

**ACADEMIC REGULATIONS COURSE STRUCTURE
AND
DETAILED SYLLABUS**

**CSE – IOT AND CYBER SECURITY WITH BLOCK
CHAIN TECHNOLOGY**

COURSE STRUCTURE AND SYLLABUS (R20)

for

B. Tech., FOUR YEAR DEGREE COURSE

(Applicable for batches admitted from 2020-2021)



**VASIREDDY VENKATADRI INSTITUTE OF TECHNOLOGY
(Autonomous)**

**Approved by AICTE, Permanently Affiliated to JNTUK,
NAAC Accredited with 'A' Grade, ISO 9001:2015 Certified**
Nambur (V), Pedakakani (M), Guntur (Dt.), Andhra Pradesh – 522 508

ACADEMIC REGULATIONS (R20) FOR B. TECH. (REGULAR)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2020-21 onwards

The B.Tech Degree of Jawaharlal Nehru Technological University Kakinada, Kakinada shall be conferred on candidates who are admitted to the programme and who fulfill all the requirements for the award of the Degree.

VISION

To impart quality education through exploration and experimentation and generate socially-conscious engineers, embedding ethics and values, for the advancement in science and technology.

MISSION

- To educate students with a practical approach to dovetail them to industry-needs.
- To govern the institution with a proactive and professional management with passionate teaching faculty.
- To provide holistic and integrated education and achieve over all development of students by imparting scientific and technical, social and cognitive, managerial and organizational skills.
- To compete with the best and be the most preferred institution of the studios and the scholarly.
- To forge strong relationships and linkage with the industry.

OBJECTIVES

- Equip the institute with state-of-the-art infrastructure comparable to the best in the industry.
- Tap the resources of the best minds in the field as faculty and visiting faculty.
- Groom students to become global entrepreneurs and responsible citizens.
- Provide financial assistance to meritorious students.
- Requisition the services of the best HR managers to place our students in reputed industries.
- Provide conducive atmosphere to the faculty for Research & Development and ensure active participation of the students.

About CIC Department

Department of Computer Science and Engineering has been successfully functioning since 2007. It offers B.Tech (Computer Science and Engineering) and M.Tech (Computer Science and Engineering). This has good interactions and MOUs with leading technology domain Training & Development Industries. Department of CSE under VVIT, signed MoUs with Google CodeLabs, Infosys (Campus Connect), Microsoft (Campus Agreement), Tech Mahindra, SphereMe, InetSolv& V-Technologies and many more. The Department students are placed in various top MNCs like Infosys, IBM, Tech Mahindra, Accenture, Mind Tree, Samsung R&D, Amazon, DBS, EPAM etc., for deserving & esteemed packages of more than 2.4 Lakhs to 18 Lakh per Annum.

In order to meet the global needs and make students industry ready engineers, a new program with the name of Computer Science and Engineering (Internet of Things, Cyber Security including Blockchain Technology-CIC) was started from the academic year 2020-2021 with an intake of 60 students. This new B.Tech CSE (IoT & Cyber Security including Blockchain Technology), undergraduate programme familiarizes students with the functional and operational aspects of IoT, Cyber Security and Blockchain Technology. Internet of Things (IoT) is a pervasive technology that interrelates computing devices, to enable transfer of data over a network, without requiring human-to-human or human-to-computer interaction. Various IoT applications focus on automating different tasks and are trying to empower the inanimate physical objects to act without any human intervention. Cyber Security as a profession is evolving over the years, reason being the increasing rate of cyber crimes. Any industry that transacts online or carries sensitive data is in need of a Cyber Security professional to safeguard its data from such delinquents. Cyberspace being a common platform which is accessed anyone from every corner of the world, the scope of Cyber Security is equally spread across the globe.

ACADEMIC REGULATIONS (R20) FOR B. TECH (REGULAR)

Applicable for the students of B.Tech from the Academic Year 2020 – 21 onwards

1. Award of B. Tech. Degree

A student will be declared eligible for the award of B. Tech. degree if he/she fulfills the following:

- Pursues a course of study in not less than four and not more than eight academic years.
- After eight academic years from the year of their admission, he/she shall forfeit their seat in B. Tech course and their admission stands cancelled.
- Registers for 160 credits and must secure all the 160 credits.
- A student shall be eligible for the award of **B.Tech degree with Honors or Minor if he/she earns 20 credits in addition to the 160 credits. A student shall be permitted to register either for Honors or for Minor and not for both simultaneously.**

2. **Courses of Study:** The following courses of study are offered at present as specializations for the B. Tech. Courses

S. No.	Branch	Branch Short Form	Branch Code
1	Civil Engineering	CIV	01
2	Electrical and Electronics Engineering	EEE	02
3	Mechanical Engineering	MEC	03
4	Electronics and Communication Engineering	ECE	04
5	Computer Science and Engineering	CSE	05
6	Information Technology	INF	12
7	CSE (Artificial Intelligence and Machine Learning)	CSM	42
8	CSE (Internet of Things and Cyber Security with Block Chain Technology)	CIC	47
9	CSE (Internet of Things)	CSO	49
10	CSE (Artificial Intelligence and Data Science)	AID	54

3. **Medium of Instruction:** The medium of instruction of the entire B. Tech undergraduate programme in Engineering & Technology (including examinations and project reports) will be in English only.

4. **Admissions:** Admission to the B. Tech Programme shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the student in the common entrance examination conducted by the A.P. Government/University or on the basis of any other order of merit approved by the A.P. Government/University, subject to reservations as prescribed by the Government/University from time to time.

5. **Structure of the Undergraduate Engineering program:** Every course of B. Tech. Program shall be placed in one of the nine categories as listed in table below:

S.No.	Category	Breakup of Credits
1	Humanities and social science including Management courses	10.5 - 12
2	Basic Science courses	21 - 25
3	Engineering science courses	24
4	Professional core Courses	48 - 51
5	Open Elective Courses	12 - 18
6	Professional Elective Courses	15 - 18
7	Internship, seminar, project work	15 – 16.5
8	Mandatory courses	NC
9	Skill Oriented Courses	----
Total Credits		160

** Breakup of Credits based on AICTE /APSCHE

Assigning of Credits

- Hr. Lecture (L) per week - 1 credit
- Hr. Tutorial (T) per week - 1 credit
- Hr. Practical (P) per week - 0.5 credits

6. Programme Pattern

- i. Total duration of the of B. Tech (Regular) Programme is four (three for lateral entry) academic years
- ii. Each Academic year of study is divided in to two semesters.
- iii. Minimum number of instruction days in each semester is 90.
- iv. Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
- v. The total credits for the Programme are 160.
- vi. A three-week induction program is mandatory for all first year UG students (Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc.,) and shall be conducted as per AICTE/UGC/APSCHE guidelines.
- vii. Student is introduced to “Choice Based Credit System (CBCS)”.
- viii. A pool of interdisciplinary and job-oriented mandatory skill courses which are relevant to the industry are integrated into the curriculum of concerned branch of engineering (total five skill courses: two basic level skill courses, one on soft skills and other two on advanced level skill courses)
- ix. A student has to register for all courses in a semester.
- x. All the registered credits will be considered for the calculation of final CGPA.

- xi. Each semester has - 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 course structure as suggested by AICTE are followed.
- xii. A 10 months industry/field mandatory internship, both industry and social, during the summer vacation and also in the final semester to acquire the skills required for job and make engineering graduates to connect with the needs of the industry and society at large.
- xiii. All students shall be mandatorily registered for NCC/NSS activities. A student will be required to participate in an activity for two hours in a week during second and third semesters. Grade shall be awarded as Satisfactory or Unsatisfactory in the mark sheet on the basis of participation, attendance, performance and behaviour. If a student gets an unsatisfactory Grade, he/she shall repeat the above activity in the subsequent years, in order to complete the degree requirements.
- xiv. Courses like Environmental Sciences, Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc., shall be included in the curriculum as non-credit mandatory courses. Environmental Sciences is to be offered compulsorily as mandatory course for all branches. A student has to secure 40% of the marks allotted in the internal evaluation for passing the course. No marks or letter grade shall be allotted for all mandatory non-credit courses.
- xv. College shall assign a faculty advisor/mentor after admission to each student or group of students from same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies / GATE / other competitive exams etc.
- xvi. Departments may swap some of the courses between first and second semesters to balance the work load.
- xvii. The concerned Board of studies can assign tutorial hours to such courses wherever it is necessary, but without change in the total number of credits already assigned for semester.

7. Registration for Courses

- i. The college shall invite registration forms from the students at the beginning of the semester for the registration for courses each semester. The registration process shall be closed within one week. If any student wishes to withdraw the registration, he/she shall submit a letter to the principal through the class teacher/instructor and HOD. The principal shall communicate the registration and withdraw details courses of each student in a consolidated form to the college examination section and University without fail.
- ii. There are four open electives in each branch. All Open Electives are offered to students of all branches in general. A student shall choose an open elective, by consulting the HOD/advisor, from the list in such a manner that he/she has not studied the same course in any form during the Programme. The college shall invite registration forms from the students at the beginning of the semester for offering professional and open elective courses. There shall be a limit on the minimum and maximum number of registrations based on class/section strength.

- iii. A student shall be permitted to pursue up to a maximum of two elective courses under MOOCs during the programme. Students are advised to register for only for minimum 12 weeks in duration MOOCs courses. Student has to pursue and acquire a certificate for a MOOC course only from the SWAY/NPTE through online with the approved by the BoS in order to earn the 3 credits. The Head of the department shall notify the list of such courses at the beginning of the semester. The details of the MOOCs courses registered by the students shall be submitted to the University examination centre as well as college examination center. The Head of the Department shall appoint a mentor for each of the MOOC subjects registered by the students to monitor the student's assignment submissions given by SWAYAM/NPTEL. The student needs to submit all the assignments given and needs to take final exam at the proctor centre. The student needs to earn a certificate by passing the exam. The student will be awarded the credits given in curriculum only by submission of the certificate. In case if student does not pass subjects registered through SWAYAM/NPTEL, the same or alternative equivalent subject may be registered again through SWAYAM/NPTEL in the next semester with the recommendation of HOD and shall be passed.
- iv. Two summer internships each with a minimum of six weeks duration shall be mandatorily done/completed respectively at the end of second and third years (during summer vacations). The internship can be done by the students at local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs. After completing the summer internship, the students shall register in the immediate respective odd semester and it will be evaluated at the end of the semester as per norms of the autonomy. The student has to produce the summer internship satisfactory report and certificate taken from the organization to be considered for evaluation. The College shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.
- v. In the final semester, the student should mandatorily register and undergo internship and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated with an external examiner.
- vi. Curricular Framework for Skill oriented courses
 - a. There are five (05) skill-oriented courses shall be offered during III to VII semesters and students must register and pass the courses successfully.
 - b. For skill oriented/skill advanced course, one theory and 2 practical hours (1-0-2) or two theory hours (2-0-0) may be allotted as per the decision of concerned BOS.
 - c. Out of the five skill courses; (i) two shall be skill-oriented courses from the same domain and shall be completed in second year (ii) Of the remaining 3 skill courses, one

shall be necessarily be a soft skill course and the remaining two shall be skill-advanced courses either from the same domain or job-oriented skill courses, which can be of inter disciplinary nature.

- d. Students may register the interdisciplinary job-oriented skill courses based on the prerequisites and eligibility in consultation with HoD of the college.
- e. The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies/APSSDC or any other accredited bodies. However, the department has to assign mentors in the college to monitor the performance of the students.
- f. If a student chooses to take a certificate course offered by industries/Professional bodies/APSSDC or any other accredited bodies, in lieu of the skill advanced course offered by the department, then the department shall mark overall attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate. However, the student is deemed to have fulfilled the attendance requirement of the course, if the external agency issues a certificate with satisfactory condition. If the certificate issued by external agency is marked with unsatisfactory condition, then the student shall repeat the course either in the college or at external agency. The credits will be awarded to the student upon producing the successful course completion certificate from the agency/professional bodies and after passing in the viva-voce examination conducted at college as per BoS norms at the end of the semester.

8. Attendance Requirements:

- i. A student is eligible to write the semester-end examinations if he acquires a minimum of 40% in each subject and 75% of attendance in aggregate of all the subjects.
- ii. Shortage of Attendance below 65% in aggregate shall in NO case be condoned. Students whose shortage of attendance is not condoned in any semester are not eligible to take their end semester examination of that class and their registration shall stand cancelled.
- iii. Condonation for shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.
- iv. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester, as applicable. They may seek readmission for that semester when offered next.
- v. A student will be promoted to the next semester if he satisfies the(a) attendance requirement of the present semester and (b) minimum required credits (from Vth Semester onwards).
- vi. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.
- vii. For induction programme attendance shall be maintained as per AICTE norms.

- viii. For non-credit mandatory courses the students shall maintain the attendance similar to credit courses.

9. Evaluation-Distribution and Weightage of marks

Paper setting and evaluation of the answer scripts shall be done as per the procedures laid down by the Academic Council of the institute from time to time.

- i. A student is deemed to have satisfied the minimum academic requirements if he/she has earned the credits allotted to each theory/practical design/drawing subject/ project etc. by securing not less than 35% of marks in the end semester exam and minimum 40% of marks in the total of the internal marks and end semester examination marks together.
- ii. For non-credit mandatory courses, like Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge, the student has to secure 40% of the marks allotted in the internal evaluation for passing the course. No marks or letter grade shall be allotted for all mandatory non-credit courses.
- iii. **Distribution and Weightage of marks:** The assessment of the student's performance in each course will be based on Continuous Internal Evaluation (CIE) and Semester-End Examination (SEE). The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for theory subject, 50 marks for practical subject/Mini Project/Internship/Industrial Training/ Skill Development programmes/Research Project, and 200 marks for end Project Work.
- iv. **Guide lines for Continuous Internal Evaluation (CIE)**
 - a. For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of (i) one online objective examination (ii) one descriptive examination (iii) one assignment and (iv) one Subject Seminar. The online examination (objective) shall be 10 marks with duration of 20 minutes, descriptive examination shall be for 10 marks with a duration of 1 hour 30 minutes, assignment test shall be 5 marks with duration of 50 minutes (Open book system with questions of L4 standard on Bloom's scale) and 90 minutes for descriptive paper) and Subject Seminar 5 marks.
 - b. The first online examination (objective) is set with 20 multiple choice questions for 10 marks (20 questions x 1/2 marks) from first two and half units (50% of the syllabus).
 - c. The descriptive examination is set with 3 full questions for 10 marks each from first two and half units (50% of the syllabus), the student has to answer all questions.
 - d. The Assignment Test from first two and half units conducted for 20 Marks and will be scaled down to 5 Marks. The test is open book system and the duration of the exam is 50 minutes. Students can bring a maximum of three printed text books related to that subject. (Soft copies of the text books will not be allowed.) The assignments have to provide broadened exposure to the course. The questions shall include problem solving approach, problem analysis & design, implementation, case studies etc.

