and demonstrative
* Prepositions: with the accusative, dative and with both these cases

**Unit –IV**

* Adjective :declension with the
* Indefinite article
* Definite article
* Without article
* With the indefinite pronoun
* Degrees of comparison (also adverbs),ordinal numbers, adjectives as nouns
* Conjunctions: subordinating and coordinating with respect to the position of the verb

**Unit –V**

* Pretaritum of sein and haben
* Perfect tense

**Unit –VI**

* Negatin: of a sentence and words therein.
* Sentence structure: general principles observed in German Language.

**TEXT BOOK:**

1. Hermann Funk, Christina Kuhn, Oliver Bayerlein., Studio d A 1.2005 Comelsen Verlag, Berlin.

**REFERENCES:**

1. Rosa –Marie Dallapiazza, Eduard von Jan, Till Schonherr,unter Mitarbeit von Jutta Orth-Chambah Tangram aktuell 1 –Lektion 1-4, Lektion 5 - 8

Max Hueber Verlag. Munchen. 2009

1. Jutta Muller, Thomas Storz, 2006. Laguna. Heuber Veerlag, Ismaning. Deutschland

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** | **m** |
| **x** | **x** |  | **x** |  |  |  |  |  |  |  | **x** |  |

**B. Tech. III Year I semester**

**Code: 6FC32 Database Systems**

**(Open Elective – I)**

**L T P/D C**

**2 1 - 2**

**Course Outcomes:**

1. Students will learn basics of databases and understand the architecture of database management systems.
2. Students will learn about good database design techniques and database theories behind.
3. Understand conceptual database designs, and functional dependencies and normalization.
4. Students will understand the Mathematical foundation for relational databases.
5. Student will be able to understand concept of Constraints, Views and will be able to create dynamic databases.
6. Learn transaction management, concurrency controls.

**Unit – I** Introduction to Databases and Transactions What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management

**Unit- II** Data Models The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.

**Unit-III** Database Design ,ER-Diagram and Unified Modeling Language Database design and ER Model:overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd’s rules, Relational Schemas, Introduction to UML Relational database model: Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).

**Unit- IV** Relational Algebra and Calculus Relational algebra: introduction, Selection and

projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.

**Unit- V** Constraints, Views and SQL What is constraints, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers.

**Unit-VI** Transaction management and Concurrency control Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.

**TEXT BOOKS:**

1. A Silberschatz, H Korth, S Sudarshan, “Database System and Concepts”, fifth Edition McGraw-Hill , Rob, Coronel, “Database Systems”, Seventh Edition, Cengage Le

**III – year I – Semester**

**(Open Elective – I)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  |  | **x** |  | **x** |  |  |  | **x** |  |

**L T P/D C**

**2 1 0 2**

**Code: 6ZC22**

**BASICS OF ENTREPRENEURSHIP**

**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.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  |  | **x** |  | **x** |  |  |  | **x** |  |

**III – year I-Semester**

**(Open Elective – I)**

**L T P/D C**

**2 1 0 2**

**Code: 6ZC25**

**BASICS OF INDIAN ECONOMY**

**(Common to all Branches)**

**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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  |  |  |  |  | **x** |  |  | **x** |  |

**III – year I – Semester**

**(Open Elective – I)**

**L T P/D C**

**2 1 0 2**

**Code: 6ZC05**

**BANKING OPERATIONS, INSURANCE AND RISK MANAGEMENT**

**Course Objectives:** 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.

**III year B.Tech – I Sem**

**Code: 6H576**

**QUANTITATIVE APTITUDE**

**L T P C**

**1 1 1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  |  | **x** |  |  |  |  |  |  |  |  |

**Course Objective :**

Learn and practice problems on numbers systems, ratios, mensuration and relations to Excel in and competitive examinations.

**Course Outcomes:** After completing this course, students should able to

|  |
| --- |
| 1. Solve problems related to number systems |
| 2. Find averages of numbers and groups |
| 3. Solve problems related to ratio and proportion |
| 4. Find simple interest, solve time work and distance problems |
| 5. Solve menstruation problems |
| 6. Interpret the various kinds of data and find the relation between them. |

**UNIT I**

Number System: Test for Divisibility, Test of prime number, Division and Remainder – HCF and LCM of Numbers - Fractions.

**UNIT II**

Average: Average of different groups, Replacement of some of the items - Percentage - Profit and Loss.

**UNIT III**

Ratio and Proportion: Properties of Ratio, Comparison of Ratios, Useful Simple Results on Proportion – Partnership and Share – Mixtures.

**UNIT IV**

Simple Interest: Effect of change of P, R and T on Simple Interest - Compound Interest: Conversion Period, Difference between Compound Interest and Simple Interest – Time and Work – Time and Distance.

**UNIT V**

Mensuration: Area of Plane Figures, Volume and Surface Area of Solid Figures.

**UNIT VI**

Data Interpretation: Tabulation, Bar Graphs, Pie Charts, Line Graphs.

**TEXT BOOKS:**

1. Quantitative Aptitude by R.S.Agarwal

2. Quantitative Aptitude by Abhijit Guha

**B. Tech. III Year I semester**

**Code: 6A574 GROUP PROJECT**

**L T P/D C**

**- - 2 1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

**Course Objective :**

To acquaire basic knowledge on selecting a projcet , learn related tools and enhance programming and communication skills for employabilty.

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

**Course Outcomes: After completing this course, student shall 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 25 marks of internal evaluation and 75 marks of external

The **internal evaluation** shall consist of:

Day to day work : 10 marks

Report : 05 marks

Demonstration / presentation : 10 marks

-----------

25 marks

End examination : 75 Marks.

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 – I Sem**

**Code: 6CC79 LINEAR AND DIGITAL IC APPLICATIONS LAB**

**L T P C**

**3 2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** | **x** | **x** | **x** |  |  |  | **x** | **x** |  | **x** |

**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
* An ability to implement combinational designs using TTL Ics.
* An ability to understand and implement sequential designs using TTL Ics

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a | b | c | d | e | f | g | h | i | j | k | l | m |
| CO1 | 3 | 3 | 2 | 3 | 3 |  |  |  | 2 | 3 |  | 3 | 2 |
| CO2 | 3 | 2 |  | 2 | 3 |  |  |  | 3 | 3 |  | 3 | 2 |
| CO3 | 3 |  | 3 |  | 2 |  |  |  |  | 3 |  | 3 |  |
| CO4 | 3 | 2 | 3 |  | 3 |  |  |  | 2 | 3 |  |  | 2 |
| CO5 | 3 | 2 | 3 |  | 3 |  |  |  |  |  |  |  |  |
| CO6 | 2 |  | 3 | 3 | 3 |  |  |  | 2 | 3 |  | 3 | 2 |

***Syllabus Content***

**Part A (Linear IC Application Lab):** (At least Six Experiments)

**Design and testing of**

1. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
2. Active Filter Applications – LPF, HPF (first order)
3. Function Generator using OP AMPs.
4. 4 bit DAC using OP AMP.
5. IC 555 Timer – Monostable
6. IC 555 Timer -Astable .
7. Phase Locked Loop

**Part B (Digital IC Application Lab):** (At least Six Experiments)

Verify the operations of the Digital ICs (Hardware) in the Laboratory

1. 3x8 Decoder using IC 74x138
2. 8 x1 Multiplexer using IC 74x151
3. 4-bit Binary Adder using IC 74x283
4. Priority encoder using 74x148
5. D Flip-Flop IC 74x74
6. Decade counter using IC74x90
7. Shift registers using 74x194

**III year B.Tech – I Sem**

**Code: 6A575 CONTROL SYSTEMS AND SIMULATION LAB**

**L T P C**

**3 2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  | **x** | **x** | **x** |  |  |  |  | **x** |  |  |  |

**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.

L T P/D C

0 0 2 1

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  |  | **x** | **X** |  |  | **X** | **X** | **x** | **x** |

**III Year B.Tech – I Sem**

**Code: 6A595 TECHNOLOGY REVIEW AND SEMINAR-I**

**COURSE OUTCOMES:**

|  |  |
| --- | --- |
| 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**

|  |  |
| --- | --- |
| 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: 6GC49 INTELLECTUAL PROPERTY RIGHTS**

**L T P C**

**1 - 1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** |  | **x** | **x** |  |  |  | **x** |  |  |  |

**Course Objective:**

**This course is intended to impart awareness on intellectual property rights and various regulatory issues related to IPR**

**Course Outcomes:**

|  |  |
| --- | --- |
| **CO:1** | Demonstrate a breadth of knowledge in Intellectual property |
| **CO:2** | Overview of Patents, Searching ,filling and drafting of Patents |
| **CO:3** | Overview of copyright & GI . |
| **CO:4** | Overview of Trade Mark & Trade Secret, |
| **CO:5** | Overview of Integrated Circuit and Industrial Design. |
| **CO:6** | Knowledge about different national and international : Conventions and Treaties Governing the IPRs |

**Unit I: Introduction to IPR:** Discovery, Invention, Creativity, Innovation, History & Significance of IPR, Overview of IPR -Patent, Copyright, Trade Mark, Trade Secret , GI, Industrial Design & Integrated Circuit, Non-patentable criteria

**Unit II: Patents**: Patents- Patentability Criteria, Types of Patents-Process, Product & Utility Models, Software Patenting and protection, Patent infringement- Case studies- Apple Vs Samsung, Enfish LLC Vs Microsoft, Overview of Patent search-Types of Searching, Public & Private Searching Databases, Basics of Patent Filing & Drafting, Indian Patents Law

**Unit III: Copyrights and Geographical Indications:** Types of Copyrights, Procedure for filing, copyright infringement, Copyright Law, Geographical Indications -Tirupati Laddu , Darjeeling Tea, Basmati rice

**Unit IV: Trademark and Trade secrets:** Trade Marks –Commercial importance, protection, registration, Case Studies- Sabena and Subena, Castrol Vs Pentagon, Trade Secrets- Case Studies-Kentucky Fried Chicken (KFC), Coca-Cola

**Unit V: Protection of Industrial Designs & Integrated Circuits:** Industrial Designs – Scope, protection, filing, infringement; Integrated Circuits & Layout design, Semiconductors, Unfair competition, Designs Act.

**Unit VI: International Conventions & Treaties:** Overview of WTO, GATT, TRIPS, WIPO, Berne Convention, Rome convention, Paris Convention, Patent Cooperation Treaty (PCT), Madrid Protocol, Budapest Treaty, Hague agreement

**Text Book:**

1. Deborah E. Bouchoux, Intellectual Property for Paralegals – The law of Trademarks, Copyrights, Patents & Trade secrets, 3rd Edition, Cengage learning, 2012
2. N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property, Eastern Book Company, Lucknow, 2009.

**References**

1. M. M. S. Karki , Intellectual Property Rights: Basic Concepts, Atlantic Publishers, 2009
2. Neeraj Pandey & Khushdeep Dharni, Intellectual Property Rights, Phi Learning Pvt. Ltd
3. Ajit Parulekar and Sarita D’ Souza, Indian Patents Law – Legal & Business Implications; Macmillan India ltd, 2006.
4. B. L. Wadehra. Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India 2000.
5. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010.