- e. For the subject seminar 5 marks, each student shall be evaluated based on the presentation on any topic of his/her choice in the subject duly approved by the faculty member concerned.
- f. For the subject having design and / or drawing (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (15 marks for continuous Assessment (day-to-day work) and 15 marks for internal tests).

In the similar lines, the mid-2 examinations shall be conducted on the rest of the syllabus.

- g. For practical subjects there shall be continuous evaluation during the semester for 15 marks. The internal 15 marks shall be awarded as follows: day to day work 5 marks, record 5 marks and the remaining 5 marks are to be awarded by conducting an internal laboratory test of 3 hours duration.
- h. The mid marks submitted to the examination section shall be displayed in the concerned department notice boards for the benefit of the students. If any discrepancy found in the displayed Mid marks, it shall be brought to the notice of examination section within two working days from the date of display.
- i. Internal marks can be calculated with 80% weightage for better of the two mids and 20% Weightage for another mid exam.

Example:

Mid-1 marks = Marks secured in (online examination-1+descriptive examination-1 +one assignment-1 + Seminar-1)

Mid-2 marks = Marks secured in (online examination-2+descriptive examination-2 +one assignment-2 + Seminar-2)

Final internal Marks = (Best of (Mid-1/Mid-2) marks x 0.8 + Least of (Mid-1/Mid-2) marks x 0.2)

v. **Semester End Examinations Evaluation:**

- a. The semester end examinations for theory subjects will be conducted autonomous examination section for 70 marks consists of five questions carrying 14 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an “either” “or” choice, which means that there will be two questions from each unit and the student should answer either of the two questions.
- b. For practical subjects shall be conducted for 35 marks by the teacher concerned and external examiner appointed by Chief superintendent/ Controller of Examinations (CoE), VVIT. All the laboratory records and internal test papers shall be preserved in respective departments as per autonomous norms and shall be produced to the Committees as and when they ask for.

- c. Evaluation of the summer internships: It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs in the area of concerned specialization of the UG programme. Students shall pursue this internship during summer vacation just before its offering as per course structure. The minimum duration of this course shall be at least 6 weeks. The student shall register for the internship as per course structure after commencement of academic year. A supervisor/mentor/advisor has to be allotted to guide the students for taking up the summer internship. The supervisor shall monitor the attendance of the students while taking up the internship. Attendance requirements are as per the norms of the academic regulations. After successful completion, students shall submit a summer internship technical report to the concerned department and appear for an oral presentation before the departmental committee consists of an external examiner appointed by Chief superintendent/ CoE; Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate from industry/skill development center shall be included in the report. The report and the oral presentation shall carry 40% and 60% weightages respectively. It shall be evaluated for 50 external marks at the end of the semester. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the examination section.
- d. The job-oriented skill courses may be registered at the college or at any accredited external agency. A student shall submit a record/report on the on the list skills learned. If the student completes job-oriented skill course at external agency, a certificate from the agency shall be included in the report. The course will be evaluated at the end of the semester for 50 marks (record: 15 marks and viva-voce: 35 marks) along with laboratory end examinations in the presence of external (appointed by the Chief superintendent/ CoE) and internal examiner (course instructor or mentor). There are no internal marks for the job-oriented skill courses.
- e. Mandatory Course (M.C): Environmental Sciences, Universal Human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge etc. non-credit (zero credits) mandatory courses. Environmental Sciences shall be offered compulsorily as mandatory course for all branches. A minimum of 75% attendance is mandatory in these subjects. There shall be an external examination for 70 marks and it shall be conducted by the department internally. Two internal examinations shall be conducted for 30 marks and a student has to secure at least 40% of the marks for passing the course. There is no online internal exam for mandatory courses. No marks or letter grade shall be printed in the transcripts for all mandatory non-credit courses, but only Completed (Y)/Not-completed (N) will be specified.
- f. Procedure for Conduct and Evaluation of MOOC: There shall be a Discipline Centric Elective Course through Massive Open Online Course (MOOC) as Program Elective

course. The student shall register for the course (Minimum of 12 weeks) offered by SWAYAM/NPTEL/etc., through online with the approval of Head of the Department. The Head of the Department shall appoint one mentor for each of the MOOC subjects offered. The student needs to register the course in the SWAYAM/NPTEL portal. During the course, the mentor monitors the student's assignment submissions given by SWAYAM/NPTEL. The student needs to submit all the assignments given and needs to take final exam at the proctor center. The student needs to earn a certificate by passing the exam. The student will be awarded the credits given in curriculum only by submission of the certificate. In case if student does not pass subjects registered through SWAYAM/NPTEL, the same or alternative equivalent subject may be registered again through SWAYAM/NPTEL in the next semester with the recommendation of HOD and shall be passed.

- g. Major Project (Project - Project work, seminar and internship in industry): In the final semester, the student should mandatorily register and undergo internship and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated with an external examiner. Evaluation: The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner appointed by the Chief superintendent/ CoE and is evaluated for 140 marks.
- vi. Recounting/ Revaluation/ Revaluation by Challenge in the End Semester Examination: A student can request for recounting/ revaluation/ revaluation by challenge of his/her answer book on payment of a prescribed fee as per autonomous norms.
- vii. Supplementary Examinations: A student who has failed to secure the required credits can appear for a supplementary examination, as per the schedule announced by the examination section.
- viii. Malpractices in Examinations: Disciplinary action shall be taken in case of malpractices during Mid/End examinations as per the rules framed by the academic council.
- ix. If the student is involved in indiscipline/malpractices/court cases, the result of the student will be withheld.

10. Promotion Rules:

- i. A student shall be promoted from first year to second year if he/she fulfills the minimum attendance requirements.
- ii. A student will be promoted from II year to III year if he/she fulfills the academic requirement of 40% of credits up to either II year I-Semester or II year II-Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.
- iii. A student shall be promoted from III year to IV year if he/she fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

11. Course Pattern

- i. The entire course of study is for four academic years; all years are on semester pattern.
- ii. A student eligible to appear for the end semester examination in a subject, but absent from it or has failed in the end semester examination, may write the exam in that subject when conducted next.
- iii. When a student is detained for lack of credits/shortage of attendance, he may be re-admitted into the same semester/year in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable to him.

12. Grading:

The grade points and letter grade will be awarded to each course based on students' performance as per the grading system shown in the following Table.

% of Marks	Letter Grade	Level	Grade Points
≥ 90	A+	Outstanding	10
80 to 89	A	Excellent	9
70 to 79	B	Very Good	8
60 to 69	C	Good	7
50 to 59	D	Fair	6
40 to 49	E	Satisfactory	5
<40	F	Fail	0
ABSENT	Ab	Absent	0

13. Computation of SGPA and CGPA

- i. The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a

student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$SGPA(S_i) = \Sigma (C_i \times G_i) / \Sigma C_i$$

where, C_i is the number of credits of the i th subject and G_i is the grade point scored by the student in the i th course

- ii. The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$$CGPA = \Sigma (C_i \times S_i) / \Sigma C_i$$

where ' S_i ' is the SGPA of the i th semester and C_i is the total number of credits in that semester

- iii. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- iv. While computing the SGPA/CGPA, the subjects in which the student is awarded Zero grade points will also be included.
- v. Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.
- vi. Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters A+, A, B, C, D, E and F.
- vii. As per AICTE regulations, conversion of CGPA into equivalent percentage as follows:

$$\text{Equivalent Percentage} = (CGPA - 0.75) \times 10$$

- viii. Illustration of Computation of SGPA and CGPA

Illustration for SGPA: Let us assume there are 6 subjects in a semester. The grades obtained as follows:

Course	Credit	Grade Obtained	Grade point	Credit x Grade Point
Subject 1	3	B	8	3 X 8 = 24
Subject 2	4	C	7	4 X 7 = 28
Subject 3	3	D	6	3 X 6 = 18
Subject 4	3	A ⁺	10	3 X 10 = 30
Subject 5	3	E	5	3 X 5 = 15
Subject 6	4	D	6	4 X 6 = 24
	20			139

Thus, $SGPA (S_i) = 139/20 = 6.95 = 6.9$ (approx.)

Illustration for CGPA:

	Sem-1	Sem-2	Sem-3	Sem-4	Sem-5	Sem-6	Sem-7	Sem-8
Credits	20	22	25	26	26	25	21	23
SGPA	6.9	7.8	5.6	6.0	6.3	8.0	6.4	7.5

$$CGPA = \frac{20 \times 6.9 + 22 \times 7.8 + 25 \times 5.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0 + 21 \times 6.4 + 23 \times 7.5}{188}$$

$$= \frac{1276.3}{188} = 6.78$$

14. Award of Class:

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

Class Awarded	CGPA to be secured
First Class with distinction*	≥ 7.5
First Class	≥ 6.5 & < 7.5
Second Class	≥ 5.5 & < 6.5
Pass Class	≥ 4 & < 5.5
Fail	< 4

* Awarded only if all the credit courses prescribed are cleared within four years for regular candidates and three years for lateral entry candidates

The students who are approved for break in study for entrepreneurships / start-up's will also be considered for award of first class with distinction

For the purpose of awarding First, Second and Pass Class, CGPA obtained in the examinations appeared within the maximum period allowed for the completion of the program shall be considered

15. Gap - Year:

Gap Year – concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I year/II year/III year to pursue entrepreneurship full time. This period shall be counted for the maximum time for graduation. An evaluation committee at university level shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for availing the Gap Year.

16. Transitory Regulations

A candidate, who is detained or discontinued a semester, on re-admission shall be required to pass all the courses in the curriculum prescribed for such batch of students in which the student joins subsequently and the academic regulations be applicable to him/her which are in force at the time of his/her admission. However, exemption will be given to those candidates who have already passed in such courses in the earlier semester(s) and additional courses are to be studied as approved by Board of Studies and ratified by Academic Council.

17. Curricular Framework for Honors Programme

- i. Students of a Department/Discipline are eligible to opt for Honors Programme offered by the same Department/Discipline.
- ii. A student shall be permitted to register for Honors program at the beginning of 4th semester provided that the student must have acquired a minimum of 8.0 SGPA up to the end of 2nd semester without any backlogs. In case of the declaration of the 3rd semester results after the commencement of the 4th semester and if a student fails to score the required minimum of 8 SGPA, his/her registration for Honors Programme stands cancelled and he/she shall continue with the regular Programme.
- iii. Students can select the additional and advanced courses from their respective branch in which they are pursuing the degree and get an honors degree in the same. e.g. If a Mechanical Engineering student completes the selected advanced courses from same branch under this scheme, he/she will be awarded B.Tech. (Honors) in Mechanical Engineering.
- iv. In addition to fulfilling all the requisites of a Regular B.Tech Programme, a student shall earn 20 additional credits to be eligible for the award of B. Tech (Honors) degree. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e., 160 credits).
- v. Of the 20 additional Credits to be acquired, 16 credits shall be earned by undergoing specified courses listed as pools, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired through two MOOCs, which shall be domain specific, each with 2 credits and with a minimum duration of 8/12 weeks as recommended by the Board of studies.
- vi. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. The courses offered in each pool shall be domain specific courses and advanced courses.
- vii. The concerned BoS shall decide on the minimum enrolments for offering Honors program by the department. If minimum enrolments criteria are not met then the students shall be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.
- viii. Each pool can have theory as well as laboratory courses. If a course comes with a lab component, that component has to be cleared separately. The concerned BoS shall explore the possibility of introducing virtual labs for such courses with lab component.
- ix. MOOC courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Students have to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned will be as decided by the university/academic council.

- x. The concerned BoS shall also consider courses listed under professional electives of the respective B. Tech programs for the requirements of B. Tech (Honors). However, a student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.
- xi. If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a “pass (P)” grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.
- xii. In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors and they will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
- xiii. Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor’s degree.

18. Curricular Framework for Minor Programme

- i. Students who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, If Mechanical Engineering student selects subjects from Civil Engineering under this scheme, he/she will get Major degree of Mechanical Engineering with minor degree of Civil Engineering
- ii. Student can also opt for Industry relevant tracks of any branch to obtain the Minor Degree, for example, a B.Tech Mechanical student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.
- iii. The BOS concerned shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance / demand. For example, the minor tracks can be the fundamental courses in CSE, ECE, EEE, CE, ME etc., or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric vehicles, Robotics, VLSI etc.
- iv. The list of disciplines/branches eligible to opt for a particular industry relevant minor specialization shall be clearly mentioned by the respective BoS.
- v. There shall be no limit on the number of programs offered under Minor. The college can offer minor programs in emerging technologies based on expertise in the respective departments or can explore the possibility of collaborating with the relevant industries/agencies in offering the program.

- vi. The concerned BoS shall decide on the minimum enrolments for offering Minor program by the department. If a minimum enrolments criterion is not met, then the students may be permitted to register for the equivalent MOOC courses as approved by the concerned Head of the department in consultation with BoS.
- vii. A student shall be permitted to register for Minors program at the beginning of 4th semester subject to a maximum of two additional courses per semester, provided that the student must have acquired 8 SGPA (Semester Grade point average) up to the end of 2nd semester without any history of backlogs. It is expected that the 3rd semester results may be announced after the commencement of the 4th semester. If a student fails to acquire 8 SGPA up to 3rd semester or failed in any of the courses, his registration for Minors program shall stand cancelled. An SGPA of 8 has to be maintained in the subsequent semesters without any backlog in order to keep the Minors registration active.
- viii. A student shall earn additional 20 credits in the specified area to be eligible for the award of B. Tech degree with Minor. This is in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e., 160 credits).
- ix. Out of the 20 Credits, 16 credits shall be earned by undergoing specified courses listed by the concerned BoS along with prerequisites. It is the responsibility of the student to acquire/complete prerequisite before taking the respective course. If a course comes with a lab component, that component has to be cleared separately. A student shall be permitted to choose only those courses that he/she has not studied in any form during the Programme.
- x. In addition to the 16 credits, students must pursue at least 2 courses through MOOCs. The courses must be of minimum 8 weeks in duration. Attendance will not be monitored for MOOC courses. Student has to acquire a certificate from the agencies approved by the BOS with grading or marks or pass/fail in order to earn 4 credits. If the MOOC course is a pass/fail course without any grades, the grade to be assigned as decided by the University/academic council.
- xi. Student can opt for the Industry relevant minor specialization as approved by the concerned departmental BoS. Student can opt the courses from Skill Development Corporation (APSSDC) or can opt the courses from an external agency recommended and approved by concerned BOS and should produce course completion certificate. The Board of studies of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skills based on industrial demand.
- xii. A committee should be formed at the level of College / department to evaluate the grades/marks given by external agencies to a student which are approved by concerned BoS. Upon completion of courses the departmental committee should convert the obtained grades/marks to the maximum marks assigned to that course. The controller of examinations can take a decision on such conversions and may give appropriate grades.