**III year B.Tech – II Sem**

**Code: 6DC05 MICROPROCESSOR AND MICROCONTROLLERS**

**L T P C**

**3 1 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** |  | **x** | **x** |  |  |  | **x** |  |  |  |

***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. *Apply concepts related to Microprocessors and Microcontrollers.*
2. *Write ALP for 8086 and 8051.*
3. *Design hardware interface with 8086 & 8051 to A/D, D/A, 8251, Keyboard.*

**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: 6A611 SWITCH GEAR AND PROTECTION**

**L T P C**

**3 1 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  | **x** | **x** |  |  |  |  | **x** |  |  |  |

**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: 6A612 MEASUREMENTS & INSTRUMENTATION**

**L T P C**

**3 1 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  | **x** | **x** | **x** |  |  |  |  | **x** |  |  | **x** |

**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.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **X** | **X** | **x** |  | **x** |  |  |  |  |  |  | **X** |

**III Year B.Tech – II Sem**

**CODE: 6CC15**

**FUNDAMENTALS OF DIGITAL SIGNAL PROCESSING**

**(PROFESSIONAL ELECTIVE-I)**

**L T P/D C**

**3 1 0 3**

***Course objectives***: To develop skills for analyzing and synthesizing algorithms and systems that process discrete time signals, with emphasis on realization and implementation.

***Course outcomes****:*

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. *Design of digital filters by several methods once the desired specifications are given & Distinguish b/w IIR and FIR filters;*
6. *Understand the need and implement the multirate sampling techniques.*

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a | b | c | d | e | f | g | h | i | j | k | l | m |
| CO1 | 2 | 2 | 2 |  |  |  |  |  |  |  |  | 2 | 3 |
| CO2 | 2 | 2 | 2 |  |  |  |  |  |  |  |  | 2 | 3 |
| CO3 | 2 | 2 | 2 |  |  |  |  |  |  |  |  | 2 | 3 |
| CO4 |  | 2 | 2 |  | 3 |  |  |  |  |  |  | 2 | 3 |
| CO5 |  | 2 | 3 |  | 3 |  |  |  |  |  |  | 2 | 3 |
| CO6 |  | 2 | 3 |  | 2 |  |  |  |  |  |  | 2 | 3 |

**UNIT I INTRODUCTION:**

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

***Applications: Contents form the foundation for DSP.***

**UNIT II DISCRETE FOURIER SERIES AND TRANSFORM:** Discrete Fourier series representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear and circular convolutions, Overlap add and Overlap save methods, Computation of DFT. Relation between Z-transform and DFT.

***Applications: Analysis of DT signals-Periodic and Aperiodic.***

**UNIT III FAST FOURIER TRANSFORMS:** Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

***Applications: Design of spectrally efficient system such as OFDM system.***

**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.

***Applications: Design of digital system function to meet the given specifications.***

**UNIT V 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.

***Applications: Design of IIR/FIR digital filter conforming to given specifications.***

**UNIT VI MULTIRATE DIGITAL SIGNAL PROCESSING**:

Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion. ***Applications of Multirate signal processing such as design of narrowband filter, sub band coding, digital filter banks, quadrature mirror filters etc***. 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.
3. Digital Signal Processing: A Modern Introduction, Ashok Ambardar, 9th Indian Reprint, 2012, Cengage Learning.

**REFERENCE BOOKS:**

* + - 1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
      2. Digital Signal Processing: MH Hayes, Schaum’s Outlines, TATA Mc-Graw Hill, 2007.
      3. DSP Primer - C. Britton Rorabaugh, Tata McGraw Hill, 2005.
      4. Fundamentals of Digital Signal Processing using MatLab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007

5. Discrete Time Signal Processing – A.V.Oppenheim

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **X** | **X** | **x** |  | **x** |  |  |  |  |  |  | **X** |

**III Year – II Sem. B.Tech**

**Code: 6A625 ADVANCED CONTROL SYSTEMS**

**(PROFESSIONAL ELECTIVE-I)**

**L T P C**

**3 1 3**

**Course 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.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **X** | **X** | **x** |  | **x** |  |  |  |  |  |  | **X** |

**III Year – II Sem. B.Tech**

**CODE: 6A633 SWITCHED MODE POWER CONVERSION**

**(PROFESSIONAL ELECTIVE – I)**

**L T P C**

**3 1 - 3**

**Objective:**

This subject deals with different control topologies of converters.

**Course outcomes:**

Students will be able to

* + 1. Understand the Dc/DC converters.
    2. Understand the current mode and current fed topologies..
    3. Understand about resonant converters.
    4. Know about converter transfer function.
    5. Understand the power converter design.
    6. Study about controller design.

**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.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** | **x** |  |  |  |  |  | **x** |  |  | **x** |

**III year B.Tech – II Sem**

**Code: 6A617 HIGH VOLTAGE ENGINEERING**

**(PROFESSIONAL ELECTIVE-I)**

**L T P C**

**3 1 3**

**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.

**III Year II semester**

**Operating System Concepts**

**(Open Elective-II)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** | **m** |
|  | **x** |  | **x** |  |  |  |  | **x** | **x** |  |  |  |

**Code: 6EC67 L T P/D C**

**2 1 - 2**

**Course Objectives:**

Learn the basics of operating Systems. Understand process management and synchronization. Learn principles of memory, I/O and file management in a secured environment.

**Course Outcomes:**

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

1. Describe the basic functionalities and structure of the Operating System
2. Explain the concepts and implementations of: Processes, Process Scheduling. Describe, contrast and compare various types of Operating systems like Windows and Linux.
3. Comprehend the concepts of Synchronization and Deadlocks in the Operating System
4. Discuss the concepts of Memory Management(Physical and Virtual memory)
5. Explain the concepts of File System with regard to directory and disk management algorithms.
6. Students understand the concepts of I/O systems, protection and security in a case study given

**UNIT 1:**

**Introduction:** Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, Types of OS Services, System Calls, Types of System Calls, Structure of an OS-single structure, layered approach.

**UNIT 2:**

**Processes:** Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching. Process Vs Thread

**Process Scheduling**: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor Scheduling

**UNIT 3:**

**Inter-process Communication:** Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson’s Solution, The Producer\ Consumer Problem, Semaphores, , Monitors, Message Passing, Classical IPC Problems: Reader’s & Writer Problem, Dinning Philosopher Problem etc.

**UNIT 4:**

**Deadlocks:** Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker’s algorithm, Deadlock detection and Recovery.

**UNIT 5:**

**Memory Management:** Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.

**Virtual Memory**: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

**UNIT 6:**

**I/O Hardware:** I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

**File Management**: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table),

**Disk Management:** Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks

**Text books:**

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.

2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

**Reference books:**

1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing

2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley

3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India

4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

**III year B.Tech – II Sem**

Code: 6HC41 Basic French Language

**(Open Elective – II)**

**L T P/D C**

**2 1 - 2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  | **x** | **x** |  |  |  | **x** | **x** |  | **X** |

***UNITÉ – I :***

Professions et nationalités, viequotidienne et loisirs, descriptions physiques et psychologiques, nombres cardinaux.

Articles définis et indéfinis, genre et nombre des noms et des adjectifs, interrogation et négation, conjugaison du présent.

***UNITÉ – II***

Intonation, liaison, voyelles orales et nasales.

Faire connaissance, inviter et répondre à une invitation, décrire les personnes.

***UNITÉ – III***

Paris, monuments et lieux publics. La vie de quatre parisiens de professions différentes.

Logement et nourriture, vêtements et couleurs, fêtes et faits divers, nombres ordinaux.

***UNITÉ – IV***

Articles partitifs, adjectifs démonstratifs et possessifs, prépositions et adverbes de quantité et de lieu, pronoms toniques, l’impératif, verbes pronominaux.

Intonation, semi-voyelles, liaison, consonnes sonores et sourdes.

***UNITÉ – V***

Exprimer l’ordre et 1'obligation, demander et commander, évaluer et apprécier, féliciter et remercier.

Une région de France: la Bourgogne, vie quotidienne à la campagne.

***UNITÉ – VI***

*Teaching pass*é *compos*é *through the above lessons.*

**TEXT BOOK:**

1. Dominique, Philippe, *et al*. 1999. *Le Nouveau sans Frontières -I* (Including Exercise Book). Paris: Clé, International (Indian Edition).

**REFERENCES:**

1. Alter Ego I & II. Published by Hachette
2. Connexion I & II. Published by Didier
3. Echo I & II. Clé International publishers
4. Latitude I & II. Published by Didier

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

**SAP – II: SAP ABAP Workbench Concepts**

**(Open Elective – II)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** |
| **x** | **x** | **x** | **x** |  |  |  | **x** | **x** |  |  |

**Code: 6EC27 L T P/D C**

**2 1 - 2**

**Course Objectives:**

1. Write object oriented programs with ABAP

2. Understand the techniques in enhancements and modifications

3. Create simple Web Dynpro for ABAP applications

**Course Outcomes:**

**After completion of this course student will be able to**

1. To carry out enhancements and modifications to SAP standard, in future proof manner

2. To develop simple Web Dynpro for ABAP applications

3. To be able to understand Functional Specifications and write Technical Specifications

**UNIT – I: ABAP Objects-Part 1**

1. Object-Oriented Programming (OOPS Programming)

2. Fundamentals Object-Oriented syntax

3. Inheritance and casting

4. Interfaces and casting

5. Events

**UNIT – 2: ABAP Objects-Part2**

1. Global Classes and Interfaces

2. Exception handling

3. ABAP Object-Oriented examples-ALV and BAdls

4. Abstract classes, factory methods, singletons

UNIT – 3: **Shared Objects and shared Memory Areas**

1. Shared Objects

2. Shared Memory Access

UNIT – 4: **Dynamic Programming**

1. Generic data types

2. Field symbols and data references

3. Runtime Type Identifications (RTTI)

4. Runtime Type Creation (RTTC)

UNIT – 5: **Enhancements and Modifications**

1. Adjustment of SAP Standard Software

2. Enhancing Dictionary elements

3. Customers Exits

4. Business Add Ins (BAdls)

5. Modifications of the SAP standard applications

6. Implicit and Explicit Enhancements

UNIT – 6: **Fundamentals of Webdynpro for ABAP**

1. Web Dynpro Components, Windows and Views

2. Web Dynpro Controllers

3. Web Dynpro Context

4. Web Dynpro User Interface

5. Controller and Context programming

**TEXTBOOKS:**

* 1. SAP ABAP Workbench Concepts, Part 1, SAP India
  2. SAP ABAP Workbench Concepts, Part 2, SAP India

**REFERENCES:** [www.Training.sap.com/in/en](http://www.Training.sap.com/in/en)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  | **x** |  |  |  |  |  | **x** | **x** | **x** |  |

**L T P C**

**2 1 -- 2**

**III Year B.Tech II Semester**

**CODE: 6BC13 PRINCIPLES OF OPERATIONS RESEARCH**

**(OPEN ELECTIVE-II)**

**Course Objectives:**

This course aims at familiarizing the students with quantitative tools and techniques, which are frequently applied to business decision-making & to provide a formal quantitative approach to problem solving and an intuition about situations where such an approach is appropriate

**Course Outcomes:**

After completing the subject, students will be able to:

1. understand the application & techniques of OR & Formulate & Obtain solution problems using linear programming (LP) by different methods
2. understand the transportation problem their formulation and solution, understand the job sequencing under different condition
3. understand the significance of replacement and the techniques of replacement of various types of items
4. understand the Game theory concept & solutions and its industrial significance
5. understand the importance of queue system and various possible configuration of queues, concept of inventory system, various inventory models
6. concept of stage wise optimization and its implications, concept of simulation and its uses

**UNIT – I: INTRODUCTION:**

Definition, Characteristics and Phases (or steps) of OR method, Types of models, applications.

**LINEAR PROGRAMMING PROBLEM**- Formulation – Graphical solution, Simplex method-Types of variables, Unbounded solution Artificial variables techniques -Two–phase method, Big-M method -Degeneracy, Duality Principle-examples

**UNIT – II: TRANSPORTATION PROBLEM:**

Formulation – methods of finding initial solution, optimal solution-MODI method, Special cases in TP: unbalanced, maximization case, Degeneracy.

**ASSIGNMENT PROBLEM** – Formulation – Optimal solution - Variants of Assignment Problem-Unbalanced, Maximization, Traveling Salesman problem.

**UNIT – III: SEQUENCING:**

Introduction – Terminology, Assumptions, Johnson’s procedure- Processing n jobs through two machines – Processing n jobs through three machines – Processing two jobs through ‘m’ machines.

**REPLACEMENT:** Introduction – Types of failure, Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, Group replacement.

**UNIT – IV: THEORY OF GAMES:**

Introduction, Definitions, Pure strategies-Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Mixed Strategies-Rectangular games without saddle points- Dominance principle – 2 X 2 games , m X 2 & 2 X n games -Graphical method.

**UNIT – V: WAITING LINES:**

Introduction, Terminology, Structure of a queue, Calling population characteristics-size, behavior, pattern of arrivals, Kendall-Lee notation, Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals.

**INVENTORY :** Introduction, Inventory costs, Concept of EOQ, Single item Deterministic models without shortages and with shortages, Single item inventory models with one price break and multiple price breaks, Stochastic models – Instantaneous demand and no set up cost.

**UNIT – VI: SIMULATION:**

Definition – Types of simulation – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages

**DYNAMIC PROGRAMMING:** Introduction – Bellman’s Principle of optimality – Applications of dynamic programming- shortest path problem -capital budgeting problem –– linear programming problem.

**TEXT BOOKS:**

1. Operations research Hira & Gupta

2. Operation Research J.K.Sharma/MacMilan publishers.

**REFERENCES:**

1. Operations research V.K.Kapoor

**III – year II – Semester**

**(Open Elective – II)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  |  | x |  | **x** |  |  |  |  |  |

**L T P/D C**

**2 1 0 2**

**Code: 6ZC24**

**INNOVATION & DESIGN THINKING**

**(Common to all Branches)**

**Course Objective:** The objective of the course is to make students understand the nature of Innovation, creativity and IPRs, and to motivate the student to start his/her own enterprise with innovative skills.

**Course Outcomes:**

1. The students gain the knowledge on the inputs required for innovation and also gain familiarity on Entrepreneurship.
2. The students will get exposure on creative methods of ideation and the importance of protecting the ideas.
3. The students gain knowledge on design thinking and types of thinking.
4. The students gain familiarity on emerging technologies like Internet of things (IOT).
5. The students understand the process of building the startup.
6. The students gain knowledge on various startup funding and also to branding building for the startup.

**Unit – I: Introduction to Innovation: -** Meaning of Innovation, Difference between innovation and invention, Difference between Innovation and Creativity, Need to be Creative , Importance of Innovation, Innovation as a Competitive Advantage, Innovation Continuum, Innovation Cycle, Disruptive Innovation, , Breakthrough innovations and its consequences on the society, Challenges in Innovation.

**Unit – II: Creative Thinking : -** Types of Creative Thinking, Creative Thinking Process, Components of Creativity, Characteristics of a Creative Mindset, New product ideas, Idea generation methods, Principles of Idea Generation, Difference between Idea Generation and Brainstorming, Killing the ideas through Stage Gate Models, Process of Reverse Thinking. Intellectual Property Rights, Importance of IPR, Role of WIPO, Case Studies on Patents and Infringement of Rights.

**Unit – III: Design Thinking & Liberal Art: -** Concept of Design Thinking, Difference between Designer and Scientist, Stages of Design Thinking, Difference between Convergent Thinking and Divergent Thinking. Definition of Liberal Art and its Importance of Liberal Art , Role of Art and Culture to Innovate Business.

**Unit – IV: Emerging Technologies: -** Meaning of Internet of Things, Components of IoT, Benefits of IoT, Types of Product – Service hybrid, examples of IoT enabled Innovations, Impact of IoT on Business, Future of IoT. Case Study on IoT.Innovation Leadership &Network: - Leadership, Skills and Characteristics of an Innovation Leadership, Meaning of Innovation Network, Significant of Innovation Network, Define Social Media Analysis, Steps to Build an Innovation Network.

**Unit –V: Building Startup**

Kelly Johnsons KISS Principle, Road map for building a startup, identify, analyze and evaluate

funding, advantages of crowd funding. Pricing strategies. Determining factors for Monetizing Innovation, Process of Monetization, Fixing the price of an Innovative Project. Detailed study on market potential, pitfalls and Negative effects of Monetizing innovation. Reasons for failure of Monetization of Innovation.

**Unit-VI: Startup Funding & Branding**

Sources of funding: Bootstrapping, Angel Investors, Crowd funding, Venture capitalists, Advantages of crowd funding, Schemes of Government through Startup India, role of Institutional support and Commercial Banks. Introduction to branding a startup and developing branding strategies.

**References:**

1. Peter Drucker (1993), “Innovation and Entrepreneurship”, Hyper Business Book.
2. C.K. Prahalad, M.S. Krishnan, The new age of Innovation – TATA McGRAW-HILL     Edition 2008.
3. “Innovation by Design", Gerald H. (Gus) Gaynor, AMACOM {American Management Association), NYC, 2002
4. Bholanath Dutta: Entrepreneurship – Text and cases, Excel, 2009.
5. Vasanth Desai: Entrepreneurship, HPH, 2009
6. Barringer: Entrepreneurship, Pearson, 2009.
7. H. Nandan: Fundamentals of Entrepreneurship, PHI, 2009.
8. John M Nicholas “Project Management for Business and Technology” Prentice Hall of India Pvt. Ltd.
9. Stay Hungry Stay Foolish, Rashmi Bansal and published by IIM., Ahmedabad

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  |  | x |  | **x** |  |  |  |  |  |

**III – year II – Semester**

**(Open Elective – II)**

**L T P/D C**

**2 1 0 2**

**Code: 6ZC26**

**BASICS OF POLITY AND ECOLOGY**

**(Common to all Branches)**

**Course Objectives:**

To provide basic knowledge relating to the Indian Polity and Ecology, thus making the students appreciate the current aspects related to both polity and ecology.

**Course Outcomes:**

1. Gain knowledge relating to the Indian Constitution and the Preamble to the Constitution.
2. Gain knowledge relating to the fundamental rights and duties of the Indian citizens and the directive principles of state policy.
3. Students will learn about the federal structure and judiciary of India.
4. Comprehend knowledge relating to the conservation of the environment.
5. Learn about bio-diversity and climatic changes occurring in the environment.
6. Know about the international treaties, conventions and organizations active in the field of environmental protection.

**Unit 1: Introduction to Salient Features of Constitution**

Significance of the Constitution, Distinction between Written and Unwritten Constitution, Composition of the Constituent Assembly and the role and objectives of the Drafting Committee, Main features and the nature of the Constitution of India. Preamble to the Constitution and its relevance; Basic principles of Preamble and their reflection in the constitutional provisions.

**Unit 2: Fundamental Rights, Duties and Directive Principles of State Policy**

Fundamental Rights and Duties of Citizens- Importance of Rights and Duties, Dignity of an individual, Safeguards against deprivation of life and personal liberty; Writs for the protection of Fundamental Rights; Meaning of Directive Principles of State Policy, Classification of the Directive Principles, Role of Directive Principles, Role of Directive Principles in the establishment of economic and social democracy.

**Unit 3: Government and Judiciary**

Legislative, financial and judicial powers of the President; Appointment of Prime Minister and constitution of Council of Ministers; Powers and functions of Prime Minister; Individual and collective responsibility; Powers and discretionary powers of the Governor; Appointment of the Chief Minister, Formation of the Council of Ministers; Powers and jurisdiction of the Supreme Court and High Courts of India.

**Unit 4: 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 5: 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 6: 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).

**References:**

1. Indian Polity - M. Laxmikanth, 5th Edition, McGraw Hill Education, Chennai
2. Environment And Ecology A Complete Guide for Civil Services Preliminary and Main Examinations – R. Rajgopalan, 2017, Oakbridge Publishing Pvt. Limited.
3. Introduction to Constitution of India – Dr. Durga Das Basu, 22nd Edition, 2015, LexisNexis
4. Our Constitution – Subhash C Kashyap, 5th Edition, 2015, National Book Trust, India
5. Environment and Ecology – Anil Kumar De and Arnab Kumar De, 2009, New Age International (P) Limited.
6. ICSE Environment Education for Class X – Dr. M.P. Mishra , 2009, S.Chand and Company

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  | **x** |  |  |  |  |  | **x** | **x** | **x** |  |

**L T P C**

**2 1 -- 2**

**III Year B.Tech II Semester**

**CODE: 6ZC19**

**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-V1**

**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, 1st 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)

**III year B.Tech – II Sem**

**Code: 6HC51 (Open Elective – III)**

**Basic Spanish Language**

**L T P/D C**

**3 - 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  | **x** | **x** |  |  |  |  | **x** |  | **x** |

Unit-I **Functional Aspects**

Greetings, introductions, identifying others; tools to ask meaning,

pronunciation and spellings; different nationalities and their languages;

Hispanic names, family relations and professions; days of the week,

Months.

**Grammatical Aspects**

Basic structure of spelling and pronunciation; present indicative of the regular verbs (‘ar/er/ir) and ‘querer’; subject pronouns; interrogative sentences with ‘Por que’, and ‘quien’; causal phrase with ‘porque’; ‘ser’ and ‘estar’; negative sentences; adjectives of nationality.

Unit-II **Functional Aspects**

Ordinal and cardinal numbers: quantities; to go shopping, identifying

Material, color, size etc; to go to a restaurant, food habits of Spanish and

Latin American people.

**Grammatical Aspects**

Gender and number of nouns and adjectives; the verb ‘tener’; interrogative

Sentences; demonstrative and qualitative adjectives.

Unit-III **Functional Aspects**

To express opinions on something contradict someone in modest ways;

Suggest something, to value things aesthetically and intellectually;

Expression of likes and dislikes; expression and reaction to certain things,

(agreement or disagreement)

**Grammatical Aspects**

Qualitative adjectives, forms and usage, gradations, superlative adjectives,

Exclamatory sentences; thew verb’gustar’, forms and syntax; personal

Pro0nouns; definite and indefinite pronouns, direct object pronouns

Prepositions; verbs like ‘parecer’ and ‘encontrar and preferir, their form

And syntax, interrogative pronouns.

Unit-IV **Functional Aspects**

Invitations; accepting and rejecting invitations; how to fix an appointment;

Inviting through e-mail or telephone

**Grammatical Aspects**

Present indicative of irregular verbes, expressions with ‘tener’ and estar

Prepositional pronouns; interrogative sentences

Unit-V **Functional Aspects**

Expression of time; Spanish and Latin American time tables and

Comparison with Indian time tables, festivals Indian and Hispanic

**Grammatical Aspects**

Time with ‘ser’, expression s relating to festivals.

Unit-VI **Functional Aspects**

Expressions relating to climate, weather of the day seasons, vacations, planning of holiday and brochers, hotel reservations, offers

**Grammatical Aspects**

Expressions with verbs, ‘ser’ and ‘hacer’ and other verbs.

**Text Book:**

1. NOUVEAU ELE INICIAL 1

**Reference Books:**

1. Espanol sin Fronteras, A. Sanchez, M. Rios, J.A. Metella, SGEL. Madrid, 1997
2. Entre Nosotros A. Sanchez, M. Rios, J.A. Metella, SGEL. Madrid, 1997

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k | l |
| x | x | x |  |  |  |  | x |  |  |  | x |

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

**CODE: 6FC33**

**DATA ANALYTICS**

**(OPEN ELECTIVE – III)**

**(Common to ECE & BT)**

**L T P C**

**2 0 0 2**

**Course Objectives:**

1. Obtain, clean/process and transform data.
2. Analyze and interpret data using an ethically responsible approach.
3. Use appropriate models of analysis, assess the quality of input, derive insight from results, and investigate potential issues.
4. Apply computing theory, languages and algorithms, as well as mathematical and statistical models, and the principles of optimization to appropriately formulate and use data analyses.
5. Formulate and use appropriate models of data analysis to solve hidden solutions to business-related challenges.
6. Perform well in a group.
7. Interpret data findings effectively to any audience, orally, visually and in written formats.