- xiii. If a student drops (or terminated) from the Minor program, they cannot convert the earned credits into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a “pass (P)” grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript or None of the courses done under the dropped Minor will be shown in the transcript.
- xiv. In case a student fails to meet the CGPA requirement for B.Tech degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for degree with Minors and they will receive B. Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.
- xv. Minor must be completed simultaneously with a major degree program. A student cannot earn the Minor after he/she has already earned bachelor’s degree.

19. Industrial Collaborations (Case Study)

Institution-Industry linkages refer to the interaction between firms and universities or public research centers with the goal of solving technical problems, working on R&D, innovation projects and gathering scientific as well as technological knowledge. It involves the collaboration of Industries and Universities in various areas that would foster the research ecosystem in the country and enhance growth of economy, industry and society at large.

The Institutions are permitted to design any number of Industry oriented minor tracks as the respective BoS feels necessary. In this process the Institutions can plan to have industrial collaborations in designing the minor tracks and to develop the content and certificate programs. Industry giants such as IBM, TCS, WIPRO etc., may be contacted to develop such collaborations. The Institutions shall also explore the possibilities of collaborations with major industries in the core sectors and professional bodies to create specialized domain skills.

20. Amendments to Regulations: The college may from time-to-time revise, amend or change the Regulations, Curriculum, Syllabus and Scheme of examinations through the Board of Studies with the approval of Academic Council and Governing Body of the college.

21. Transferred Students: The students seeking transfer to VVIT from various Universities/ Institutions have to obtain the credits of any equivalent subjects as prescribed by the Academic Council. Only the internal marks obtained in the previous institution will be considered for evaluation of failed subjects.

ACADEMIC REGULATIONS (R20) FOR B. TECH.(LATERAL ENTRY SCHEME)

Applicable for the students admitted into II-year B. Tech. from the Academic Year 2021-22 onwards

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

- A student shall be declared eligible for the award of the B. Tech Degree, if he pursues a course of study in not less than three academic years and not more than six academic years.
- The candidate shall register for 121 credits and secure all the 121 credits.
- A student shall be eligible for the award of B.Tech degree with Honors or Minor if he/she earns 20 credits in addition to the 121 credits. A student shall be permitted to register either for Honors or for Minor and not for both simultaneously.

2. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech Lateral Entry Students.

3. Promotion Rule

- A student shall be promoted from second year to third year if he fulfills the minimum attendance requirement.
- A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

4. Award of Class

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

Class Awarded	CGPA to be secured
First Class with distinction*	≥ 7.5
First Class	≥ 6.5 & < 7.5
Second Class	≥ 5.5 & < 6.5
Pass Class	≥ 4 & < 5.5
Fail	< 4

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

MALPRACTICE RULES

DISCIPLINARY ACTION FOR IMPROPER CONDUCT IN EXAMINATIONS

S.No.	Nature of Malpractices/Improper conduct	Punishment
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The

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

	<p>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.</p>	<p>case is registered against them.</p>
7.	<p>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</p>	<p>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</p>
8.	<p>Possess any lethal weapon or firearm in the examination hall.</p>	<p>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</p>
9.	<p>If student of the college, who is not a candidate for the particular examination or any person not</p>	<p>Student of the college expulsion from the examination hall and cancellation of the performance in that subject and all other subjects</p>






	connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Ragging

Prohibition of ragging in educational institutions Act 26 of 1997

Salient Features

- ⇒ Ragging within or outside any educational institution is prohibited.
- ⇒ Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student

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

In case any emergency call Toll Free No. 1800 425 1288

LET US MAKE VVIT A RAGGING FREE CAMPUS

Ragging



ABSOLUTELY

NO TO RAGGING

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.
2. Ragging entails heavy fines and/or imprisonment.
3. Ragging invokes suspension and dismissal from the College.
4. Outsiders are prohibited from entering the College and Hostel without permission.
5. Girl students must be in their hostel rooms by 7.00 p.m.
6. All the students must carry their Identity Cards and show them when demanded
7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

In case any emergency call Toll Free No. 1800 425 1288
LET US MAKE VVIT A RAGGING FREE CAMPUS

COURSE STRUCTURE

Definition of Credit (C)

1 Hour Lecture (L) per week 1 Credit

1 Hour Tutorial (T) per week 1 Credit

1 Hour Practical (P) per week 0.5 Credit

Structure of B. Tech program Regulation R20

S.No.	Category	Code	Suggested Breakup of Credits by AICTE	Suggested Breakup of Credits by APSCHE	Breakup of Credits
1	Humanities and Social Sciences including Management courses	HS	12	10.5	10.5
2	Basic Science courses	BS	25	21	21
3	Engineering Science courses including workshop, drawing, basics of electrical/ mechanical/ computer etc	ES	24	24	24
4	Professional core courses	PC	48	51	51
5	Professional Elective courses relevant to chosen specialization/ branch	PE	18	15	15
6	Open subjects – Electives from other technical and /or emerging subjects	OE	18	12	12
7	Project work, seminar and internship in industry or elsewhere	PR	15	16.5	16.5
8	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge]	NC	Non-Credit	Non-Credit	Non-Credit
9	Skill Oriented Courses	SC	--	10	10
Total			160	160	160

SEMESTER-WISE STRUCTURE OF CURRICULUM
I Year I Semester (Semester-1)

S. No	Course code	Course Name	L	T	P	C
1	BS1101	Mathematics-I	2	1	0	3
2	BS1102	Applied Chemistry	2	1	0	3
3	ES1101	Basic Electrical and Electronics Engineering	2	1	0	3
4	ES1102	Computer Engineering Workshop	1	0	4	3
5	ES1103	Problem Solving using C	2	1	0	3
6	BS1102L	Applied Chemistry Lab	0	0	3	1.5
7	ES1101L	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
8	ES1103L	Problem Solving using C Lab	0	0	3	1.5
Total						19.5

Category		Credits
BS	Basic Science Courses	3+3+1.5=7.5
ES	Engineering Science Courses	3+3+3+1.5+1.5=12
Total Credits		19.5

I Year II Semester (Semester-2)

S. No	Course code	Course Name	L	T	P	C
1	BS1201	Mathematics-II	2	1	0	3
2	BS1202	Applied Physics	2	1	0	3
3	HS1201	Communicative English	3	0	0	3
4	ES1201	Problem solving using Python	3	0	0	3
5	ES1202	Digital Logic Design	2	1	0	3
6	BS1202L	Applied Physics Lab and Virtual Lab	0	0	3	1.5
7	HS1201L	Communicative English Lab	0	0	3	1.5
8	ES1201L	Problem solving using Python Lab	0	0	3	1.5
9	MC1201	Environmental Science	2	0	0	0
Total						19.5

Category		Credits
BS	Basic Science Courses	3+3+1.5=7.5
ES	Engineering Science Courses	3+3+1.5=7.5
HS	Humanities and Social Science Courses	3+1.5=4.5
MC	Mandatory Course (AICTE)	0
Total Credits		19.5

II Year I Semester (Semester-3)

S. No	Course code	Course Name	L	T	P	C
1	BS2101	Mathematics – III	2	1	0	3
2	PC2101	Mathematical Foundations of Computer Science	2	1	0	3
3	PC2102	Data Structures	3	0	0	3
4	PC2103	Java Programming	3	0	0	3
5	PC2104	Software Engineering	3	0	0	3
6	PC2102L	Data Structures Lab	0	0	3	1.5
7	PC2103L	Java Programming Lab	0	0	3	1.5
8	PC2104L	UML Lab	0	0	3	1.5
9	SOC2101	Advanced Python Programming	1	0	2	2
10	MC2101	Essence of Indian Traditional Knowledge	2	0	0	0
Total						21.5

Category		Credits
BS	Basic Science Course	3
PC	Professional Core Courses	3+3+3+3+1.5+1.5+1.5=16.5
SOC	Skill Oriented Course	2
MC	Mandatory Course (AICTE)	0
Total Credits		21.5

II Year II Semester (Semester-4)

S. No	Course code	Course Name	L	T	P	C
1	BS2201	Probability and Statistics	2	1	0	3
2	HS2201	Engineering Economics and Management	3	0	0	3
3	ES2201	Computer Networks	3	0	0	3
4	PC2201	Operating Systems	3	0	0	3
5	PC2202	Database Management System	3	0	0	3
6	ES2201L	Unix and Network Programming Lab	0	0	3	1.5
7	PC2201L	Operating Systems Lab	0	0	3	1.5
8	PC2202L	Database Management Systems Lab	0	0	3	1.5
9	SOC2201	Programming with Microcontroller	1	0	2	2
Total						21.5
		Internship / Community Service Project 2 Months (Mandatory) during summer vacation				
		Honors/Minor courses	3	0	2	4

Category		Credits
BS	Basic Science Courses	3
HS	Humanities and Social Sciences Courses	3
ES	Engineering Science Courses	3
PC	Professional Core Courses	3+3+1.5+1.5=12
SOC	Skill Oriented Courses	2
	Total Credits	21.5

III Year I Semester (Semester-5)

S. No	Course code	Course Name	L	T	P	C
1	PC3101	Cryptography and Network Security	3	0	0	3
2	PC3102	Introduction to IoT	3	0	0	3
3	PC3103	Web Technologies	3	0	0	3
4	PE3101	Professional Elective-1 Design and Analysis of Algorithms Software Testing Methodologies Introduction to Data Science Formal Languages and Automata Theory	2	0	2	3
5	OE3101	Open Elective-1 Computer Organization Social Networks TCP/IP Internetworking Unix and Shell Programming	2	0	2	3
6	PC3101L	IoT Lab	0	0	3	1.5
7	PC3102L	Web Technologies Lab	0	0	3	1.5
8	SAC3101	.Net Programming	1	0	2	2
9	MC3101	Indian Constitution	2	0	0	0
10	INTERN3101	Summer Internship / Community Service Project 2 Months (Mandatory) after second year (to be evaluated during V semester)	0	0	0	1.5
Total						21.5
Honours/Minor courses			3	1	0	4

Category		Credits
PC	Professional Core Courses	3+3+3+1.5+1.5=12
PE	Professional Elective Courses	3
OE	Open Elective Courses/Job Oriented Elective Courses	3
SAC	Skill Advanced Course/Soft Skills Course	2
INTERN	Summer Internship	1.5
Total Credits		21.5

III Year II Semester (Semester-6)

S. No	Course code	Course Name	L	T	P	C
1	PC3201	Foundations of Blockchain Technology	3	0	0	3
2	PC3202	Ethical Hacking and Penetration Testing	2	1	0	3
3	PC3203	Front End Development	3	0	0	3
4	PE3201	Professional Elective-2 Cloud Computing Compiler Design Computer Graphics MOOCs Online Course (NPTEL/Swayam)	2	0	2	3
5	PE3202	Professional Elective-3 Data Warehousing and Data Mining Artificial Intelligence Information Security Software Project Management	2	0	2	3
6	PC3201L	Blockchain Application Development Lab	0	0	3	1.5
7	PC3202L	Ethical Hacking & Penetration Testing Lab	0	0	3	1.5
8	PC3203L	Front End Development Lab	0	0	3	1.5
9	SAC3201	Soft Skills	1	0	2	2
10	MC3201	Entrepreneurial Skill Development	2	0	0	0
Total						21.5
		Industrial/Research Internship 2 Months (Mandatory) during summer vacation				
		Honors/Minor courses	3	0	2	4

Category		Credits
PC	Professional Core Courses	3+3+1.5+1.5+1.5=10.5
PE	Professional Elective Courses	3
OE	Open Elective Courses/Job Oriented Elective Courses	3
SAC	Skill Advanced Course/Soft Skills Course	2
MC	Mandatory course (AICTE)	0
Total Credits		21.5

IV Year I Semester (Semester-7)

S. No	Course code	Course Name	L	T	P	C
1	HSE4101	Universal Human Values -2: Understanding Harmony	3	0	0	3
2	PE4101	Professional Elective-4 Blockchain Technologies :: Use Cases Cloud Architecture and Deployment Models Design Patterns MOOCs Online Course(NPTEL/Swayam)	2	0	2	3
3	PE4102	Professional Elective-5 Smart Contracts Digital Forensics Cyber Laws Information Retrieval Systems	2	0	2	3
4	OE4101	Open Elective-2 Machine Learning Wireless Sensor Networks Digital Image processing Mean Stack Technologies	2	0	2	3
5	OE4102	Open Elective-3 No SQL databases Mobile Application Development Mathematics of Modern Cryptography Supply Chain Management	2	0	2	3
6	OE4103	Open Elective-4 Big Data Analytics Advanced Database Systems Smart Grids Data Visualization	2	0	2	3
7	SAC4101	Selenium	1	0	2	2
8	PR	Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester)	0	0	0	3
Total						23
		Honors/Minor courses	3	0	2	4

	Category	Credits
HSE	Humanities and Social Science Courses	3
PE	Professional Elective Courses	3+3=6
OE	Open Elective Courses/Job Oriented Elective Courses	3+3+3=9
SAC	Skill Advanced Course/Soft Skills Course	2
PR	Industrial/Research Internship (Mandatory) 2months	3
	Total Credits	23

IV Year II Semester (Semester-8)

S. No	Course code	Course Name	L	T	P	C
1	PROJ4201	Major Project Project work, seminar, and internship in industry	0	0	0	12
		Internship (6 months)				
Total Credits						12

Open Electives offered to other Departments

1. Cyber Security Foundations
2. Network Security Fundamentals
3. Block Chain Fundamentals
4. Block Chain Application Development

Courses for Honors degree

POOL-1	POOL-2	POOL-3	POOL-4
Advanced JAVA and J2EE	Quantum Computing	Data Sciences	Supply Chain Finance and Block Chain Technology
Advanced Operating Systems	Security Governance Risk and Compliance	Introduction to Open-Source Tools for IoT	Deep Learning
Virtual Reality	Internet of Robotics	Storage Area Networks	Perception and Computer Vision
Database Security	Software Design and System Integration	High Performance Computing	Natural Language Processing
Advanced Python Programming	Advanced Database Systems	Advanced Operating Systems	Cloud Security Fundamentals
Script Programming	Introduction to MongoDB & Node JS	Web Programming in React JS	Cloud Essentials
MOOC-1* (NPTEL/SWAYAM)Duration: 12 Weeksminimum			
MOOC-2* (NPTEL/SWAYAM)Duration: 12 Weeksminimum			

*Course/subject title can't be repeated

Minor Degree

General Minor degree courses offered by CIC department

1. Cyber Security Foundations
2. Network Security Fundamentals
3. Block Chain Fundamentals
4. Block Chain Application Development
5. Computer organization and Architecture
6. Database Management Systems

7. Java Programming
8. Operating Systems
9. Computer Networks
10. Cryptography and Network Security

Note:

- i. A Student can select four subjects from the above subjects @ 3-0-2-4 credits per subject.
- ii. Compulsory MOOC/NPTEL courses for 04 credits (02 courses @ 02 credits each)

(***)

VVIT Life skill courses

The following courses are admitted to be the **courses beyond curriculum** to improve individual life skills. These courses will be demonstrated in the class room and will be having an internal assessment for satisfactory.