**Course Outcomes:**

1. Ability to Analyze and interpret data

1. Ability to formulate and use appropriate models of data analysis to solve hidden solutions to business-related challenges.
2. Ability to demonstrate proficiency with statistical **analysis of data.**
3. Ability to apply data science concepts and methods to **solve** problems in real-world contexts and will **communicate** these solutions effectively

**Unit-1: Introduction:**

What is data warehousing?, What is data mining?, Classification of Data Mining systems, Data pre-processing: Why data pre-processing is needed, Data Cleaning, Data Integration and Transformation, Data Reduction. Data Warehouse: Data Warehouse and OLAP Technology, Multidimensional Data Model, Data Warehouse Architecture.

**Unit-2: Data Mining Tasks:**

Association Analysis: Frequent Itemsets generation using Apriori Algorithm, Evaluation of Association Patterns, Classification: General approach to solving a classification problem, Decision Tree Induction, Model Overfitting, Clustering: Overview, k-means algorithm.

**Unit-3: Introduction to Big Data**

What is big data, why big data, convergence of key trends , unstructured data ,industry examples of big data , web analytics, big data and marketing, fraud and big data ,risk and big data ,credit risk management, big data in medicine, introduction to Hadoop open source technologies , cloud and big data

**Unit-4: Frameworks of Big Data:**

The Map Reduce Framework; Uses of Map Reduce; Architecture, Storing Big Data with HBase, Role of HBase in Big Data Processing, NoSQL Databases.

**Unit-5: Introduction to Data Science**

Need for data scientists, Foundation of Data Science, What is Business Intelligence, What is Data Analysis, Machine Learning, Analytics VS Data Science, Types of Analytics, Life cycle probability, Analytics Project Lifecycle.

**Unit-6: Data Visualization:**

Introduction-Terminology-Basic charts and plots-Multivariate Data Visualization-Data Visualization Techniques-Explorative Data Analysis (EDA) – Introduction to EDA, Needs of EDA, Goals of EDA, Types of EDA, Implementation of EDA, Boxplots, cor() in R, EDA functions, Elements of Data Visualization, Info-graphics vs Data Visualization, Data Visualization and Graphical Functions in R, Plotting of Graphs.

**Textbooks:**

1. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, Third Edition. ISBN 0123814790. 2011. **[FOR UNIT-1]**
2. Introduction to Data Mining - First Edition, by Pang-Ning Tan, Michael Steinbach and Vipin Kumar, ISBN-13: 978-0321321367 **[FOR UNIT-2]**
3. BIG DATA and ANALYTICS, Seema Acharya, Subhasinin Chellappan, Wiley publications. **[FOR UNITS – 3 & 4]**
4. Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools, Davy Cielen, Arno Meysman, Mohamed Ali, Manning Publications, 2016, ISBN 1633430030, 9781633430037 **[FOR UNITS - 5 & 6]**

**References:**

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk from The Frontline. O'Reilly. 2014.
2. Tom Mitchell. Machine Learning. Mc Graw Hill 1997.
3. Jure Leskovek, Anand Rajaraman and Jefrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2014. (free online)
4. BIG DATA, Black Book TM , DreamTech Press, 2015 Edition
5. Seeing What Others Don’t. The Remarkable Ways We Gain Insights. Gary Klein. 1st Edition, Public Affairs Press.

**III year B.Tech – II Sem**

**CODE: 6ZC21 GENERAL MANAGEMENT AND ENTREPRENEURSHIP**

**(OPEN ELECTIVE-III)**

**L T P/D C**

**2 1 0 2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  | **x** |  |  |  |  | **x** | **x** | **x** | **x** |

**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 career prospects and ambitions of starting a new Enterprise.

**Pre-requisites**: This course shall require a student to have knowledge in Managerial Economics and Financial analysis, Management Science, Operations management**.**

**Course Outcomes:**

1. Describe the necessary managerial skills and tactics required for an emerging Entrepreneur.
2. Distinguish various methods for business process and product development
3. Demonstrate the skills required for the project planning, implementing and controlling
4. Outline the legal aspects and applying for Intellectual Property Rights
5. Illustrate the various sources of finance for venturing a business project.
6. Designing production plant and quality management system.

**UNIT I**

**INTRODUCTION TO MANAGEMENT AND ENTREPRENEURSHIP:** Changing Face of Management-Entrepreneurship, Modern Management with Entrepreneurial Orientation.. Meaning of Entrepreneurship. Benefits and Drawbacks of Entrepreneurship Reasons feeding the Entrepreneurial fire. Understanding Entrepreneurship as a Process. Multiple roles of Entrepreneur: Intrapreneur, Inventor, Coordinator, Manager and Controller. Psychological and behavioral aspects of First-Generation Entrepreneur. Case Studies

**UNIT II**

**PROCESS DEVELOPMENT AND INNOVATION PROJECT MANAGEMENT:** Business Process Model, Value chain for Manufacturing industries and Service Industries. Frugal Innovation. Creativity process in developing Innovation.. Types of New Products, Forecasting of New Products, Stages in the New Product Development, Prototype building and pitching Going ahead with ideas, killing the ideas through Stage Gate Models, pitching of full fledged idea. Choosing the Start-Up Team.

**UNIT III**

**PROJECT MANAGEMENT AND FEASIBILITY REPORT:** Project Inception, Project Implementation, and Project control. Analyzing the project by employing capital budgeting techniques, Risk Management, tools and techniques. Methods of Appraising the Project. Industry Analysis pertaining to the Product, Competitive Analysis and Market analysis. Preparation of feasibility report, Contents of Feasibility Report. Exercise to write an effective Feasibility report. Case Studies.

**UNIT IV**

**PROTECTION OF IDEAS AND MECHANISM:** Exposure to intellectual property rights to the entrepreneur in the Indian and the World context. Registration process for Patents, Copyrights, Trademarks, Geographical indicators. Legal Framework in administration of Intellectual property rights. Meaning of Infringement, consequences of Infringement. Cases on Infringement. Case Studies.

**UNIT V**

**VENTURE FINANCING AND ISSUES RELATED TO PRICING:** Meaning of Venture Capitalist, Process of Venture Capital, Seed Funding, First Phase Funding, Second Phase Funding and Final Phase funding. Cost analysis, Preparation of standard costing, Finalizing the output, fixing the pricing based on market structure, Monopoly, oligopoly market structures and marketing pricing practices for attracting customers. Case Studies

**UNIT VI**

**MANUFACTURING AND QUALITY MANAGEMENT:** Plant Layout, Process and Product Layout, Service Factory. Introduction to Quality Circles, Quality inspection, ISO Certification, process of certification and exposure to the entrepreneurs of the need for certification. Quality certification for Manufacturing industrial. Case Studies

**References:**

1. "Projects: Planning, Analysis, Selection, Financing, Implementation, and Review", Prasanna Chandra, TMH, New Delhi, 2012
2. "Project Management", Jeffrey K. Pinto, Pearson, 2011
3. Small Scale industries and Entrepreneurship Vasanth Desai “Himalya publishing 2012
4. Innovation by Design", Gerald H. (Gus) Gaynor, AMACOM {American Management Association), NYC, 2002
5. Entrepreneurship Rajeev Roy “” oxford ,2012
6. Fundamentals of Entrepreneurship Nandan H

**III – year II – Semester**

**(Open Elective – III)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **J** | **k** | **l** |
|  |  |  |  | **x** |  |  |  |  |  | **x** |  |

**LL T P/D C**

**2 1 0 2**

Code: **6ZC23**

**ADVANCED ENTREPRENEURSHIP**

**(Common to all Branches)**

**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 effecting 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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **J** | **k** | **l** |
|  |  |  |  | **x** |  |  |  |  |  | **x** |  |

**III – year II – Semester**

**(Open Elective – III)**

**L T P/D C**

**2 1 0 2**

**Code: 6ZC15**

**FINANCIAL INSTITUTIONS, MARKETS AND SERVICES**

**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. Enables the students to understand the financial structure and the financial sector reforms after 1991.
2. 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.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **J** | **k** | **l** |
|  |  |  |  | **x** |  |  |  |  |  | **x** |  |

**III – year II – Semester**

**(Open Elective – III)**

**L T P/D C**

**2 1 0 2**

**Code: 6ZC27**

**INDIAN HISTORY, CULTURE AND GEOGRAPHY**

**(Common to all branches)**

**Course Objectives**: To equip the students with necessary knowledge, relating 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.

1. To understand earth evolution and world climatic change.
2. To understand India Oceanography,
3. 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. Edition : 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](http://en.citizendium.org/wiki/Special:BookSources/033390298X)
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.

**III – year II – Semester**

**EFFECTIVE ENGLISH COMMUNICATION AND SOFT SKILLS**

**Semester-I : BT, ECE, CSE**

**Semester-II : Mech, IT, ECM, EEE and Civil**

**Subject Code: 6HC74**

**L – T– P – C**

1 0 0 1

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a | b | c | d | e | f | g | h | i | j | k | l |
|  |  |  |  |  |  |  | X | X | X |  | X |

**Course Objectives:**

**Enable students –**

1. **to analyze themselves and to practice the ways to overpower their weaknesses**
2. **to enhance their soft skills and behavioral patterns**
3. **to equip themselves with the skill of solving problems and taking effective decisions**
4. **to build up conflicts and stress management skills**
5. **to face interviews confidently and effectively**
6. **to cultivate appropriate etiquette and manners to deal with personal and professional life**

UNIT-1: Know Yourself – SWOT / SWOC Analysis

1. Importance of Knowing Yourself

2. Benefits of SWOT/ SWOC analysis

3. How to go about SWOT analysis

4. SWOT/ SWOC analysis grid

UNIT-2: **Soft Skills**

* + - 1. Definition and importance of soft skills
      2. Positive attitude
      3. Goal setting
      4. Team building and Leadership qualities

UNIT-3: 1. Problem Solving

1. Decision Making
2. Time Management

UNIT-4: Conflict Management

* + - 1. Stress Management – IQ
      2. Emotional Intelligence – EI

UNIT-5: Interview Skills

Resume writing

a. Types of Résumé

b. Differences among Bio-data, Curriculum Vitaé and Résumé

c. Purpose of Curriculum Vitaé and Resume

e. Tips to write Curriculum Vitaé and Résumé

f. The DOs and the DON’Ts of Résumé preparation

g. Cover letter

2. Types of interviews (Face to Face / Panel Interviews, etc.)

3. Pre-interview preparation

4. Types of questions asked - FAQs

5. Mock Interviews

UNIT-6**: Etiquette and Manners**

Etiquette: Introduction

1. Classification of etiquette

2. Modern etiquette and social etiquette

3. Work etiquette and benefits of following work etiquette

Manners: Introduction:

1. Practicing good manners

**Course Outcomes:**

**Students become skilled at-**

1. **identifying their strengths and weaknesses and realize the ways to overcome their weaknesses**
2. **enhancing their soft skills and behavioral patterns**
3. **solving problems and taking effective decisions**
4. **managing the stress and conflicts**
5. **facing interviews confidently and effectively**
6. **cultivating appropriate etiquette and manners to deal with personal and professional life**

**Suggested Reading:**

1. Technical communication*- Meenakshi Raman and Sangeetha Sharma (Oxford Publications)*
2. Technical Writing Process and Product *by SharonJ Gerson:Fifth edition.Pearson Publishers.*
3. Developing Communication Skills *– Krishna Mohan and Meera Benarjee*
4. SOFT SKILLS *– Dr. K. Alex, S.Chand publications*
5. Advanced Technical communication *- Kavita Tyagi and Padma Mistri*
6. Developing Speaking-Listening Skills in English (With CD)
7. Basic Communication Skills For Technology- *Andrea J Rutherfoord- Pearson*
8. Developing Communication Skills- *Krishna Mohan- Macmillan*
9. Written Communication Skills- *Michael Hatton-iste*
10. Soft Skills Know Yourself And Know The World- *K Alex- S Chand*

**III year B.Tech – II Sem**

**Code: 6H677**

**LOGICAL REASONING**

**L T P C**

- 1 1 1

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **L** |
|  | **x** | **x** |  |  |  |  |  | **x** |  |  |  |

**Course Objectives**

Understand and solve arithmetic, analogy, coding, puzzles and ranking related problems for enhancing employability.