S. No	Year and Semester	Course Name
1	I Year I Semester (Semester-1)	Quantitative Aptitude
2	I Year II Semester (Semester-2)	Verbal Ability
3	II Year I Semester (Semester-3)	Understanding Self for Effectiveness
4	II Year II Semester (Semester-4)	Design Thinking
5	III Year I Semester (Semester-5)	Stress and Coping Strategies
6	III Year II Semester (Semester-6)	Research Skills

I- Year I - Semester	Name of the Course	L	T	P	C
BS1101	Mathematics -I	2	1	0	3

Course Objectives

1. This course will illuminate the students in the concepts of calculus.
2. To enlighten the learners in the concept of differential equations and multivariable calculus.
3. To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

Unit-1

Differential equations of first order and first degree

Linear differential equations-Bernoulli's equations - Exact equations and equations reducible to exact form.

Applications: Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories – Electrical circuits.

Unit-2

Linear differential equations of higher order

Non-homogeneous equations of higher order with constant coefficients – with non-homogeneous term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x^n , $e^{ax} V(x)$ and $x^n V(x)$ - Method of Variation of Parameters.

Applications: LCR circuit – Simple harmonic motion

Unit-3

Mean value theorems

Mean value theorems (without proofs): Rolle's Theorem – Lagrange's mean value theorem – Cauchy's mean value theorem – Taylor's and Maclaurin's theorems with remainders. **Unit-4**

Unit-4

Partial differentiation

Introduction – Homogeneous function – Euler's theorem - Total derivative – Chain rule – Jacobian – Functional dependence – Taylor's and Mc Laurent's series expansion of functions of two variables.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

Unit-5

Multiple integrals

Double integrals (Cartesian and Polar) – Change of order of integration – Change of variables (Cartesian to Polar) –Triple integrals.

Applications: Areas by double integrals and Volumes by triple integrals.

TEXT BOOKS

1. **B.S. Grewal**, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. **B.V. Ramana**, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

REFERENCE BOOKS

1. **H. K. Das**, Advanced Engineering Mathematics, 22nd Edition, S. Chand & Company Ltd.
2. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India.

I- Year I - Semester	Name of the Course	L	T	P	C
BS1102	Applied Chemistry	3	0	0	3

Pre-Requisites:

Knowledge of basic concepts of chemistry for Engineering students will help them as professional engineers later in design and material selection as well as utilizing the available resources.

Course Objectives

1. Significance of various types of plastic materials in household appliances and composites (FRP) in aerospace and automotive industries.
2. Understand the basic concepts of electrochemistry, which are useful to construct the electrochemical cells, batteries and fuel cells.
Illustrate the theories and mechanism of corrosion and its prevention.
3. Importance of advanced materials and their engineering applications.
4. Make use of molecular machines in supramolecular chemistry and need of green chemistry.
5. Design and construction of advanced instrumental techniques and recall their importance.

Unit-1

POLYMER TECHNOLOGY

Polymerisation: Introduction-Methods of polymerisation-(emulsion and suspension)-Physical and mechanical properties.

Plastics: Compounding-Fabrication (compression, injection, blown film, extrusion)-Preparation, properties and applications of PVC, polycarbonates and Bakelite-Mention some examples of plastic materials used in electronic gadgets, recycling of e-plastic waste.

Elastomers: Natural rubber-Drawbacks-Vulcanization-Preparation-Properties and applications of synthetic rubbers (Buna S, thiokol and polyurethanes)

Composite Materials: Fiber reinforced plastics-CFRP and GFRP

Conducting polymers: Polyacetylene, doped conducting polymers -p-type and n-type doping.

Bio degradable polymers: Biopolymers and biomedical polymers.

Unit-2

ELECTROCHEMICAL CELLS AND CORROSION

Single electrode potential-Electrochemical series and uses of series-Standard hydrogen electrode, calomel electrode, concentration cell, construction of glass electrode, Batteries: Dry cell, Ni-Cd cells, Ni-Metal hydride cells, Li-ion battery, Zinc air cells, Fuel cells-H₂-O₂, CH₃OH-O₂, phosphoric acid, molten carbonate.

Corrosion: Definition-theories of corrosion (chemical and electrochemical)-galvanic corrosion, differential aeration corrosion, stress corrosion, water-line corrosion- passivity of metals-galvanic series-factors influencing rate of corrosion-corrosion control: (proper designing, cathodic protection)- protective coatings: cathodic and anodic coatings, electroplating, electroless plating (nickel), paints (constituents and its functions).

Unit-3

MATERIAL CHEMISTRY

Non-elemental semiconducting materials: Stoichiometric, controlled valency & chalcogen photo/semiconductors-preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling technique) – Semiconductor devices (p-n junction diode as rectifier, junction transistor)

Nano materials: Introduction, sol-gel method, characterization by BET, SEM and TEM methods, applications of graphene-carbon nanotubes and fullerenes: Types, preparation of carbon nanomaterials by carbon-arc, laser ablation methods.

Liquid crystals: Introduction-types-applications.

Superconductors: Meissner effect, type- I and type- II superconductors, characteristics and applications.

Unit-4

ADVANCED CONCEPTS AND GREEN CHEMISTRY

Molecular switches and machines: Introduction to supramolecular chemistry, characteristics of molecular motors and machines. Rotaxanes and Catenanes as artificial molecular machines. Prototypes linear motions in Rotaxanes, and acid-base controlled molecular shuttle, a molecular elevator, an autonomous light –powered molecular motors, natural molecular motors and machine.

Green chemistry: Principles of green chemistry, green synthesis – aqueous phase, microwave assisted chemical reactions and phase transfer catalysis (PTC).

Unit-5

SPECTROSCOPIC TECHNIQUES & NON-CONVENTIONAL ENERGY SOURCES

Spectroscopic Techniques: Electromagneticspectrum-types of molecular spectra and their absorption criteria.**UV**-visible spectroscopy (electronic spectroscopy), Frank-Condon principle, Beer-Lambert's law and its limitations, chromophores and auxochromes – *applications of UV visible spectroscopy.**IR** spectroscopy – functional group and finger print region – molecular vibrations – stretching and bending vibrations – *applications of IR.**NMR** (Nuclear magnetic resonance): Working principle and instrumentation of NMR – chemical shift(δ) – *applications of NMR.(*only general applications – without any spectroscopic problems regarding quantitative and qualitative analysis.)

Non-conventional energy sources: Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, organic photo-voltaic, hydropower, geothermal power, tidal, ocean thermal energy conversion (OTEC) – open cycle OTEC, closed cycle OTEC and hybrid cycle OTEC.

REFERENCE BOOKS

1. A text book of Engineering Chemistry by S.S. Dara, S. S. Umare; S. Chand & Co., Ltd., Latest Edition.
2. Engineering Chemistry by Shashi Chawla; Dhanpat Rai Publicating Co., Latest Edition.

TEXT BOOKS

1. Engineering Chemistry by Jain & Jain; Dhanpat Rai Publicating Co., Latest Edition
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2019 Edition.
3. Engineering Chemistry by Prasanth Rath, B. Ramadevi, Ch. Venkata Ramana Reddy, Subendu Chakravarthy; Cengage Publications, 2019 Edition.

I- Year I - Semester	Name of the Course	L	T	P	C
ES1101	Basic Electrical and Electronics Engineering	2	1	0	3

Course Objectives

1. To introduce basics of electric circuits and to teach DC and AC electrical circuit analysis.
2. To explain the working principles DC machines and speed control of various DC motors.
3. To explain the working principles of transformers and AC machines and its applications.
4. To introduce the basics of semiconductor physics and operation and applications of Diodes.
5. To introduce the basics of transistors and explain the transistor configurations

Unit-1

DC & AC Circuits

DC Circuits: Electrical circuit elements (R - L and C) – Kirchhoff's laws -Voltage and Current division rules-series, parallel circuits and star-delta and delta-star transformations- [Elementary treatment only]

AC Circuits: Representation of sinusoidal waveforms - Peak and RMS values - phasor representation - real power - reactive power - apparent power - power factor. [Elementary treatment only]

Unit-2

DC Machines

DC Generator: Construction-Principle and operation of DC Generator - EMF equation -Types– Applications [Elementary treatment only]

DC Motor: Principle and operation of DC Motor – types-Torque equation - Speed control of DC Motor-Brake test- Swinburne's test-Applications. [Elementary treatment only]

Unit-3

AC Machines

Single Phase Transformer: Construction, Principle and operation of Single-Phase Transformer – EMF Equation-Losses-Efficiency. [Elementary treatment only]

Three Phase Induction Motor: Construction- Principle and operation of three phase Induction Motor-Types- Applications. [Elementary treatment only].

Unit-4

Semiconductor Devices

Semiconductor Physics, PN Junction Diode & Zener Diode-characteristics- Applications: Rectifiers (Half Wave Rectifier & Full Wave Rectifier) [Elementary treatment only], Clippers and Clampers.

Unit-5

Bipolar Junction Transistors

Construction and working of bipolar junction transistor, CB, CE and CC Configurations and characteristics. [Elementary treatment only], Transistors as amplifiers, op-amp basics.

Text Books

1. D. P. Kothari and I. J. Nagrath- “Basic Electrical Engineering” - Tata McGraw Hill - 2010.
2. Electronic Devices and Circuits, R. L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.

References

1. L. S. Bobrow- “Fundamentals of Electrical Engineering” - Oxford University Press - 2011.
2. E. Hughes - “Electrical and Electronics Technology” - Pearson - 2010.

I- Year I - Semester	Name of the Course	L	T	P	C
ES1102	Computer Engineering Workshop	1	0	4	3

Course Objectives

1. To make the students aware of the basic hardware components of a computer and installation of operating system.
2. To introduce Raptor Tool for flowchart creation.
3. Each student will familiar with Productivity tool: LaTeX and Microsoft (MS) office
4. To get knowledge in awareness of cyber hygiene that is protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks.
5. To introduce the usage of Productivity tools in crafting professional word documents, excel spreadsheets and power point presentations using open office tools.

Unit-1

Simple Computer System: Central processing unit, the further need of secondary storage, Types of memory, Hardware, Software and people. Peripheral Devices: Input, Output and storage, Data Preparation, Factors affecting input, Input devices, Output devices, Secondary devices, Communication between the CPU and Input/ Output devices.

Unit-2

Problem Solving and Programming: Algorithm development, Flowcharts, Looping, some programming features, Pseudo code, the one-zero game, some structured programming concepts, documents. Programming Languages: Machine Language and assembly language, high -level and low-level languages, Assemblers, Compilers, and Interpreters

Unit-3

Operating systems: Introduction, Evolution of operating systems, Command Interpreter, Popular operating systems- Microsoft DOS, Microsoft Windows, UNIX and Linux.

Introduction to Unix Shell Commands, directory management commands, file operations, user's commands, Time and Date commands.

Unit-4

Computer Networks: Introduction to computer Networks, Network Topologies-Bus topology, star topology, Ring topology, Mesh topology, Hybrid topology, Types of Networks: Local area Network, Wide Area Networks, Metropolitan Networks, Campus/ Corporate Area Network, Personal Area Network, Network Devices- Hub, Repeater, Switch, Bridge, Router, Gateway, Network interface Card, Basic Networking Commands.

Unit-5

Introduction to HTML: Basics in Web Design, Brief History of Internet, World Wide Web Why create a web site ,Web Standards, HTML Documents ,Basic structure of an HTML document Creating an HTML document ,Mark up Tags ,Heading-Paragraphs ,Line Breaks ,HTML Tags.

Elements of HTML: Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

List of Tasks

TASK 1: PC Hardware: PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition, hardware and software level troubleshooting process, tips and tricks would be covered.

Every student should identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor. Every student should disassemble and assemble the PC back to working condition.

TASK 2: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition.

Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

TASK 3: Drawing flowcharts (Raptor Tool)

1. Create flowcharts for take-off landing of an Aeroplane.
2. Create a flowchart to validate an email id entered by user.
3. Create flowchart to print first 50 prime numbers.

TASK 4: Productivity tool:LaTeX and Microsoft (MS) office: Importance of MS office, Details of the three tasks and features that should be covered in each, MS word, Power Point, Excel.

TASK 5: Operating System Installation: Every student should individually install operating system like Linux or MS windows on the personal computer. The system should be configured as dual boot with both windows and Linux.

TASK 6: Basic Commands: Unix Shell Commands, directory management commands, file operations, users commands, Time and Date commands.

TASK 7: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate how to access the websites and email.

TASK 8: Networking Commands:

ping, ssh, ifconfig, scp, netstat, ipstat, nslookup, traceroute, telnet, host, ftp, arp, wget, route

TASK 9: Basic HTML tags

1. Head Section and Elements of Head Section, Paragraphs, Formatting Styles.
2. Colour tags, Creating Hyperlinks, Images, Tables, lists
3. HTML Forms, Form Attributes, Form Elements.

TASK 10: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured. Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. Usage of search engines like Google, Yahoo, ask.com and others should be demonstrated by student.

TASK 11: Cyber Hygiene: Students should learn about viruses on the internet and install antivirus software. Student should learn to customize the browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

Text Books

1. Fundamentals of Computers –Reema Thareja-Oxford higher education
2. Computer Fundamentals, Anita Goel, Pearson Education, 2017
3. PC Hardware Trouble Shooting Made Easy, TMH
4. Programming the World Wide Web, 7th Edition, Robert W Sebesta, Pearson, 2013.

Reference Books

1. An Introduction to Web Design, Programming, 1st Edition, Paul S Wang, Sanda S Katila, Cengage Learning, 2003.
2. An Introduction to Computer studies –Noel Kalicharan-Cambridge

I- Year I - Semester	Name of the Course	L	T	P	C
ES1103	Problem Solving Using C	2	1	0	3

Course objectives:

The main objectives are

1. To familiarize to notion of an algorithm, editing and executing programs in Linux.
2. To Understanding branching, iteration.
3. To represent Data using arrays.
4. To use Modular programming and recursive solution formulation.
5. To familiarize pointers and dynamic memory allocation.
6. To handle data through files

Unit-1

Introduction to Computers: Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers

Introduction to the C Language: Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Scope, Storage Classes and Type Qualifiers.

Structure of a C Program: Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs, Command Line Arguments.

Unit-2

Bitwise Operators: Exact Size Integer Types, Logical Bitwise Operators, Shift Operators.

Selection & Making Decisions: Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions

Repetition: Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples

Unit-3

Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example – Calculate Averages

Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions String/ Data Conversion, A Programming Example – Morse Code

Enumerated, Structure, and Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application

Unit-4

Pointers: Introduction, Pointers to pointers, Compatibility, L value and R value

Pointer Applications: Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application

Processor Commands: Processor Commands

Unit-5

Functions: Designing, Structured Programs, Function in C, User Defined Functions, Inter-Function Communication, Standard Functions, Passing Array to Functions, Passing Pointers to Functions, Recursion.**Text Input / Output:** Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions

Binary Input / Output: Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type.

TEXT BOOKS

1. Programming for Problem Solving, Behrouz A. Forouzan, Richard F.Gilberg, CENGAGE
2. The C Programming Language, Brian W.Kernighan, Dennis M. Ritchie, 2e, Pearson

REFERENCES

1. Computer Fundamentals and Programming, Sumithabha Das, Mc Graw Hill
2. Programming in C, Ashok N. Kamthane, Amit Kamthane, Pearson
3. Computer Fundamentals and Programming in C, Pradip Dey, Manas Ghosh, OXFORD

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

- CO1. Comprehend** algorithms and basic terminology of C
- CO2. Solve** problems using control structures and modular approach
- CO3. Demonstrate** 1D and 2D arrays along with strings for linear data handling
- CO4. Determine** the use of pointers and structures
- CO5. Implement** various operations on data files.

I- Year I - Semester	Name of the Course	L	T	P	C
BS1101L	Applied Chemistry Lab	0	0	3	1.5

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

Course Objectives

1. To furnish the students with a solid foundation in Chemistry Laboratory required to solve the Engineering problems.
2. To expose the students in practical aspects of the theoretical concepts like pH, hardness of water etc.
3. To guide the students on how to handle the instruments like UV-visible spectrophotometer, potentiometer and conductometer.

List of Experiments

Students should do any 10 experiments listed below

1. Determination of HCl using standard Na_2CO_3 solution.
2. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH.
3. Determination of Mn (II) using standard oxalic acid solution.
4. Determination of ferrous iron using standard $\text{K}_2\text{Cr}_2\text{O}_7$ solution.
5. Determination of Copper (II) using standard EDTA solution.
6. Determination of temporary and permanent hardness of water using standard EDTA solution.
7. Determination of Iron (III) by colorimetric method.
8. Determination of the concentration of acetic acid using sodium hydroxide (pH-metric method).
9. Determination of concentration of strong acid vs strong base (by conductometric method).
10. Determination of strong acid vs strong base (by potentiometric method).
11. Determination of Mg^{+2} present in an antacid.
12. Determination of CaCO_3 presence in an egg shell.
13. Estimation of vitamin- C.
14. Determination of phosphoric content in soft drinks.
15. Adsorption of acetic acid by charcoal.
16. Preparation of nylon-6, 6 and Bakelite (demonstration only)

Reference Books:

I- Year I - Semester	Name of the Course	L	T	P	C
ES1102L	Basic Electrical Engineering Lab	0	0	3	1.5

Course Objectives

- To Verify Kirchhoff's laws, Voltage and Current division rules.
- To learn speed control and testing of DC Shunt Motor.
- To learn and understand the operation of induction motor.
- To learn applications of diodes and transistors.

List of Experiments

Cycle-1

1. Verification of Kirchhoff laws.
2. Verification of Voltage division rule and current division rule.
3. Speed control of DC Shunt Motor.
4. Perform Brake test on DC Shunt Motor.
5. Conduct Swinburne's test on DC Shunt Motor.
6. Brake test on 3-phase Induction Motor.

Cycle-II

1. V-I characteristics of P-N Junction Diode.
2. Understand Zener Diode Characteristics.
3. Understand Half wave rectifier and Full wave rectifier with and without filter.
4. Characteristics of BJT in Common Base Configuration.
5. Characteristics of BJT in Common Emitter Configuration.
6. Zener diode as voltage regulator.

Text Books

1. D. P. Kothari and I. J. Nagrath- "Basic Electrical Engineering" - Tata McGraw Hill - 2010.
2. Electronic Devices and Circuits, R. L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.

References

3. L. S. Bobrow- "Fundamentals of Electrical Engineering" – Oxford University Press – 2011.
4. E. Hughes – "Electrical and Electronics Technology" – Pearson – 2010.

I- Year I - Semester	Name of the Course	L	T	P	C
ES1102L	Problem Solving Using C Lab	0	0	3	1.5

Course Objectives

1. Apply the principles of C language in problem solving.
2. To design flowcharts, algorithms and knowing how to debug programs.
3. To design & develop of C programs using arrays, strings pointers & functions.
4. To review the file operations, pre-processor commands.

Exercise 1

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.
3. Write a C program to display multiple variables.

Exercise 2

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

Exercise 4

1. Write a program in C to display the n terms of even natural number and their sum.
2. Write a program in C to display the n terms of harmonic series and their sum. $1 + 1/2 + 1/3 + 1/4 + 1/5 \dots 1/n$ terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5

1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

Exercise 6

1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

Exercise 7

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

Exercise 8

1. Write a program in C to compare two strings without using string library functions.
2. Write a program in C to copy one string to another string.

Exercise 9

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 10

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers.

Exercise 11

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 12

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

Exercise 13

1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function.

Exercise 14

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc() function. Understand & write the difference.
2. Write a program in C to convert decimal number to binary number using the function.

Exercise 15

1. Write a program in C to check whether a number is a prime number or not using the function.
2. Write a program in C to get the largest element of an array using the function.

Exercise 16

1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name.
3. Write a program in C to remove a file from the disk.

I- Year II - Semester	Name of the Course	L	T	P	C
BS1201	Mathematics-II	2	1	0	3

Course Objectives

- To elucidate the different numerical methods to solve nonlinear algebraic equations
- To disseminate the use of different numerical techniques for carrying out numerical integration
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications

Unit-1

Iterative methods

Introduction–Bisection method–Method of false position–Iteration method–Newton-Raphson method (one variable)–Jacobi and Gauss-Seidel methods for solving system of equations.

Unit-2

Interpolation

Introduction–Errors in polynomial interpolation–Finite differences–Forward differences–Backward differences–Central differences –Relations between operators–Newton’s forward and backward formulae for interpolation–Gauss’s forward and backward formulae for

Interpolation – Interpolation with unequal intervals–Lagrange’s interpolation formula–Newton’s divide difference formula.

Unit-3

Numerical integration and solution of ordinary difference equations

Trapezoidal rule–Simpson’s $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rule–Solution of ordinary differential equations by Taylor’s series–Picard’s method of successive approximations–Euler’s method–Modified Euler’s method–Runge-Kutta method (second and fourth order).

Unit-4

Laplace Transforms

Laplace transforms of standard functions – Shifting theorems – Transforms of derivatives and integrals – Unit step function – Dirac’s delta function –Periodic function - Inverse Laplace transforms – Convolution theorem (without proof)

Applications: Evaluation of integrals using Laplace transforms - Solving ordinary differential equations (Initial value problems) using Laplace transforms.

Unit-5

Fourier series and Fourier Transforms

Fourier series: Introduction – Periodic functions – Fourier series of periodic function – Dirichlet's conditions – Even and odd functions – Change of interval – Half-range sine and cosine series.

Fourier Transforms: Fourier integral theorem (without proof) - Fourier sine and cosine integrals – Sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

Text Books

1. **B.S. Grewal**, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.

Reference Books

1. **B.V. Ramana**, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
2. **H.K.Das**, Advanced Engineering Mathematics, 22nd Edition, S. Chand & Company Ltd.
3. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India.

I- Year II - Semester	Name of the Course	L	T	P	C
BS1201	Applied Physics	2	1	0	3

Course Objectives

Applied Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by Vasireddy Venkatadri Institute of Technology, which serves as a transit to understand the branch specific advanced topics. The course is designed to:

- Impart Knowledge of Physical Optics phenomena like Interference and Diffraction required to design instruments with higher resolution.
- Understand the physics of Semiconductors and their working mechanism for their utility in electronic devices.
- Impart the knowledge of materials with characteristic utility in appliances.

Unit-1

Wave Optics

Interference: Principle of Superposition-Interference of light – Conditions for sustained Interference-Interference in thin films (reflected geometry) - Newton's Rings (reflected geometry)

Diffraction: Fraunhofer Diffraction:- Diffraction due to single slit (quantitative), double slit(qualitative), N –slits(qualitative) and circular aperture (qualitative) – Intensity distribution curves - Diffraction grating – Grating spectrum – missing order– resolving power – Rayleigh's criterion – Resolving powers of Microscope(qualitative), Telescope(qualitative) and grating (qualitative).

Unit-2

LASERs and Holography

LASERs: Interaction of radiation with matter – Spontaneous and Stimulated emission of radiation – population inversion – Einstein's coefficients & Relation between them and their significance - Pumping Mechanisms - Ruby laser – Helium-Neon laser – Applications.

Holography: Introduction – principle – differences between photography and holography – construction and reconstruction of hologram – applications of holograms

Unit-3

Magnetism and Dielectrics

Magnetism: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment - Bohr Magneton-Classification of magnetic materials: Dia, para & Ferro – Domain concept of Ferromagnetism - Hysteresis – soft and hard magnetic materials – applications of Ferromagnetic material.

Dielectrics: Introduction- Dielectric Polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic and Ionic (Quantitative), Orientation Polarizations (Qualitative) - Lorentz Internal field- Claussius – Mossotti’s equation- Frequency dependence of polarization - Applications of dielectrics.

Unit-4

Quantum Mechanics

Introduction– matter waves – de Broglie’s hypothesis – Davisson-Germer experiment – G. P. Thomson experiment – Heisenberg’s Uncertainty Principle–Schrödinger time independent and time dependent wave equations – physical significance of Schrödinger wave function – Particle in a potential box (determination of energy).

Unit-5

Semiconductor Physics

Origin of energy bands (qualitative) –Classification of solids based on energy bands–Intrinsic semiconductors-density of charge carriers –Electrical conductivity-Fermi level – extrinsic semiconductors-P-type & N-type – Density of charge carriers- Dependence of Fermi energy on carrier concentration and temperature- Hall effect-Hall coefficient- Applications of Hall effect- Drift and Diffusion currents - Einstein’s equation.

TEXT BOOKS

1. “Engineering Physics” by B. K. Pandey, S. Chaturvedi - Cengage Publications, 2012
2. “A Text book of Engineering Physics” by M.N. Avadhanulu, P.G.Kshirsagar - S.Chand, 2017.
3. “Engineering Physics” by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).
4. “Engineering Physics” by R.K Gaur. and S.L Gupta., - Dhanpat Rai publishers, 2012.

REFERENCE BOOKS

1. “Engineering Physics” by M.R.Srinivasan, New Age international publishers (2009).
2. “Optics” by AjoyGhatak, 6th Edition McGraw Hill Education, 2017.
3. “Solid State Physics” by A.J.Dekker, Mc Millan Publishers (2011).

I- Year II - Semester	Name of the Course	L	T	P	C
HS1201	Communicative English	3	0	0	3

Course Objectives

1. Adopt activity based teaching-learning methods to ensure that learners would be engaged in use of language both in the classroom and laboratory sessions.
2. Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
3. Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
4. Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
5. Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
6. Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Unit 1

Detailed Study: A Proposal to Girdle the Earth (Excerpt) by Nellie Bly

Theme: Exploration

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Grammar and Vocabulary: Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Non-Detailed Study:

1. "How to Fashion Your Own Brand of Success" by Howard Whitman
2. "How to Recognize Your Failure Symptoms" by Dorothea Brande

Unit 2

Detailed Study: An excerpt from The District School as It Was by One Who Went to It by Warren Burton

Theme: On Campus

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Cohesive devices - linkers, signposts and transition signals; use of articles and zero article; prepositions.

Non-detailed Study:

3. “How to Conquer the Ten Most Common Causes of Failure” by Louis Binstock

4. “How to Develop Your Strength to Seize Opportunities” by Maxwell Maltz

Unit 3

Detailed Study: The Future of Work?

Theme: Working Together

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.

Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Non-Detailed Study:

5. “How to Make the Most of Your Abilities” by Kenneth Hildebrand

6. “How to Raise Your Self-Esteem and Develop Self-confidence” by James W Newman

Unit 4

Detailed Study: H.G Wells and the Uncertainties of Progress by Peter J. Bowler

Theme: Fabric of Change

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role-plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.

Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Non-Detailed Study

7. “How to Win Your War against Negative Feelings” by Dr Maxwell Maltz

8. “How to Find the Courage to Take Risks” by Drs. Tom Rusk and Randy Read

Unit 5

Detailed Study: Leaves from the Mental Portfolio of a Eurasian by Sui Sin Far

Theme: Tools for Life

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.

Reading: Reading for comprehension.

Writing: Writing structured essays on specific topics using suitable claims and evidences

Grammar and Vocabulary: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Non-Detailed Study

9. “How to Become a Self-Motivator” by Charles T Jones

10. “How to Eliminate Your Bad Habits” by OgMandino

Text Books

5. English All Round: Communication Skills for Undergraduate Learners-Volume 1, Orient Black Swan, 2019
6. University of Success by OgMandino, Jaico, 2015.

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

AICTE Recommended Books

1. Meenakshi Raman and Sangeeta Sharma. Technical Communication. Oxford University Press, 2018.
2. Pushplata and Sanjay Kumar. Communication Skills, Oxford University Press, 2018.
3. Kulbushan Kumar. Effective Communication Skills. Khanna Publishing House, Delhi

Sample Web Resources

Grammar / Listening / Writing

1-language.com

<http://www.5minuteenglish.com/>

<https://www.englishpractice.com/>

Grammar/Vocabulary

English Language Learning Online

<http://www.bbc.co.uk/learningenglish/>

<http://www.better-english.com/>

<http://www.nonstopenglish.com/>

<https://www.vocabulary.com/>

BBC Vocabulary Games

Free Rice Vocabulary Game

Reading

<https://www.usingenglish.com/comprehension/>

<https://www.englishclub.com/reading/short-stories.htm>

<https://www.english-online.at/>

Listening

<https://learningenglish.voanews.com/z/3613>

<http://www.englishmedialab.com/listening.html>

Speaking

<https://www.talkenglish.com/>

BBC Learning English – Pronunciation tips

Merriam-Webster – Perfect pronunciation Exercises

All Skills

<https://www.englishclub.com/>

<http://www.world-english.org/>

<http://learnenglish.britishcouncil.org/>

I- Year II - Semester	Name of the Course	L	T	P	C
ES1201	Problem Solving using Python	3	0	0	3

Course Objectives

- To learn about Python programming language syntax, semantics, and the runtime environment
- To be familiarized with universal computer programming concepts like data types, containers
- To be familiarized with general computer programming concepts like conditional execution, loops & functions
- To be familiarized with general coding techniques and object-oriented programming

Unit-1

Introduction: Introduction to Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output.