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

|  |
| --- |
| 1. Generate number and alphabet series |
| 2. Apply concept of analogy and solve related problems |
| 3. Classify and figure out odd one |
| 4. Realize the various techniques for coding and decoding |
| 5. Solve the relations puzzles. |
| 6. Solve the problem related to number, ranking and arithmetic reasoning |

**Unit – I**

Series Completion: Number Series, Alphabet Series, Alpha – Numeric Series.

Analogy: Completing the Analogous Pair, Simple Analogy, Choosing the Analogous pair, Double Analogy, Word Analogy, and Number Analogy.

**Unit – II**

Classification / Odd One Out: Word Classification, Number Classification, Letter Classification.

Coding – Decoding: Letter Coding, Number Coding, Matrix Coding, Substitution, Deciphering Message Word Codes, Jumbled Coding.

**Unit – III**

Blood Relations, Deciphering Jumbled up Descriptions, Relation Puzzle – Direction sense test.

Number, Ranking & Time Sequence Test – Arithmetical Reasoning – Mathematical Operations.

**Unit – IV**

Directions, Arithmetical Reasoning.

Puzzle Test: Classification Type Questions, Seating Arrangements Comparison Type Questions, Sequential Order of Things, Selection Based on given conditions, Family – Based Puzzles, Jumbled Problems.

**Unit – V**

Assertions and Reason– Logical Venn Diagrams – Alpha Numeric Sequence Puzzle.

Cubes and Dice – Analytical Reasoning .Logical Deduction: Logic, Statement – Arguments,

**Unit – VI**

Clocks & Calendar .Data Sufficiency and Syllogism.

**Text Book:** Verbal and Non Verbal Reasoning by R.S.Agarwal.

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

**Code: 6A676 COMPREHENSIVE VIVA- VOCE- II**

**L T P/D C**

**- - - 1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** |  |  |  |  |  |  | **x** |  |  |  |

**Course Objectives:**

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

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

|  |
| --- |
| 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. |

There will be 100 marks in total with 50 marks of internal evaluation and 50 marks of external evaluation.

**Internal:**

Comprehensive Viva Voce is Conducted twice in a semester and evaluated for 25 marks each.

End examination : 50 Marks.

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: 6A677 ELECTRICAL MACHINES LAB – II**

**L T P C**

**3 2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  | **x** | **x** |  | **x** |  | **x** |  |  | **x** | **x** |  |

**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

**III year B.Tech – II Sem**

**Code: 6A678 POWER ELECTRONICS AND SIMULATION LAB**

**L T P C**

**3 2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  | **x** | **x** | **x** |  |  | **x** |  | **x** |  | **x** |  |

**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 – Mathworks, USA.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** |  |  |  | **x** |  | **x** | **x** | **x** |  | **x** |

**III Year B.Tech – II Sem**

**CODE: 6A696 TECHNOLOGY REVIEW AND SEMINAR - II**

**L T P/D C**

**0 0 2 1**

**COURSE OUTCOMES:**

|  |  |
| --- | --- |
| 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 and 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**

|  |  |
| --- | --- |
| 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 |

**IV year B.Tech – I Sem**

**Code: 6ZC02**

**MANAGEMENT SCIENCE**

**L T P C**

**3 - - 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  |  |  |  |  |  | **x** | **x** | **x** |  |

After going through the course, the student will be able to

1. Understand the significance of management, basic concepts and applicability of management principles in changing paradigms.
2. Demonstrate the procedures of the work study method and work measurement, Project management.
3. Infer the need to understand the importance of materials management and quality control techniques.
4. Relate the knowledge of two functional areas of business, human resource management and marketing management.
5. Explain the different dimensions of behavior, personality, perception, attitudes overall to gain insights into organizational behavior.
6. Distinguish some aspects related to strategic planning and strategic implementation to gain competitive advantage over competitors.

**UNIT I: INTRODUCTION TO MANAGEMENT:**

Management- Definitions, Levels of Management, Functions of management- Planning: types of planning, planning process; Organizing: Organizational Design and Structure, Staffing; Directing; Controlling: Basic control process- Fayol’s principles of Management - Taylor’s principles of scientific management- Maslow’s Motivational theory,.

**UNIT II: INTRODUCTION TO OPERATIONS MANAGEMENT:**

Plant Location- need, factors; Plant layout – types, Methods of production, Techniques of Project Management - Network Analysis - Program Evaluation and Review Techniques (PERT), Critical Path Method (CPM), Crashing of Simple Networks.

**UNIT III: MATERIALS MANAGEMENT**:

Objectives of Material management, Inventory control- need for Inventory Control, ABC Analysis, Economic Order Quantity; Just In Time; Introduction to LSCM; Quality Control Techniques– Introduction to SQC, Inspection, ISO standards, Six Sigma.

**UNIT IV:**

**(i) Human Resources Management**: Objectives of HRM, Challenges of HRM, HR Planning process HR functions and policies – Job Analysis, Recruitment, Selection, Training and Development, Performance Appraisal**.**

**(ii) Marketing Management**: Concept of Marketing, Functions, Marketing Mix, Product Life Cycle, Marketing Strategies, Channels of Distribution, Differences between products and services.

**UNIT V: INTRODUCTION TO ORGANIZATIONAL BEHAVIOR:**

Definition, Nature and Scope of OB, Personality-determinants of Personality – Perception- Attitudes- Attribution theory- Johari Window and Transactional Analysis , Stress Management- factors and remedies

**UNIT VI: STRATEGIC MANAGEMENT:**

**I**ntroduction to Strategic Management, Vision, Mission, Goals, Objectives, Environmental Scanning- PESTEL, SWOT Analysis, Competitive Advantage, Concept of Core Competence, PORTER’s five force model, types of strategies, Strategic formulation and Implementation.

**TEXT BOOK:**

* + - 1. A R Aryasri: Management Science, Tata Mc Graw Hill

**REFRENCES:**

1. Dr. Y. Satyanarayana: Management control systems in competitive environment,
2. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2005
3. Kotler Philip & Keller Kevin Lane: Market Management 12/e, PHI, 2005

**IV year B.Tech – I Sem**

**Code: 6A714 POWER SYSTEM ANALYSIS AND CONTROL**

**L T P C**

**3 1 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  | **x** | **x** | **x** |  |  | **x** |  | **x** |  | **x** |  |

**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.

**III year B.Tech – II Sem**

**Code: 6A713**

**POWER SEMICONDUCTOR DRIVES**

**L T P C**

**3 1 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  | **x** | **x** | **x** |  |  |  |  |  |  |  |  |

**Course Objective:**

This course is an extension of Power Electronics applications to AC and DC drives. Control of DC motor drives with single phase and three phase converters and choppers are given in detail. The control of AC motor drives with variable frequency converters and variable voltage are presented.

**Course Outcomes:**

1. Identify the necessity of drive; understand the operation of different converters connected to D.C separately excited motors and series motors derive the Speed.
2. Understand four Quadrant operations of dc drives and analyze electric braking.
3. Understand four Quadrant operations of Chopper fed dc drives.
4. Describe the operation of Induction motor with its equivalent circuit, speed control of Induction motor with V/ F control and its speed torque Characteristics
5. Explain the concept of slip power and deduce an expression for speed variation with slip power
6. Analyze the working of different Synchronous Motor drives.

**UNIT – I CONTROL OF DC MOTORS BY SINGLE PHASE AND THREE PHASE CONVERTERS:**

Introduction to Thyristor controlled Drives, Single Phase and three phase semi and Fully controlled converters connected to d.c separately excited and d.c series motors, Continuous current operation, Output voltage and current waveforms, Speed and Torque expressions, Speed, Torque Characteristics, Problems on Converter fed d.c motors.

**UNIT – II FOUR QUADRANT OPERATION OF DC DRIVES:**

Introduction to Four quadrant operation, Motoring operations, Electric Braking, Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of D.C motors by dual converters, Closed loop operation of DC motor (Block Diagram Only).

**UNIT-III CONTROL OF DC MOTORS BY CHOPPERS:**

Single quadrant, Two - quadrant and four quadrant chopper fed dc separately excited and series excited motors, Continuous current operation, Output voltage and current wave forms, Speed torque expressions, speed torque characteristics, Problems on Chopper fed D.C Motors, Closed Loop operation ( Block Diagram Only).

**UNIT – IV CONTROL OF INDUCTION MOTOR ON STATOR SIDE:**

Variable voltage characteristics, Control of Induction Motor by AC Voltage Controllers, Waveforms, speed torque characteristics, Variable frequency characteristics, Variable frequency control of induction motor by Voltage source and current source inverter and cyclo converters, PWM control, Comparison of VSI and CSI operations, Speed torque characteristics, numerical problems on induction motor drives, Closed loop operation of induction motor drives (Block Diagram Only).

**UNIT –V CONTROL OF INDUCTION MOTOR ON ROTOR SIDE:**

Static rotor resistance control, Slip power recovery, Static Scherbius drive, Static Kramer Drive, Their performance and speed torque characteristics, Advantages applications, problems.

**UNIT – VI CONTROL OF SYNCHRONOUS MOTORS:**

Separate control & self control of synchronous motors, Operation of self controlled synchronous motors by VSI and CSI cyclo converters. Load commutated CSI fed Synchronous Motor, Operation, Waveforms, Speed torque characteristics, Applications Advantages and Numerical Problems, Closed Loop control operation of synchronous motor drives (Block Diagram Only), Variable frequency control, Cyclo converter, PWM, VFI, CSI.

**TEXT BOOKS:**

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

2. Power Electronic Circuits, Devices and applications – M.H.Rashid, PHI.

**REFERENCES:**

1. Power Electronics – MD Singh and K B Khanchandani, Tata – McGraw-Hill Publishing Company.

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

3. Thyristor Control of Electric drives – Vedam Subramanyam Tata McGraw Hill Publications.

4. A First course on Electrical Drives – S K Pillai New Age International (P) Ltd, 2nd Edition.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  |  | **x** |  |  |  |  |  |  |  |  |

**III Year B.Tech – II Sem**

**CODE: 6A716**

**UTILIZATION OF ELECTRICAL ENERGY**

**L T P/D C**

**2 1 0 2**

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

3. Identify the core areas of illumination, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, and their applications & sources of light.

4. 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.

5. Understands System of electric traction and track electrification.

6. 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.

**UNIT – II ELECTRIC HEATING:**

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 – III ILLUMINATION FUNDAMENTALS:**

Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, sources of light.

**UNIT – IV VARIOUS ILLUMINATION METHODS**

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 – V ELECTRIC TRACTION - I:**

System of electric traction and track electrification. Review of existing electric traction systems in India. Special features of traction motor, methods of electric braking-plugging rheostatic braking and regenerative braking. Mechanics of train movement. Speed-time curves for different services – trapezoidal and quadrilateral speed time curves.

**UNIT – VI ELECTRIC TRACTION - II:**

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.

**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.

**IV year B.Tech – I Sem**

**Code: 6A715 RENEWABLE ENERGY SOURCES**

**(Professional Elective – II)**

**L T P C**

**3 1 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  | **x** | **x** | **x** |  |  |  |  |  |  | **x** |  |

**Course Objectives:**

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  |  |  |  |  |  | **x** | **x** | **x** |  |

**L T P C**

**3 1 - 3**

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

**CODE: 6A739 SENSORS AND ACTUATORS**

**(PROFESSIONAL ELECTIVE – II)**

**UNIT I - INTRODUCTION AND DISPLACEMENT MEASUREMENT** Sensors - Basic requirements of a sensors- Classification of sensors- Static and Dynamic characteristics of sensors- Displacement Sensors- Linear and Rotary displacement sensorsPotentiometer, Capacitive and Inductive type displacement sensor- position sensors- Optical encoder, Photoelectric sensor, Hall Effect Sensor.

**UNIT II - MEASUREMENT OF PROXIMITY, FORCE AND PRESSURE** Eddy current proximity sensor- Inductive Proximity sensor- Capacitive Proximity sensor - Pneumatic Proximity sensors- Proximity Switches- Contact and Noncontact type – Strain Gauge – Diaphragm Pressure Sensor- Capsule Pressure sensors- Bellows Pressure SensorBourdon tube pressure sensor- Piezoelectric Sensor- Tactile sensor.

**UNIT III - MEASUREMENT OF VELOCITY, FLOW AND LEVEL** Tachogenerator - Pyroelectric sensors - Ultrasonic sensor – Resistive sensor- Pitot tube – Orificeplate - flow nozzle- Venturi tubes – Rotameter- Electromagnetic flow meter. Float level sensor- Pressure level sensor- Variable capacitance sensor.

**UNIT IV - MEASUREMENT OF TEMPERATURE, MOTION AND LIGHT SENSORS** Thermocouples- Thermistors -Thermodiodes - Thermotransistors- Bimetallic StripResistance Temperature Detector- Infrared Thermography. Vibrometer and accelerometerseismic accelerometer. Photoresistors -Photodiodes - Phototranistors- Photocondutors.

**UNIT V & VI - MICRO SENSORS AND ACTUATORS** Micro Sensors: Principles and examples, Force and pressure micro sensors, position and speed micro sensors, acceleration micro sensors, chemical sensors, biosensors, temperature micro sensors and flow micro sensors. Micro Actuators: Actuation principle, shape memory effects-one way, two way and pseudo elasticity. Types of micro actuators- Electrostatic, Magnetic, Fluidic, Inverse piezoeffect, other principles.

**TEXT BOOKS:**

1. Sawhney.A.K, “Course in Mechanical Measurements and Instrumentation”, Dhanpat Rai and Sons, 1997.

2. Patranabis.D, “Sensors and Transducers”, Wheeler publisher, 1994.

3. Sergej Fatikow and Ulrich Rembold, Microsystem “Technology and Microbotics” First edition, Springer -Verlag NEwyork, Inc, 1997.

4. Gupta.I.C, “A Text book of Engineering Metrology”, Dhanpat Rai and Sons, 1996.

5. “ASTE Hand Book of Industries Metrology”, Prentice Hall of India, 1992.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  |  |  |  |  |  |  |  | **x** | **x** | **x** |  |

**L T P C**

**3 0 0 3**

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

**CODE: 6DC52**

**EMBEDDED SYSTEMS**

**(PROFESSIONAL ELECTIVE – II)**

***Course Objectives -  The student will learn about***

1. *The constraints and challenges of an Embedded System design*
2. *The 8051 Architecture, Assembly Language Programming , Interfacing and Interrupt handling mechanism*
3. *Modern Embedded System Design case studies*

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

1. *Write ALP for 8051 architecture*
2. *Implement interfaces for Embedded System using various protocols and hardware modules.*
3. *Identify the design constraints and challanges of an embedded system with case studies.*

**UNIT – I: Introduction to Embedded Systems**

Embedded Systems, Comparing Embedded and General Computing, Complex System Design and Processors, Classification of Embedded Systems, Embedded System Design Process, Formalization of System Design, Embedded SOC and VLSI Circuit Technology, Application examples of Embedded Systems.

**UNIT – II: 8051 Architecture, Memory Organization and Programming**

8051 Architecture, features, Addressing modes, Instruction set, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data, Input/Output, Interrupts; The Assembly Language programming Process, Programming the 8051, Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, use of C programming for 8051.

**UNIT – III: 8051 Real World Interfacing**

Part A - Real World Interfacing, Performance metrics, Memory map, Processor and Memory selection,

Part B - IO Subsystem, Sensors and Actuators, LED and LCD Interfacing, Keyboard Interfacing, Stepper Motor Interfacing, DC motor Interfacing Using PWM

**UNIT – IV: Embedded Communication Interface**

Serial and Parallel Communication, Timer and Counting Devices, Watchdog Timer, Real Time Clock, I2C, SPI protocol, ISA , PCI, Internet Enabled Systems, Wireless and Mobile Systems Protocols

**UNIT – V: Introduction to Real - Time Operating Systems**

Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment. (Chapter 6 and 7 from Text Book 3, SImon).

**UNIT – VI: Basic Design Using a Real-Time Operating System** : Principles, Semaphores and Queues, HardReal-Tjme Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source);

**Embedded Software Development Tools**: Host and Target machines, Linker! Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging

**Techniques:** Testing on Host Machine, Using Laboratory Tools, An Example System. (Chapter 8,9,10 & 11 from Text Book 3, Simon).

**TEXT BOOKS:**

1. Embedded Systems- Architectuer, Programming and Design 2E, Raj Kamal, TMH
2. Introduction to Embedded Systems, K.Shibu, Tata McGraw-Hill
3. The 8051 Microcontroller And Embedded Systems Using Assembly And C – Mazidi, Pearson Education India, 2nd edition, 2008.
4. An Embedded Software Primer, David E. Simon, Pearson Education

**REFERENCES:**

1. An Embedded Software Primer, David E. Simon, Pearson Education.
2. Computers and Components: principles of embedded *computing* system design, Wayne Wolf, Elseveir.
3. 8051 Application Notes by Atmel.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  |  | **x** | **x** |  |  |  | **x** | **x** | **x** |  |

**IV Year B.Tech – I Sem.**

**Code: 6A737 ADVANCED POWER ELECTRONICS**

**(Professional Elective – II)**

**L T P C**

**3 1 - 3**

**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.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  |  | **x** | **x** |  |  |  | **x** | **x** | **x** |  |

**B.Tech IV Year – I Sem.**

**Code: 6A731 SMART GRID**

**(PROFESSIONAL ELECTIVE-II)**

**L T P C**

**3 1 3**

**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.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  |  | **x** | **x** |  |  |  | **x** | **x** | **x** |  |

**IV Year B.Tech – I Sem.**

## Code: 6A738 **Extra High Voltage AC TRANSMISSION**

**(Professional Elective – II)**

**L T P C**

**3 1 - 3**

**Course Objective:**

## Understand the concepts of E.H.V. A.C. Transmission, Properties of bundled conductors and geometric mean radius of bundle, Effect of high electrostatic field on biological organisms, Surface voltage Gradient on conductors, Corona in EHV lines, sub synchronous resonance in series and SVC schemes.

**Course Outcomes:**

Students will able to

1. Describe the E.H.V. A.C. Transmission, line trends and preliminary aspects.
2. Explain Line capacitance calculation: capacitance of two conductor line, and capacitance of multi conductor lines.
3. Explain Mangolt formula, cosine law and Surface voltage Gradient on conductors.
4. Understand Corona in EHV lines, Audio noise due to corona and measurement of audio noise.
5. Understand Power Frequency voltage control, Shunt and series compensation.
6. Understand Static reactive compensating systems.

## **UNIT –I:**

## E.H.V. A.C. Transmission, line trends and preliminary aspects, standard transmission voltages – power handling capacities and line losses – mechanical aspects. Calculation of line resistance and inductance: resistance of conductors, temperature rise of conductor and current carrying capacity. Properties of bundled conductors and geometric mean radius of bundle, inductance of two conductor lines and multi conductor lines, Maxwell’s coefficient matrix.

**UNIT II:**

Line capacitance calculation: capacitance of two conductor line, and capacitance of multi conductor lines, potential coefficients for bundled conductor lines, sequence inductances and capacitances and Diagonalization. Calculation of electro static field of AC lines - Effect of high electrostatic field on biological organisms and human beings.

**UNIT - III:**

Surface voltage Gradient on conductors, surface gradient on two conductor bundle and cosine law, maximum surface voltage gradient of bundle with more than 3 sub conductors, Mangolt formula.

**UNIT - IV:**

Corona : Corona in EHV lines – corona loss formulae – attenuation of traveling waves due to corona – Audio noise due to corona, its generation, characteristics and limits, measurement of audio noise.

**UNIT - V:**

Power Frequency voltage control : Problems at power frequency, generalized constants, No load voltage conditions and charging currents, voltage control using synchronous condenser, cascade connection of components : Shunt and series compensation, sub synchronous resonance in series – capacitor compensated lines

**UNIT - VI:**

Static reactive compensating systems: Introduction, SVC schemes, Harmonics injected into network by TCR, design of filters for suppressing harmonics injected into the system.

**REFERENCE BOOKS:**

1. Extra High Voltage AC Transmission Engineering – Rakosh Das Begamudre, Wiley Eastem ltd., New Delhi – 1987.
2. EHV Transmission line reference book – Edision Electric Institute (GEC) 1986.

**IV year B.Tech – I Sem**

**CODE: 6A734 HVDC TRANSMISSION & FACTS**

**(PROFESSIONAL ELECTIVE-III)**

**L T P C**

**3 1 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  | **x** | **x** | **x** |  |  |  |  | **x** |  | **x** |  |

**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: 6A718 OPTIMIZATION TECHNIQUES**

**(PROFESSIONAL ELECTIVE-III)**

**L T P C**

**3 1 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** | **x** | **x** |  |  |  |  | **x** |  | **x** |  |

**Objective:**

This subject deals with different mathematical methods of optimization.

**Course outcomes:**

Students will be able to

1. Understand the Introduction And Classical Optimization Techniques.
2. Understand the Classical Optimization Techniques.
3. Understand the Transportation Problem.
4. Know about Unconstrained Nonlinear Programming.
5. Understand the Constrained Nonlinear Programming.
6. Study about Dynamic Programming.

**UNIT – I INTRODUCTION AND CLASSICAL OPTIMIZATION TECHNIQUES:**

Statement of an Optimization problem – design vector – design constraints – constraint surface-objective function – objective function surfaces – classification of Optimization problems.

**UNIT – II CLASSICAL OPTIMIZATION TECHNIQUES:**

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

**LINEAR PROGRAMMING**

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

**UNIT – III TRANSPORTATION PROBLEM**

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel’s approximation method – testing for optimality of balanced transportation problems.

**UNIT – IV UNCONSTRAINED NONLINEAR PROGRAMMING:**

One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method

**Unconstrained Optimization Techniques** Univariate method, Powell’s method and steepest descent method.

**UNIT – V CONSTRAINED NONLINEAR PROGRAMMING:**

Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

**UNIT – VI DYNAMIC PROGRAMMING:**

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

**TEXT BOOKS:**

1. Engineering optimization: Theory and practice - S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.

2. Introductory Operations Research - H.S. Kasene & K.D. Kumar, Springer (India), Pvt .LTd.

**REFERENCES:**

1 Optimization Methods in Operations Research and systems Analysis – K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.