Data Types, and Expression: Strings Assignment, and Comment, Numeric Data Types and Character Sets, Using functions and Modules.

Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops.

Unit-2

Control Statement: Definite iteration for Loop Formatting Text for output, Selection if and if else Statement Conditional Iteration, While Loop

Strings and Text Files: Accessing Character and Substring in Strings, Data Encryption, Strings and Number Systems, String Methods Text Files.

Unit-3

List and Dictionaries: Lists, Defining Simple Functions, Dictionaries

Design with Function: Functions as Abstraction Mechanisms, Problem Solving with Top Down Design, Design with Recursive Functions, Case Study Gathering Information from a File System, Managing a Program's Namespace, Higher Order Function.

Modules: Modules, Standard Modules, Packages.

Unit-4

File Operations: Reading config files in python, Writing log files in python, Understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations

Object Oriented Programming: Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance , overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using OOps support

Design with Classes: Objects and Classes, Data modeling Examples, Case Study An ATM, Structuring Classes with Inheritance and Polymorphism

Unit-5

Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Redefined Clean-up Actions.

Graphical User Interfaces: The Behavior of Terminal Based Programs and GUI -Based, Programs, Coding Simple GUI-Based Programs, Other Useful GUI Resources.

Programming: Introduction to Programming Concepts with Scratch.

TEXT BOOKS:

3. Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage.
4. Python Programming: A Modern Approach, VamsiKurama, Pearson.

REFERENCES:

4. Introduction to Python Programming, Gowrishankar.S, Veena A, CRC Press.
5. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

I- Year II - Semester	Name of the Course	L	T	P	C
ES1202	Digital Logic Design	2	1	0	3

Course Objectives

1. To understand common forms of number representation in digital circuits and Boolean algebra.
2. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems and simplify logic expressions using basic theorems, K-map and Tabular methods.
3. To understand the concept of Combinational logic design and realize logic expressions using MUX and Decoder
4. Illustrate the concept of sequential logic design; analyze the operation of flip-flop and conversion from one flip-flop to another, and application of flip-flop.
5. To impart to student the concepts of sequential machines of digital system.

Unit-1

Number Systems and Boolean Algebra

Number systems: Introduction to different number system and their conversions, complement of number system and subtraction using complement method, Floating-Point Representation, Weighted and Non-weighted codes and its properties.

Boolean Algebra: Boolean algebra and logic gates, Basic theorems and properties of Boolean Algebra, Boolean functions, canonical and standard forms, Universal Gates.

Unit-2

Minimization Methods of Boolean functions

Minimization of logic expressions by algebraic method, Sum of Products (SOP), Product of Sums (POS), K-Map Method, Don't Care Combinations, Multilevel NAND/NOR realizations, Prime and essential Prime Implicants, Tabular Method, Prime Implicants Chart, Simplification Rules.

Unit-3

Combinational Circuits

Design procedure, Half/full adders, Half / full subtractors, Carry look ahead adder, BCD adder, Multiplexer/De-Multiplexer, Encoder/Decoder, Priority encoders, Implementation of Higher-Order Device Using Lower Order devices, Implementation of combinational logic using MUX/Decoder, Magnitude Comparator, Error detection and correction codes.

Unit-4

Sequential Circuits

Sequential Circuits Fundamentals: Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

Registers and Counters: Shift Registers Left, Right and Bidirectional Shift Registers, Applications of Shift Registers, Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

Unit-5

Sequential Machines

Finite State Machines, Synthesis of Synchronous Sequential Circuits, Serial Binary Adder, Sequence Detector, Parity bit Generator, Synchronous Modulo N –Counters, Finite state machine capabilities and limitations, Mealy and Moore models.

Note: Case Studies / Small Projects of Digital Circuits and Logic Design

TEXT BOOKS

1. Digital Design by Mano, PHI
2. Modern Digital Electronics by RP Jain, TMH
3. Switching Theory and Logic Design by A. Anand Kumar, PHI.

REFERENCE

1. Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill TMH edition
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers

I- Year II - Semester	Name of the Course	L	T	P	C
BS1201L	Applied Physics and Virtual Lab	0	0	3	1.5

Course Objectives: The Applied Physics Lab is designed to

- **Understand** the concepts of interference and diffraction and their applications.
- **Apply** the concept of LASER in the determination of wavelength.
- **Recognize** the importance of energy gap in the study of conductivity and Hall Effect.
- **Illustrate** the magnetic and dielectric materials applications.
- **Apply** the principles of semiconductors in various electronic devices.

LIST OF EXPERIMENTS

(Any 10 of the following listed 15 experiments)

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano - Convex Lens.
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
5. Energy Band gap of a Semiconductor p - n junction.
6. Characteristics of Thermistor – Temperature Coefficients
7. Determination of dielectric constant by charging and discharging method
8. Variation of dielectric constant with temperature
9. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
10. LASER - Determination of wavelength by plane diffraction grating
11. Determination of resistivity of semiconductor by Four probe method.
12. Determine the radius of gyration using compound pendulum
13. Rigidity modulus of material by wire-dynamic method (torsional pendulum)
14. Dispersive power of diffraction grating.
15. Determination of Hall voltage and Hall coefficients of a given semiconductor using Hall Effect.

I- Year II - Semester	Name of the Course	L	T	P	C
HS1201L	Communicative English Lab	0	0	3	1.5

Course Objectives

The main objective of the course is to adopt activity-based teaching-learning methods to ensure that learners would be engaged in use of language both in the classroom and laboratory sessions and appear confidently for competitive examinations for career development.

The specific objectives of the course are to

1. Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native and non-native speakers
2. Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials like newspapers, magazines, periodicals, journals, etc.
3. Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
4. Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
5. Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Introduction to Sound system of English

Articulation - Airstream mechanism, Manners of Articulation, Places of Articulation, English phonetic symbols.

Accent - Syllabification, word stress and accent, stress rules and stress shift, exceptions to rules.

Intonation - Stress and accent in connected speech. Types and functions of Intonation in English.

- I. **A. Speaking:** Introducing Yourself and Others
B. Listening: Conversation between two and more people.
- II. **A. Speaking:** Speak for a minute in response to a question about personal experience / wish.
B. Listening: Identifying the main idea of a talk or a conversation
- III. **A. Speaking: Group discussion** – 5 minutes followed by a summary –1 or 2 minutes: Topics-1. Features that make a place beautiful, 2. The most challenging job you can think of, 3. Some skills that everyone should learn, 4. The best criteria to measure success, 5. A recent news story that is interesting, 6. Impact of technology on the music industry, 7. An app that has helped society, 8. Pros and Cons of after school tutorials, 9. How to stay safe on Social Media, 10. The most common reasons why friendships fall apart, 11. Interactions with seniors on campus, 12. Coping with peer pressure, 13. Others’ opinion vs your belief, 14. Feeling that plants would express if they could, 15. Growing up alone vs Growing up with siblings, 16. Uniforms stifle individuality, 17. In India summer is the best and worst of times, 18. A good sense of humour is a definite perk, 19. All fast food is not junk food and 20. Ideas to make your common room in college more inviting. Question Answer sessions – 1. Idea of a Tech Startup, 2. Training programme of T&P Cell, 3. Inter-college Cultural Fest, 4. 3-day Foreign University delegation

visit to the campus, 5. Computer training programme by a reputed MNC, 6. Shifting your Dept or Classrooms to new location on campus, 7. How to manage attendance while attending additional courses (Minors/Honors), 8. How to choose placement offers? 9. Involvement in Student Affairs through SAC, 10. Planning an excursion.

B. Listening: 1. Comprehension Exercise on Teamwork, 2. Predicting what the speaker would say from the title of the talk, 3. Comprehension based on a narrative or a short video, TED Talks

IV. **A. Speaking:** Preparing speech using picture clues, asking Q&A using pictures.

B. Listening: Listening Comprehension using short films, audio files, interviews of famous personalities

V. **A. Speaking:** Preparing 30-day planner, Using important phrasal expressions in speech, Oral Presentations on – 1. Setting goals is important 2. Asking the right question is the skill you need to develop, 3. Do college students want their parents' attention 4. Everyone needs to learn how to cook 5. Doing household chores is everyone's responsibility 6. Study groups facilitate peer-monitoring 7. Is it OK for students to do things just because they want to fit in? 8. Students should compulsorily make time for physical activity, 9. Taking breaks to pursue other interests improves academic performance, 10. Strategies to avoid stress, 11. How best to use the media for educational activities, 12. Why volunteer for service activities? 13. International student exchange programme, 15. Work-life balance 16. Strategies to build on your strength and overcome weaknesses, 17. Strategies to build confidence and self-esteem 18. Procrastination kills opportunities, 19. Setting a budget and sticking to it, 20. Grooming and etiquette 21. Pros and Cons of being Competitive, 22. Virtual classroom vs real classroom, 23. Freedom brings more responsibility 24. To-do lists help you become more productive 25. Having a diverse group of friends is an asset 26. One thing you wish you had learnt in High school 27. Why is it important to be non-judgmental towards others? 28. Humans need empathy, 29. Public speaking is a necessary skill 30. How to build and maintain good professional relationships.

B. Listening: Listening Comprehension, Speeches by Famous personalities

Pair work, Role-play, conversational practice and Individual speaking activities based on following essays from University of Success.

1. "How to Fashion Your Own Brand of Success" by Howard Whitman
2. "How to Recognize Your Failure Symptoms" by Dorothea Brande
3. "How to Conquer the Ten Most Common Causes of Failure" by Louis Binstock
4. "How to Develop Your Strength to Seize Opportunities" by Maxwell Maltz
5. "How to Make the Most of Your Abilities" by Kenneth Hildebrand
6. "How to Raise Your Self-Esteem and Develop Self-Confidence" by James W. Newman
7. "How to Win Your War against Negative Feelings" by Dr Maxwell Maltz
8. "How to Find the Courage to Take Risks" by Drs. Tom Rust and Randy Reed
9. "How to Become a Self-Motivator" by Charles T Jones
10. "How to Eliminate Your Bad Habits" by Og Mandino

Text Books

1. English All Round: Communication Skills for Undergraduate Learners-Volume 1, Orient Black Swan, 2019
2. University of Success by OgMandino, Jaico, 2015.

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

AICTE Recommended Books

1. Meenakshi Raman and Sangeeta Sharma. Technical Communication. Oxford University Press, 2018.
2. Pushplata and Sanjay Kumar. Communication Skills, Oxford University Press, 2018.
3. Kulbushan Kumar. Effective Communication Skills. Khanna Publishing House, Delhi

Sample Web Resources

Grammar / Listening / Writing

1. 1-language.com
2. <http://www.5minuteenglish.com/>
3. <https://www.englishpractice.com/>

Grammar/Vocabulary

4. English Language Learning Online
5. <http://www.bbc.co.uk/learningenglish/>
6. <http://www.better-english.com/>
7. <http://www.nonstopenglish.com/>
8. <https://www.vocabulary.com/>
9. BBC Vocabulary Games
10. Free Rice Vocabulary Game

Reading

11. <https://www.usingenglish.com/comprehension/>
12. <https://www.englishclub.com/reading/short-stories.htm>
13. <https://www.english-online.at/>

Listening

14. <https://learningenglish.voanews.com/z/3613>
15. <http://www.englishmedialab.com/listening.html>

Speaking

16. <https://www.talkenglish.com/>
17. BBC Learning English – Pronunciation tips
18. Merriam-Webster – Perfect pronunciation Exercises

All Skills

19. <https://www.englishclub.com/>
20. <http://www.world-english.org/>
21. <http://learnenglish.britishcouncil.org/>

I- Year II - Semester	Name of the Course	L	T	P	C
ES1201L	Problem Solving using Python Lab	0	0	3	1.5

Course Objectives

- To acquire programming skills in core Python.
- To acquire Object Oriented Skills in Python
- To develop the skill of designing Graphical user Interfaces in Python
- To develop the ability to write database applications in Python

List of Problems

1. Write a program that asks the user for a weight in kilograms and converts it to pounds. There are 2.2 pounds in a kilogram.
2. Write a program that asks the user to enter three numbers (use three separate input statements). Create variables called total and average that hold the sum and average of the three numbers and print out the values of total and average.
3. Write a program that uses a *for* loop to print the numbers 8, 11, 14, 17, 20, . . . , 83, 86, 89.
4. Write a program that asks the user for their name and how many times to print it. The program should print out the user's name the specified number of times.
5. Use a *for* loop to print a triangle like the one below. Allow the user to specify how high the triangle should be.

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*

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6. Generate a random number between 1 and 10. Ask the user to guess the number and print a message based on whether they get it right or not.
7. Write a program that asks the user for two numbers and prints *Close* if the numbers are within .001 of each other and *Not close* otherwise.
8. Write a program that asks the user to enter a word and prints out whether that word contains any vowels.
9. Write a program that asks the user to enter two strings of the same length. The program should then check to see if the strings are of the same length. If they are not, the program should print an appropriate message and exit. If they are of the same length, the program should alternate the characters of the two strings. For example, if the user enters *abcde* and *ABCDE* the program should print out *AaBbCcDdEe*. Write a program that asks the user for a large integer and inserts commas into it according to the standard American convention for commas in large numbers. For instance, if the user enters 1000000, the output should be 1,000,000.
10. In algebraic expressions, the symbol for multiplication is often left out, as in $3x+4y$ or $3(x+5)$. Computers prefer those expressions to include the multiplication symbol, like $3*x+4*y$ or $3*(x+5)$. Write a program that asks the user for an algebraic expression and then inserts multiplication symbols where appropriate.

11. Write a program that generates a list of 20 random numbers between 1 and 100.
 - a) Print the list.
 - b) Print the average of the elements in the list.
 - c) Print the largest and smallest values in the list.
 - d) Print the second largest and second smallest entries in the list
 - e) Print how many even numbers are in the list.
12. Write a program that asks the user for an integer and creates a list that consists of the factors of that integer.
13. Write a program that generates 100 random integers that are either 0 or 1. Then find the longest run of zeros, the largest number of zeros in a row. For instance, the longest run of zeros in [1,0,1,1,0,0,0,0,1,0,0] is 4.
14. Write a program that removes any repeated items from a list so that each item appears at most once. For instance, the list [1,1,2,3,4,3,0,0] would become [1,2,3,4,0].
15. Write a program that asks the user to enter a length in feet. The program should then give the user the option to convert from feet into inches, yards, miles, millimetres, centimetres, meters, or kilometres. Say if the user enters a 1, then the program converts to inches, if they enter a 2, then the program converts to yards, etc. While this can be done with if statements, it is much shorter with lists and it is also easier to add new conversions if you use lists.
16. Write a function called *sum_digits* that is given an integer num and returns the sum of the digits of num.
17. Write a function called *first_diff* that is given two strings and returns the first location in which the strings differ. If the strings are identical, it should return -1.
18. Write a function called *number_of_factors* that takes an integer and returns how many factors the number has.
19. Write a function called *is_sorted* that is given a list and returns True if the list is sorted and False otherwise
20. Write a function called *root* that is given a number x and an integer n and returns $x^{1/n}$. In the function definition, set the default value of n to 2.
21. Write a function called *primes* that is given a number n and returns a list of the first n primes. Let the default value of n be 100.
22. Write a function called *merge* that takes two already sorted lists of possibly different lengths, and merges them into a single sorted list.
 - a) Do this using the sort method.
 - b) Do this without using the sort method.
23. Write a program that asks the user for a word and finds all the smaller words that can be made from the letters of that word. The number of occurrences of a letter in a smaller word can't exceed the number of occurrences of the letter in the user's word.
24. Write a program that reads a file consisting of email addresses, each on its own line. Your program should print out a string consisting of those email addresses separated by semicolons.
25. Write a program that reads a list of temperatures from a file called *temps.txt*, converts those temperatures to Fahrenheit, and writes the results to a file called *ftemps.txt*.
26. Write a class called *Product*. The class should have fields called *name*, *amount*, and *price*, holding the product's name, the number of items of that product in stock, and the regular price of the product. There should be a method *get_price* that receives the number of items to be bought and returns a the cost of buying that many items, where the regular price is charged for orders of less than 10 items, a 10% discount is applied for orders of between 10 and 99 items, and a 20% discount is applied for orders of 100 or more items. There should also be a method called *make_purchase* that receives the number of items to be bought and decreases amount by that much.

27. Write a class called `Time` whose only field is a time in seconds. It should have a method called `convert_to_minutes` that returns a string of minutes and seconds formatted as in the following example: if seconds is 230, the method should return '5:50'. It should also have a method called `convert_to_hours` that returns a string of hours, minutes, and seconds formatted analogously to the previous method.
28. Write a class called `Converter`. The user will pass a length and a unit when declaring an object from the class—for example, `c = Converter(9,'inches')`. The possible units are inches, feet, yards, miles, kilometers, meters, centimeters, and millimeters. For each of these units there should be a method that returns the length converted into those units. For example, using the `Converter` object created above, the user could call `c.feet()` and should get 0.75 as the result.
29. Write a Python class to implement `pow(x, n)`.
30. Write a Python class to reverse a string word by word.
31. Write a program that opens a file dialog that allows you to select a text file. The program then displays the contents of the file in a textbox.
32. Write a program to demonstrate `Try/except/else`.
33. Write a program to demonstrate `try/finally` and `with/as`.

I- Year II - Semester	Name of the Course	L	T	P	C
MC1201	Environmental Science	2	0	0	0

Course Objectives

- To make the students to get awareness on environment,
- to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life
- to save earth from the inventions by the engineers.

Unit-1

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

Unit-2

ECOSYSTEMS, BIODIVERSITY, AND ITS CONSERVATION

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

- Forest ecosystem.
- Grassland ecosystem
- Desert ecosystem
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity And Its Conservation : Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit-3

ENVIRONMENTAL POLLUTION AND SOLID WASTE MANAGEMENT

Environmental Pollution: Definition, Cause, effects and control measures of:

- a. Air Pollution.
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Unit-4

SOCIAL ISSUES AND THE ENVIRONMENT

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

Unit-5

HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

TEXT BOOKS

1. Text book of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Palaniswamy – Pearson education
3. Environmental Studies by Dr.S.AzeemUnnisa, Academic Publishing Company

REFERENCES

1. Textbook of Environmental Science by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications.
2. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication.
3. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
4. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Prentice Hall of India Private limited.
5. A Text Book of Environmental Studies by G.R.Chatwal, Himalaya Publishing House
6. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Prentice hall of India Private limited.

II- Year I - Semester	Name of the Course	L	T	P	C
BS2101	Mathematics - III	2	1	0	3

Pre-Requisites: Mathematics-I and Mathematics-II

Course Objectives:

1. To instruct the concept of Matrices in solving linear algebraic equations
2. To familiarize the techniques in partial differential equations
3. To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications

UNIT-I: Solving system of linear equations, Eigen values and Eigen Vectors

Rank of a matrix by Echelon form and normal form–solving system of homogeneous and non-homogeneous linear equations–Gauss elimination, Gauss Jordan for solving system of equations–Eigen values and Eigen vectors and their properties

UNIT-II: Cayley-Hamilton theorem and quadratic forms:

Cayley-Hamilton theorem (without proof)–Finding inverse and power of a matrix by Cayley-Hamilton theorem–Reduction to Diagonal form–Quadratic forms and nature of the quadratic forms–Reduction of quadratic form to canonical forms by orthogonal transformation.

Application: Free vibration of two mass systems.

UNIT – III: Vector Differentiation:

Scalar and Vector point functions-Vector Differential operator- Gradient – Directional derivatives–Divergence – Curl – Laplacian second order operator- Vector identities- Scalar Potential.

UNIT– IV: Vector Integration:

Line integral – Work done – Circulation- Surface integral- Volume integral Vector integral theorems (without proof): Greens theorem in a plane- Stokes theorem- Gauss Divergence theorem.

UNIT– V: Solutions of Partial differential Equations

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

Second order PDE: Solutions of linear partial differential equations with constant coefficients RHS term of the type e^{ax+by} , $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$.

Text Books:

2. **B.S. Grewal**, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.

Reference Books:

4. **B.V. Ramana**, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
5. **H.K.Das**, Advanced Engineering Mathematics, 22nd Edition, S. Chand & Company Ltd.
6. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India.

II- Year I - Semester	Name of the Course	L	T	P	C
PC2101	Mathematical Foundations of Computer Science	2	1	0	3

Course Objectives:

- To introduce concepts of mathematical logic.
- To introduce concepts and perform operations with sets, relations and functions.
- To solve counting problems by applying elementary counting techniques.
- To introduce algebraic structures, generating functions and recurrence relations.
- To use graph theory for solving problems.

Unit-1: Mathematical Logic & Calculus

Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, and Indirect Method of Proof.

Predicate Calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

Unit-2: Set theory & Relations

Set Theory: Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion.

Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, **Functions:** Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.

Unit-3: Algebraic Structures and Number Theory

Algebraic Structures: Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism.

Number Theory: Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, and Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

Unit-4: Combinatorics & Recurrence Relations

Combinatorics: Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems, Pigeonhole Principle and its Application.

Recurrence Relations: Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving non homogeneous Recurrence Relations.

Unit-5: Graph Theory

Graph Theory: Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multi graphs, Planar Graphs, Euler's Formula, Graph Colouring, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.
2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3rd Edition, Tata McGraw Hill.
3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata McGraw Hill.

Reference Books:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T. P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S. K. Chakraborty and B. K. Sarkar, Oxford, 2020

E-resources

1. <https://nptel.ac.in/courses/106/103/106103205/>
2. <https://nptel.ac.in/courses/106/106/106106183/>

II- Year I - Semester	Name of the Course	L	T	P	C
PC2102	Data Structures	3	0	0	3

Course Objectives:

1. To impart the usage of linear list to students.
2. To help students understand the difference between dynamic memory using linked list.
3. To demonstrate the students about the operations Trees.
4. To make the student to understand various algorithms in graphs.
5. To make the students to learn the importance of hashing and sorting algorithms.

Unit-1:

Algorithms and Linear Lists :Algorithmic complexity, performance and Analysis, Linear lists (Arrays) , Applications of Linear List : Searching and Sorting

Unit-2:

Stacks and Queues, Linked Lists: Single Linked List, Double Linked List, Circular Linked List, Stack and Queues using Linked list

Unit-3:

Trees: Binary Trees Operations, Tree traversal, Threaded Binary Trees, Binary Search Trees, Binary Heap

Unit-4:

Graphs- Elementary Graph Operations, Graph Traversals, Minimum cost spanning tree Algorithms , Shortest paths algorithms.

Unit-5:

Hashing and Pattern Matching: Concept Hashing, Hash Functions, Collision Resolution Techniques, Pattern Matching algorithms

Text Books

1. Data structures, Algorithms and Applications in Java, S. Sahni, University Press (India) Pvt. Ltd, 2nd edition, Universities Press, Pvt. Ltd.
2. Data structures and Algorithm Analysis in Java, Mark Allen Weiss, Pearson Education. Ltd, Second Edition

Reference Books

1. Data Structures and Algorithms, A. V. Aho, J. E. Hopcroft, and J. D. Ullman, Pearson, 2002.
2. Introduction to Algorithms, by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, MIT Press. 3rd Edition.
3. Classical Data Structures, 2nd Edition, DebasisSamanta, PHI

e- resources

1. Data Structures Visualizations :
<https://www.cs.usfca.edu/~galles/visualization/Algorithms.html>
2. Code Archery Youtube Channel:
<https://www.youtube.com/playlist?list=PLrKBff87Cy9CNZpzi3poq8BFWc0h4f0vL>

II- Year I- Semester	Name of the Course	L	T	P	C
PC2103	Java Programming	3	0	0	3

Course Objectives:

1. To understand object oriented programming concepts, and apply them in solving problems.
2. To make the students to learn the principles of inheritance and polymorphism; and to demonstrate how they relate to the design of abstract classes; to introduce the implementation of packages and interfaces.
3. To make the students to learn the concepts of exception handling.
4. To make the students to learn the concepts of multithreading.
5. To make the students to develop GUI applications.

Unit-1: Introduction to OOPS Concepts, Classes and Strings

Introduction to Object Oriented Programming, Java buzzwords, Java Programming Basics, Sample programs, Data types and operators, Control statements.

Classes: Classes, Objects, Methods, Constructors, this and static keywords, Method and Constructor Overloading, Access modifiers, arrays-One Dimensional and multi-dimensional arrays, Searching, Sorting.

Strings-Exploring the String class, String buffer class, Command-line arguments.

Unit – II: Inheritance, Interfaces, Packages

Inheritance: Need of inheritance, types, super keyword, abstract classes, interfaces, compile time and runtime polymorphism, Packages.

Unit – III: Exception Handling and I/O Streams

Exception Handling: Concepts of Exception handling, Built-in exceptions, creating own exception sub classes, Assertions.

Stream based I/O (java.io) – The Stream Classes-Byte streams and Character streams, reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, Object Serialization, exploring java.nio

Unit – IV: Multithreading

Multithreading:Concepts of Multithreading, differences between process and thread, thread life cycle, Thread class, Runnable interface, creating multiple threads, Synchronization, thread priorities, inter thread communication, daemon threads, thread groups.

Unit – V: GUI Programming

GUI Programming with Swing: Introduction, limitations of AWT, Various swing components & hierarchy.

Event Handling- event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

Text Books

.Java - The Complete Reference, Herbert Schildt, MC GRAW HILL Education, 9th Edition, 2016

Reference Books

1. “Java – How to Program”, Paul Deitel, Harvey Deitel, PHI.
2. “Core Java”, Nageswar Rao, Wiley Publishers.
3. “Thinking in Java”, Bruce Eckel, Pearson Education
4. “A Programmers Guide to Java SCJP”, Third Edition, Mughal, Rasmussen, Pearson.

II- Year I- Semester	Name of the Course	L	T	P	C
PC2104	Software Engineering	3	0	0	3

COURSE OBJECTIVES: The student should be able to

1. To understand the software life cycle models.
2. To understand the software requirements and SRS document.
3. To understand the importance of modeling and modeling languages.
4. To design and develop correct and robust software products.
5. To understand the quality control and how to ensure good quality software.

Unit-1: Introduction to Software Engineering:

Software, Software Classifications and Characteristics, Emergency of Software Engineering, what is Software Engineering? Software Engineering Challenges

Software Processes Process model, Elements and Characteristics of Process model, Process Classification, Phased Development Life Cycle, Software Development

Process Models: Prescriptive Process Models, Agile process models, and RUP process model

Unit-2: Project Management & Planning:

Project management essentials, Project success and failures, Project Life Cycle, Project team structure and organization, Software Configuration Management. Project planning activities, Metrics and Measurements, Project Size Estimation, Effort Estimation Techniques, Staffing and Personnel Planning, Project Scheduling and Miscellaneous Plans.

Unit-3: Requirement Engineering:

Software Requirements, Requirement Engineering Process, Requirement Elicitation, Requirement Analysis (Structured Analysis, Object Oriented Analysis, Data Oriented Analysis and Prototyping Analysis), Requirements Specification, Requirement Validation, and Requirement Management.

Unit-4: Software Design:

Software Design Process, Characteristics of a Good Design, Design Principles, Modular Design (Coupling and Cohesion), Software Architecture, Design

Methodologies (Function Oriented Design and Object-Oriented Design), Structured Design Methodology (SDM), Transaction Analysis and Logical Design;

Coding: Coding principles, Coding process, Code verification and documentations.

Unit-5: Software Testing:

Testing Fundamentals, Test Planning, Black Box Testing, White Box Testing, Levels of Testing, Debugging Approaches

Quality of Software: Quality Concept, Quality Factors, Verification and Validation, Quality Assurance Activities, Quality Standards: Capability Maturity Model (CMM), ISO 9000, Six Sigma.

Maintenance: Software Maintenance, Maintenance Process Models and Reengineering.

Text Books

1. Software Engineering: Concepts and Practices- Ugrasen Suman, Cengage Learning Publications.
2. Fundamentals of Software Engineering-Rajib Mall, PHI, New Delhi.

Reference Books

1. An Integrated Approach to S/w Engineering- Pankaj Jalote, Narosa Publishing House.
2. Software Engineering- Ian Sommerville, Pearson Education, New Delhi.
3. Software Engineering Concepts-Richard E. Fairly, Tata McGraw Hill Inc. New York.

e- resources

<https://www.javatpoint.com/software-engineering-tutorial>

II- Year I- Semester	Name of the Course	L	T	P	C
PC2101L	Data Structures Lab	0	0	3	1.5

Course Objectives:

1. Ability to apply computational thinking to a diverse set of problems.
2. Ability to adapt to new challenges and computational environments.
3. Proficiency in the design and implementation of algorithms.