2. Operations Research – Dr. S.D.Sharma.

3. Operations Research: An Introduction – H.A. Taha, PHI Pvt. Ltd., 6th edition.

4. Linear Programming – by G. Hadley.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  | **x** | **x** | **x** |  |  |  |  | **x** |  | **x** |  |

**IV Year B.Tech – I Sem.**

**Code: 6A724 DIGITAL CONTROL SYSTEMS**

**(Professional Elective – III)**

**L T P C**

**3 1 - 3**

**Course 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.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  |  | **x** | **x** |  |  |  | **x** | **x** | **x** |  |

**B.Tech IV Year – I Sem.**

**Code: 6A728 POWER QUALITY**

**(Professional Elective- III)**

**L T P C**

**3 1 - 3**

***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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  |  | **x** | **x** |  |  |  | **x** | **x** | **x** |  |

**IV – year I – Semester**

**(Professional Elective – III)**

**Code: 6DC53**

**INTRODUCTION TO VLSI DESIGN**

***Course Objectives:*** *The student will learn about the*

1. *IC fabrication process of various technologies and to understand the electrical properties of MOS transistor.*
2. *Various Layers and layouts for a different technology design rules and how scaling impacts its performance.*
3. *Design of various combinational and sequential circuits using MOS transistors and about CMOS testing*

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

* + 1. *Design the complex digital VLSI circuits at transistor level and layouts.*
    2. *Draw layouts for a digital circuit for a specified technology and verify design rules and validate them.*
    3. *Test the circuit various level for different fault models.*

**UNIT I**

**INTRODUCTION TO MOS AND IC FABRICATION TECHNOLOGY**:

MOS, PMOS, NMOS, CMOS & BiCMOS, VLSI Design Flow, Oxidation, Lithography, Diffusion, Ion Implantation, Metallization, Encapsulation, Probe testing, Integrated Resistors and Capacitors

**Application** – CMOS IC Manufacturing

**UNIT II**

**BASIC ELECTRICAL PROPERTIES:** Basic Electrical Properties of MOS and BiCMOS Circuits: V-I characteristics, Ids-Vds relationships, MOS transistor threshold Voltage, gm, gds, Figure of Merit (ωo), Zpu/Zpd, Latch-Up in CMOS

**INVERTERS**: NMOS Inverter, Various Pull-Ups, CMOS Inverter Analysis & Design, Bi-CMOS Inverters

**UNIT III**

**CIRCUIT DESIGN PROCESSES:** MOS Layers, Stick Diagrams, Lamda-based CMOS Design rules for Wires, Contacts and Transistors, Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling

**GATES**: CMOS Logic Gates and Structures, Switch logic, NAND, NOR, Compound gates, Multiplexers, Layout Diagrams Gates

**Application** – IC Physical Design – NAND and NOR

**UNIT IV**

**PART A - CIRCUIT CHARACTERIZATION AND PERFORMANCE**

Switching characteristics – fall time, Rise time, Delay time, CMOS Gate sizing, Power consumption (Static and Dynamic), Charge sharing

**PART B – CMOS CIRCUIT AND LOGIC DESIGN**

Logic structures / styles – Pseudo NMOS, Dynamic, Clock CMOS, Domino logic, CVSL, Modified domino logic, Pass transistor logic, transmission gate

**UNIT V**

**MEMORY:** Latches and Registers**,** Clocking strategies (Single Phase),Memory cells (SRAM & DRAM), Row decoders, Column decoders, Read/Write circuitry, LIFO

**UNIT VI**

**SUBSYSTEM DESIGN:** Adders, parity generators, comparators, binary counters, multipliers, Shifter, ALUs

**TEXTBOOKS**:

1. Principles of CMOS VLSI Design - Weste and Eshraghian, Pearson Education, 2nd Edition, 2009.
2. Digital Integrated Circuits: A Design Perspective - John M. Rabaey, 2nd Edition, 2002.

**REFERENCES:**

* 1. Chip Design for Submicron VLSI: CMOS Layout & Simulation, - John P. Uyemura, Thomson Learning.
  2. Introduction to VLSI Circuits and Systems - John .P. Uyemura, JohnWiley, 2003.
  3. Essentials of VLSI circuits and systems – Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, PHI, 2005 Edition.
  4. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.
  5. VLSI Technology – S.M. SZE, 2nd Edition, TMH, 2003.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

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

**CODE: 6A779 PROJECT PHASE - I**

**L T P/D C**

**- 1 3 3**

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

|  |  |
| --- | --- |
| CO1 | Students identify a topic from the current technical topics of their choice in the electronics and communication domain and the allied fields, after surveying in the internet resources, journals and technical magazines in the library. |
| CO2 | Student learnt to arrange the contents of the presentation and scope of the topic, in an effective manner. |
| CO3 | Each student then presents the technical topic they chose in front of the panel and the fellow students, using the oratory skills. |
| CO4 | Students also face the questions posed by the panel and the students and answer them. |

The evaluation is for 100 marks. It is internal evaluation only.

The committee consists of HOD, a Senior Faculty member and Internal Guide.

**Division of marks for internal assessment – 100 marks**

* Progress of Project work and the corresponding interim report   
  as evaluated by internal guides at the end of 5 weeks : 10 Marks
* Seminar at the end of 5 weeks : 10 Marks
* Progress of Project work as evaluated by guides  
  at the end of 10 weeks : 10 Marks
* Seminar at the end of 10 weeks : 10 Marks
* Evaluation by the Guides ( at the end of 15 weeks) : 20 Marks
* Project Report : 10 Marks
* Final presentation and defense of the project : 30 Marks

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

**CODE: 6A780 INDUSTRY ORIENTED MINI PROJECT**

**L T P/D C**

**- - - 2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

**Course Objective :**

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

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

**Course Outcomes: After completing this course, student shall 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 25 marks of internal evaluation and 75 marks of external

The **internal evaluation** shall consist of:

Day to day work : 10 marks

Report : 05 marks

Demonstration / presentation : 10 marks

-----------

25 marks

End examination : 75 Marks.

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.

**IV year B.Tech – I Sem**

**Code: 6A781 ELECTRICAL WORKSHOP**

**L T P C**

**3 1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** |  |  | **x** |

**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

**IV year B.Tech – I Sem**

**Code: 6DC71 MICROPROCESSORS AND MICROCONTROLLERS LAB**

**L T P C**

**3 2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** | **x** |  | **x** |  |  |  | **x** |  | **x** |  |

***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*

***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.*

**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: 6A782 MEASUREMENTS AND INSTURMENTATION LAB**

**L T P C**

**3 2**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  | **x** | **x** |  | **x** |  |  |  |  |  | **x** |  |

**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 and To measure 3-Ф reactive power using single phase wattmeter.
2. 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.
3. To determine the percentage of error of a given single phase energy meter and To measure the parameters of a choke coil using 3-voltmeter & 3-ammeter methods
4. 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.
5. To determine the value of the resistance of the given wire using Kelvin’s double bridge and To apply Crompton’s DC potentiometer to, Calibrate a PMMC type ammeter, Voltmeter
6. To calibrate a given 1-Ф power factor meter and a given LPF watt meter by phantom loading and 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.

6. Schering bridge & Anderson bridge.

7. Measurement of 3 phase reactive power with single-phase wattmeter.

8. Measurement of parameters of a choke coil using 3 voltmeter and 3 ammeter methods.

9. Calibration LPF wattmeter – by Phantom testing

10. Measurement of 3 phase power with single watt meter and 2 No’s of C.T.

11. LVDT and capacitance pickup – characteristics and Calibration

**IV Year B.Tech – I Sem**

**Code: 6A797 TECHNOLOGY REVIEW AND SEMINAR - III**

**L T P/D C**

**- - 2 1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** |  | **x** |  |  |  | **x** | **x** | **x** |  | **x** |

**COURSE OUTCOMES:**

|  |  |
| --- | --- |
| 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**

|  |  |
| --- | --- |
| 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 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** |  |  |  |  |  |  |  |  |  |  |

**IV Year B.Tech – II Sem**

**CODE: 6A820 ELECTRICAL DISTRIBUTION SYSTEM**

**(PROFESSIONAL ELECTIVE – IV)**

**L T P C**

**3 1 0 3**

**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.

**L T P/D C**

**3 1 0 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** |  | **x** |  |  |  |  |  |  |  |  |

**IV Year B.Tech – II Sem**

**Code: 6A822 ELECTRICAL MACHINE DESIGN**

**(PROFESSIONAL ELECTIVE-IV)**

**OBJECTIVE:**

To provide sound knowledge about constructional details and design of various electrical machines. To study mmf calculation and thermal rating of various types of electrical machines. To design armature and field systems for D.C. machines. To design core, yoke, windings and cooling systems of transformers. To design stator and rotor of induction machines. To design stator and rotor of synchronous machines and study their thermal behavior.

**UNIT - I INTRODUCTION:**

Major considerations in Electrical Machine Design - Electrical Engineering Materials – Space factor – Choice of Specific Electrical and Magnetic loadings – Thermal considerations - Heat flow – Temperature rise - Rating of machines – Standard specifications.

**UNIT -II DC MACHINES:**

Output Equations – Main Dimensions - Magnetic circuit calculations – Carter’s Coefficient - Net length of Iron –Real & Apparent flux densities – Selection of number of poles – Design of Armature – Design of commutator and brushes – performance prediction using design values.

**UNIT III TRANSFORMERS:**

Output Equations – Main Dimensions - KVA output for single and three phase transformers – Window space factor – Overall dimensions – Operating characteristics – Regulation – No load current – Temperature rise in Transformers – Design of Tank - Methods of cooling of Transformers.

**UNIT IV INDUCTION MOTORS:**

Output equation of Induction motor – Main dimensions – Length of air gap- Rules for selecting rotor slots of squirrel cage machines – Design of rotor bars & slots – Design of end rings – Design of wound rotor -– Magnetic leakage calculations – Leakage reactance of poly phase machines- Magnetizing current - Short circuit current – Circle diagram - Operating characteristics.

**UNIT V SYNCHRONOUS MACHINES-I:**

Output equations – choice of loadings – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Armature parameters – Estimation of air gap length.

**UNIT VI SYNCHRONOUS MACHINES-II:**

Design of rotor – Design of damper winding – Determination of full load field mmf – Design of field winding – Design of turbo alternators – Rotor design.

**TEXT BOOKS:**

1. Sawhney, A.K., 'A Course in Electrical Machine Design', Dhanpat Rai & Sons, New Delhi, 1984.

2. Sen, S.K., 'Principles of Electrical Machine Designs with Computer Programmes', Oxford and IBH

Publishing Co. Pvt. Ltd., New Delhi, 1987.

**REFERENCES:**

1. A.Shanmugasundaram, G.Gangadharan, R.Palani 'Electrical Machine Design Data Book', New Age

Intenational Pvt. Ltd., Reprint 2007.

2. ‘Electrical Machine Design', Balbir Singh, Brite Publications, Pune.

**L T P/D C**

**3 1 0 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** |  | **x** |  |  |  |  |  |  |  |  |

**IV Year B.Tech – II Sem**

**Code: 6A829 POWER SYSTEM DEREGULATION**

**(PROFESSIONAL ELECTIVE-IV)**

**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.

**IV year B.Tech – II Sem**

**Code: 6EC21 NUERAL NETWORKS**

**(PROFESSIONAL ELECTIVE – IV)**

**L T P C**

**3 1 3**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
|  | **x** | **x** | **x** |  |  | **x** |  |  |  | **x** |  |

## **Course Objectives:**

Students should be able apply Pattern Recognition for Real-life problems

**Course Outcomes:**

After completing this course, student shall be able to

1. The role of neural networks in engineering, artificial intelligence, and cognitive modeling.
2. Feed-forward neural networks of increasing complexity, gradient descent learning and extensions, learning and generalization theory
3. Competitive learning, Self-organizing feature maps, be able to evaluate whether neural networks are appropriate to a particular application.
4. Be able to apply neural networks to particular applications, and to know what steps to take to improve performance.

**UNIT I: INTRODUCTION** –

What is a neural network, Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks.

**UNIT II: Single layer perceptrons** –

Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perceptron –convergence theorem, Relation between perceptron and Bayes classifier for a Gaussian Environment

**UNIT III: MULTILAYER PERCEPTRON** –

The XOR problem, Heuristics, Output representation and decision rule, feature detection,

**BACK PROPAGATION** – Algorithm and its derivation by using error minimization. back propagation and differentiation, Hessian matrix, Generalization, Cross validation, Network pruning Techniques, Virtues and limitations of back propagation learning,

**UNIT IV: Self organization maps –**

Two basic feature mapping models, Self organization map, SOM algorithm.

**UNIT V: Hopfield models** –

Simple Hopfield models.

**UNIT VI :** Examples OF APPLICATIONS OF NEURAL NETWORKS

Alphabet recognition, fingerprint recognition.

**Text Books:**

1. Neural networks comprehensive foundations, Simon Hhaykin, Pearson Education 2nd Edition 2004

**Reference Books**

1. Artifical neural networks - B.Vegnanarayana Prentice Halll of India P Ltd 2005
2. Neural networks in Computer intelligence, Li Min Fu TMH 2003
3. Neural networks James A Freeman David M S kapura pearson education 2004

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  |  | **x** | **x** |  |  |  | **x** | **x** | **x** |  |

**B.Tech IV Year – II Sem.**

**Code: 6A827 REACTIVE POWER COMPENSATION & MANAGEMENT**

**(Professional Elective-V)**

**L T P C**

**3 1 - 3**

**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.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  |  | **x** | **x** |  |  |  | **x** | **x** | **x** |  |

**IV Year B.Tech – II Sem.**

**Code: 6A826 PROGRAMMABLE LOGIC CONTROLLERS**

**(Professional Elective – V)**

**L T P C**

**3 1 - 3**

**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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  |  | **x** | **x** |  |  |  | **x** | **x** | **x** |  |

**B.Tech IV Year – II Sem.**

**Code: 6A841 POWER SYSTEM RELIABILITY AND PLANNING**

**(Professional Elective-V)**

**L T P C**

**3 1 3**

**Course Outcomes:**

* Understand the importance of maintaining reliability of power system components
* Apply the probabilistic methods for evaluating the reliability of generation and transmission systems.
* Assess the different models of system components in reliability studies.
* Assess the reliability of single area and multi area systems.

**UNIT – I: BASIC RELIABILITY CONCEPTS:** The general reliability function. The exponential distribution – Mean time to failures – series and parallel systems. Markov process – continuous Markov process – Recursive techniques – Simple series and parallel system models.

**UNIT-II: GENERATING CAPACITY – BASIC PROBABILITY METHODS:** The generation system model – Loss of load indices – Capacity expansion analysis – scheduled outages. Load forecast uncertainty Loss of energy indices. The frequency and duration method.

**UNIT-III: TRANSMISSION SYSTEMS RELIABILITY EVALUATION:** Radial configuration – Conditional probability approach – Network configurations – State selection.

**UNIT – IV: GENERATION PLANNING:** Comparative economic assessment of individual generation projects – Investigation and simulation models – Heuristic and linear programming models – Probabilistic generator and load models.

**UNIT –V: TRANSMISSION PLANNING:** Deterministic contingency analysis – Probabilistic transmission system – reliability analysis. Reliability calculations for single area and multi–area power systems.

**UNIT –VI: DISTRIBUTION PLANNING:** Network configuration design–consisting of schemes – security criteria configuration synthesis.

**TEXTBOOKS:**

1. Roy Billinton and Ronald Allan Pitam: Reliability Evaluation of Power Systems,1996.

2. R.L. Sullivan: Power System Planning, McGraw Hill International, 1977.

3. Wheel Wright and Makridakis: Forecasting methods and Applications, John Wiley, 1992.

4. J. Endremyl: Reliability Modelling in Electric Power Systems, John Wiley, 2005.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** |  |  | **x** | **x** |  |  |  | **x** | **x** | **x** |  |

**B.Tech IV Year – II Sem.**

**Code: 6A830 REAL TIME CONTROL OF POWER SYSTEMS**

**(Professional Elective-V)**

**L T P C**

**3 1 3**

**UNIT – I Substation/ Generating Station:**

Lay out of substation / Generating Station, Main Equipment in Sub Station/ Generating Station, Instrument Transformers and their importance in measurements and protection, important parameters necessary for Grid operation: Analog Points (MW, MVar, Tap Position, Voltage, Frequency), Status Points (CB Status, Isolator Status, SOE Points), Alarms. Hardware required getting these parameters to RTU: Transducers & their connectivity.

**UNIT – II SCADA Functions:**

Introduction to SCADA: Grid Operation & Control, Difficulties in operating the large power systems manually, need for going to SCADA operation, advantages of SCADA operation. Data Acquisition, Monitoring and Event Processing, Control Functions, Time tagged data, Disturbance data collection and analysis, Reports and Calculations. Man –Machine Communication: Operator‘s Console, VDU Display and its use, Operator Dialogs, Mimic Diagram Functions, and Printing Facilities.

**UNIT – III Remote Terminal Unit (RTU) & Communication Practices:**

Major Components: RTU Panel, Interface Panel. D20M Main Processor, Analog Card, Status Card, Control Card, Modems. Types Of Communications: Power Line Carrier Communications, Microwave, Optical fibre, VSAT Communications. Types of Network Elements in LAN & WAN. Process of Data Communication.

**UNIT – IV Sub-Load Dispatch Center (SUB-LDC):**

Various Equipment in Sub LDC: (a) Work Stations: details (b) FEPS: Function of FEPS (Front End Processors). (c) Routers: function of routers, interconnectivity of the equipment by LAN, Functionality and responsibilities of Sub LDC

**UNIT – V Introduction to SCADA Protocols & Communication Standards for Electrical Power Systems:**

Power System Control requirements and evolution of Protocol for Communication, Protocols -Modbus, Distributed Network Protocol (DNP), IEC 870-5 and 60870 series, Benefits from the IEC (International Electro technical Commission) communication Standards. (Ref: www.dnp.org,www.modbus.org, www.kema.nl)

**Real Time Software:** Classification of Programs, Structure of Real time Programs, Construction Techniques & Tools, Programming Language Requirements for Process Control.

**UNIT – VI Computer Control of Electrical Power Systems:**

Evolution of System Control, time scale of system control, online computer control, & Software Elements: State Estimation, Monitoring & Prediction, Generation & Load Control, Security Analysis; Software Coordination & Systems Simulation. State Load Dispatch Center (SLDC): Inter Connectivity of Sub-LDCs & SLDCs, Hierarchy of Data Transfer, Functions & Responsibilities of SLDC, Real Time Operation carried at SLDC.

**Southern Regional Load Dispatch Center (SRLDC):**

Functions & Responsibilities of SRLDC, Operations carried at SRLDC, Overview of SCADA, Real Time Operation in detail.

**TEXT BOOKS:**

1. Hassan Bevrani: Robust Power System Frequency Control, Power Electronics and Power Systems, Edition illustrated Publisher Springer, 2009.

2. Michael John Howard Sterling: Power system control, Volume 6 of IEE control engineering series, Edition illustrated Publisher Peregrinus [for] the Institution of Electrical Engineers, 1978.

3. TorstenCegrell, ―Power System control –Technology‖, Prentice –Hall International seriesin Systems and control Engineering, Prentice Hall International Ltd., 1986.

4. S. Bennett and D.A. Linkens (Editors): Real –Time Computer Control, IEE Control Engineering series (24), peter Peregrinus Ltd., 1984.

5. Real –Time Systems –by C.M. Krishna and Kangg. Shin, McGraw-Hill international companies, 1997.

**IV Year B.Tech – II Sem**

**CODE: 6A883 PROJECT PHASE - II**

**L T P/D C**

**0 0 20 12**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

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

|  |  |
| --- | --- |
| CO1 | Students identify a topic from the current technical topics of their choice in the computer science domain and the allied fields, after surveying in the internet resources, journals and technical magazines in the library. |
| CO2 | Student learnt to arrange the contents of the presentation and scope of the topic, in an effective manner. |
| CO3 | Each student then presents the technical topic they chose in front of the panel and the fellow students, using the oratory skills. |
| CO4 | Students also face the questions posed by the panel and the students and answer them. |

Out of total 200 marks for project work (in the final year second semester), 50 marks shall be for Internal Evaluation and 150 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.

**The pattern of Internal Evaluation is as follows:**

**Division of marks for internal assessment – 50 marks**

* Progress of Project work and the corresponding interim report   
  as evaluated by internal guides at the end of 5 weeks : 05 Marks
* Seminar at the end of 5 weeks : 05 Marks
* Progress of Project work as evaluated by guides  
  at the end of 10 weeks : 05 Marks
* Seminar at the end of 10 weeks : 05 Marks
* Evaluation by the Guides ( at the end of 15 weeks) : 10 Marks
* Project Report : 05 Marks
* Final presentation and defense of the project : 15 Marks

If the project is conducted internally the marks supposed to be given by external guide will be given by internal guide himself.

**Division of Marks for External Evaluation – 150 Marks**

**Pattern of External Evaluation for Project**

* Final Project Report : 30 Marks
* Presentation : 20 Marks
* Demonstration / Defense of Project : 100 Marks

**IV Year B.Tech – II Sem**

**CODE: 6A884 COMPREHENSIVE VIVA-VOCE - III**

**L T P/D C**

**0 0 0 1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** |  |  |  |  |  |  | **x** |  |  |  |

**Course Outcome :**

* 1. Comprehend the concepts in the core and élective courses.
  2. Exhibit technical knowlegde to face interviews.
  3. Exhibit life long Learning skills for higher education and to persue Professional practice.

There shall be a Comprehensive Viva-Voce in II year II semester. The Comprehensive Viva-Voce will be evaluated for 100 marks, out of which 50 marks is internal and 50 marks external. The internal evaluation is done by HOD, Two Senior professors /Associate Professors in the department and Comprehensive Viva-Voce coordinator.

The internal evaluation shall consists of

**First mid-sessional viva at the end of 5 weeks -50 Marks**

**Second mid-sessional viva at the end of 10 weeks -50 Marks**

The average of two **mid-sessional vivas** will be taken into consideration.

The External 50 marks is evaluated by a Committee consisting of an External Examiner, HoD, and two senior faculty members of the department during End practical examination.

**IV Year B.Tech – II Sem**

**CODE: 6A898 TECHNOLOGY REVIEW AND SEMINAR - IV**

**L T P/D C**

**0 0 2 1**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| **x** | **x** |  | **x** |  | **x** |  | **x** | **x** | **x** |  | **x** |

**COURSE OUTCOMES:**

|  |  |
| --- | --- |
| 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**

|  |  |
| --- | --- |
| Level of content | 20 marks |
| Presentation | 20 marks |
| Seminar Notes | 10 marks |
| Discussion & Involvement | 10 marks |
| Final report | 25 marks |
| Attendance | 10 marks |
| Punctuality | 05 marks |
| Total | 100 Marks |