List of experiments:

Prerequisites: Solve the following problems in Hackerrank

1. Time Conversion
2. Diagonal Difference
3. Stair case
4. Birthday Cake candles

UNIT I

1. Implement Binary Search using arrays
2. Implement Insertion Sort.
3. Implement Quick Sort
4. Implement Merge Sort
5. Implement Radix Sort

String Pairs

Anagram

UNIT II

6. Implement stack using arrays
7. Implement conversion of infix to postfix expression.
8. Implement queue using arrays.
9. Implement circular queue
10. Implement Singly Linked List
11. Implement Doubly Linked List
12. Implement Binary Heap Operations.

Minimize the Sum

Implement Expression Tree.

UNIT III

13. Implement Complete Binary Tree
14. Implement Binary Trees Traversal techniques (recursive and non-recursive)

15. Implement Binary Search Tree
16. Implement Binary Heap Operations.

UNIT IV

17. Implement Graph and its operations
18. Implement Breadth First Search
19. Implement Depth First Search
20. Implement Prims' Algorithm
21. Implement Kruskal's Algorithm

Implement Island Strikes.

Implement Pawn Moves.

UNIT V

22. Implement Linear Probing on a dictionary.
23. Implement Separate Chaining.
24. Implement Brute Force Pattern Matching.
25. Implement Boyer Moore Pattern Matching.

II- Year I- Semester	Name of the Course	L	T	P	C
PC2102L	Java Programming Lab	0	0	3	1.5

Course Objectives:

1. To write programs using abstract classes.
2. To write programs for solving real world problems using java collection framework.
3. To write multithreaded programs.
4. To design GUI application using swing controls.
5. To introduce java compiler and eclipse platform
6. To impart hands on experience with java programming.

Note:

Mandatory to follow test driven development with Eclipse IDE empowered JUnit testing framework and code coverage plugin.

The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

List of Experiments

1. Create a class called Invoice that a hardware store might use to represent an invoice for an item sold at the store. An Invoice should include four pieces of information as instance variables-a part number (type String),a part description(type String),a quantity of the item being purchased (type int) and a price per item (double). Your class should have a constructor that initializes the four instance variables. Provide a set and a get method for each instance variable. In addition, provide a method named getInvoiceAmount() that calculates the invoice amount (i.e., multiplies the quantity by the price per item), then returns the amount as a double value. If the quantity is not positive, it should be set to 0. If the price per item is not positive, it should be set to 0.0. Write a test application named InvoiceTest that demonstrates class Invoice’s capabilities. [CO1]
2. Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, and type of EB connection (i.e. domestic or commercial). Compute the bill amount using the following tariff. [CO1]

If the type of the EB connection is domestic, calculate the amount to be paid as follows:

1. First 100 units - Rs. 1 per unit
2. 101-200units - Rs. 2.50 per unit
3. 201 -500 units - Rs. 4 per unit
4. >501 units - Rs. 6 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

5. First 100 units - Rs. 2 per unit
6. 101-200units - Rs. 4.50 per unit
7. 201 -500 units - Rs. 6 per unit
8. >501 units - Rs. 7 per unit

3. Create class Savings Account. Use a static variable annual Interest Rate to store the annual interest rate for all account holders. Each object of the class contains a private instance variable savings Balance indicating the amount the saver currently has on deposit. Provide method calculate Monthly Interest to calculate the monthly interest by multiplying the savings Balance by annual Interest Rate divided by 12 this interest should be added to savings Balance. Provide a static method modify Interest Rate that sets the annual Interest Rate to a new value. Write a program to test class Savings Account. Instantiate two savings Account objects, saver1 and saver2, with balances of \$2000.00 and \$3000.00, respectively. Set annual Concentration Rate to 4%, then calculate the monthly interest and print the new balances for both savers. Then set the annual Interest Rate to 5%, calculate the next month's interest and print the new balances for both savers
4. Create a class called Book to represent a book. A Book should include four pieces of information as instance variables-a book name, an ISBN number, an author name and a publisher. Your class should have a constructor that initializes the four instance variables. Provide a mutator method and accessor method (query method) for each instance variable. In addition, provide a method named get Book Info that returns the description of the book as a String (the description should include all the information about the book). You should use this keyword in member methods and constructor. Write a test application named Book Test to create an array of object for 30 elements for class Book to demonstrate the class Book's capabilities.
5. Write a JAVA program to search for an element in a given list of elements using binary search mechanism. [CO1]
6. Write a Java program that implements Merge sort algorithm for sorting and also shows the number of interchanges occurred for the given set of integers.
7. Write a java program to make rolling a pair of dice 10,000 times and counts the number of times doubles of are rolled for each different pair of doubles. Hint: Math.random()
8. Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.
9. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
10. Develop a java application to implement currency converter(Dollar to INR, EURO to INR, Yen to I NR and vice versa), distance converter (meter to KM, miles to KM and vice versa), time converter (hours to minutes, seconds and vice versa) using packages.
11. Write a Java Program to Handle Arithmetic Exceptions and Input MisMatch Exceptions.
12. Write a multi-threaded Java program to print all numbers below 100,000 that are both prime and Fibonacci number (some examples are 2, 3, 5, 13, etc.). Design a thread that generates prime numbers below 100,000 and writes them into a pipe. Design another thread that generates

Fibonacci numbers and writes them to another pipe. The main thread should read both the pipes to identify numbers common to both. [CO3].

13. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
14. Write a Java program that correctly implements the producer – consumer problem using the concept of inter-thread communication.
15. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file inbytes.
16. Write a Java program to build a Calculator in Swings.
17. Write a Java program to implement JMenu to draw all basic shapes using Graphics.
18. Write a Java program to implement JTable and JTree.
19. Write a Java program to implement JTabbedPane.
20. Write a Java Program that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result and then sends the result back to the client. The client displays the result on the console. For ex: The data sent from the client is the radius of a circle and the result produced by the server is the area of the circle.

II-Year-I Semester	UML Lab	L	T	P	C
PC2104L		0	0	3	1.5

The Software Engineering lab will facilitate the students to develop a preliminary yet practical understanding of software development process and tools

Course Objectives

- To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

Experiments

Take any real time problem and do the following experiments:

1. Do the Requirement Analysis and Prepare SRS
2. Using COCOMO model estimate effort.
3. Calculate effort using FP oriented estimation model.
4. Analyze the Risk related to the project and prepare RMMM plan.
5. Develop Time-line chart and project table using PERT or CPM project scheduling methods.
6. Draw E-R diagrams, DFD, CFD and structured charts for the project.
7. Design of Test cases based on requirements and design.
8. Prepare FTR
9. Prepare Version control and change control for software configuration items

Reference Books:

1. Roger S.Pressman, Software engineering-A practitioner's Approach, McGraw-Hill International Edition, 6th edition, 2001.
2. Ian Sommerville, Software engineering, Pearson education Asia, 6th edition, 2000.

II- Year I- Semester	Name of the Course	L	T	P	C
SOC2101	Advanced Python Programming	1	0	2	2

PRE-REQUISITES:

- Fundamentals of Python
- Problem solving skills

Course objectives: The student should be able to

1. Able to learn advanced concepts in Python
2. Able to use advanced packages like numpy, scipy, opencv in Python for building data processing & visualizing applications.
3. Able to process digital imaging applications

Unit-1: Python Fundamentals:

Introduction to Python, Data Structures – List, Dictionaries, Sets and Tuples

Modules, Python Packages, Libraries: Modules - Creating modules, import statement, from Import statement, name spacing. Math Module: Constants, Power and logarithmic functions, Trigonometric functions. Numpy Library: Numpy import, Basic functions, Matrices Addition, Subtraction Multiplication, Transpose, Inverse, Eigen values and Eigenvectors using Numpy

Unit-2: Python packages: Introduction to PIP, Installing Packages via PIP, Using Python Packages

Data Visualization – Matplotlib - Loading the library and importing the data, How Mat plot lib works? modifying the appearance of a plot, plotting multiple plots, Modifying the tick marks, Scatter plots, Bar plots.

Unit-3: File Handling – Introduction to Files, File modes, Reading, writing data from files, Copy one file to another, deletion of files. Other file programs in Python.

Text Processing: Word, character and line counting, Frequency count. Usage of with () and split (). Reading and writing into CSV formats.

Unit-4: Image Processing - Installing Jupiter notebook. Image & Its properties. Image processing applications. Image I/O and display with Python, Reading, saving and displaying an image using Open CV - PyPI, matplotlib

Sample programs – Image statistics Cropping, converting images from RGB to Gray and resizing the image.

Unit-5: Using Databases and SQL – Introduction to Database Concepts, usage of SQLite, Create, Insert & Retrieve data, Spidering twitter using a database. Sample Python codes

Text books:

1. Python for Everybody: Exploring Data Using Python 3, Charles Severance
2. The Hitchiker's Guide to Python, O'Reilly publication

Reference books:

1. Hands-On Image Processing with Python, O'Reilly Publications
2. *Think Python*, Allen Downey, Green Tea Press

e- Resources & other digital material

1. <https://nptel.ac.in/courses/117/105/117105079/>
2. <https://nptel.ac.in/courses/106/106/106106145/#>
3. <https://realpython.com/python-mysql/>

II- Year I- Semester	Name of the Course	L	T	P	C
MC2101	Essence of Indian Traditional Knowledge	2	0	0	0

Objectives:

To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.

- The course aim of the importing basic principle of third process reasoning and inference sustainability is at the course of Indian traditional knowledge system
- To understand the legal framework and traditional knowledge and biological diversity act 2002 and geographical indication act 2003.
- The courses focus on traditional knowledge and intellectual property mechanism of traditional knowledge and protection.
- To know the student traditional knowledge in different sector.

Unit-I:

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

Learning Outcomes:

At the end of the unit the student will able to:

- Understand the traditional knowledge.
- Contrast and compare characteristics importance kinds of traditional knowledge.
- Analyze physical and social contexts of traditional knowledge.
- Evaluate social change on traditional knowledge.

Unit-II:

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

Learning Outcomes:

At the end of the unit the student will able to:

- Know the need of protecting traditional knowledge.
- Apply significance of TK protection.
- Analyze the value of TK in global economy.
- evaluate role of government

Unit-III:

Legal framework and TK: A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmers Rights Act, 2001 (PPVFR Act);B:The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indications act 2003.

Learning Outcomes:

At the end of the unit the student will able to:

- Understand legal framework of TK.
- Contrast and compare the ST and other traditional forest dwellers
- Analyse plant variant protections
- Evaluate farmers right act

Unit-IV:

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FOR A for increasing protection of Indian Traditional Knowledge.

Learning Outcomes:

At the end of the unit the student will able to:

- Understand TK and IPR
- Apply systems of TK protection.
- Analyze legal concepts for the protection of TK.
- Evaluate strategies to increase the protection of TK.

Unit-V:

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Learning Outcomes:

At the end of the unit the student will able to:

- know TK in different sectors.
- apply TK in engineering.
- analyze TK in various sectors.
- evaluate food security and protection of TK in the country.

Reference Books:

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
3. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
4. “Knowledge Traditions and Practices of India” Kapil Kapoor, Michel Danino

E-Resources:

1. <https://www.youtube.com/watch?v=LZP1StpYEPM>
2. <http://nptel.ac.in/courses/121106003/>

Course Outcomes: After completion of the course, students will be able to:

1. understand the concept of Traditional knowledge and its importance
2. know the need and importance of protecting traditional knowledge
3. know the various enactments related to the protection of traditional knowledge.
4. understand the concepts of Intellectual property to protect the traditional knowledge

II- Year II- Semester	Name of the Course	L	T	P	C
BS2201	Probability and Statistics	2	1	0	3

Course objectives:

1. To **Classify** the concepts of data science and its importance (L4) or (L2)
2. To **Interpret** the association of characteristics and through correlation and regression tools (L4)
3. To **Understand** the concepts of probability and their applications, **apply** discrete and continuous probability distributions (L3)
4. To **Design** the components of a classical hypothesis test (L6)
5. To **Infer** the statistical inferential methods based on small and large sampling tests (L4)

UNIT-I

Descriptive statistics and methods for data science:

Data science-Statistics Introduction-Population vs Sample-Collection of data-primary and secondary data-Types of variable: dependent and independent Categorical and Continuous Variables-Data Visualization-Measures of Central Tendency-Measures of Variability (spread or variance)-Skewness Kurtosis.

UNIT-II

Correlation and Curve fitting:

Correlation- correlation coefficient-Rank Correlation-Regression coefficient and properties-regression lines-Multiple Regression-Method of least squares-Straight line-parabola-Exponential-Power curves.

UNIT-III

Probability and Distributions:

Probability-Conditional probability and Baye's Theorem-Random variables-Discrete and Continuous random variables-Distribution function-Mathematical Expectation and Variance-Binomial, Poisson, Uniform and Normal distributions.

UNIT-IV

Sampling Theory:

Introduction-Population and samples-Sampling distribution of Means and Variance (definition only)-Central limit theorem (without proof)-Point and Interval estimations, good estimator, Unbiased estimator, Efficiency estimator-Maximum error of estimate.

UNIT-V

Test of Hypothesis:

Introduction–Hypothesis-Null and Alternative Hypothesis-Type I and Type II errors-Level of significance-One tail and two-tail tests-Tests concerning one mean, two means, and proportions using Z test, Tests concerning one mean, two means using t test, also chi-square and F tests use for small samples.

Text books:

1. **Miller and Freund's**, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. **S. C. Gupta and V. K. Kapoor**, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012

Reference books

1. **Shron L. Myers, Keying Ye, Ronald E Walpole**, Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson 2007.
2. **Jay I. Devore**, Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. **Sheldon M. Ross**, Introduction to probability and statistics Engineers and the Scientists, 4th Edition, Academic Foundation, 2011.
4. **Johannes Ledolter and Robert V. Hogg**, Applied statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010.
5. **T. K. V. Iyenger**, Probability and Statistics, S. Chand & Company Ltd, 2015.

e- Resources & other digital material

1. https://www.youtube.com/watch?v=COI0BUmNHT8&list=PLyqSpQzTE6M_JcleDbrVyPnE0PixKs2JE(For Probability and Statistics)
2. <https://www.youtube.com/watch?v=VVYLpmKRfQ8&list=PL6C92B335BD4238AB>(For Probability and Statistics)
3. <https://www.mathsisfun.com/data/standard-normal-distribution-table.html>(Information about Normal distribution)
4. <https://www.statisticshowto.com/tables/t-distribution-table/>(Information about T- distribution)

Statistical Tables to be allowed in examinations:

1. Normal distribution table
2. T- distribution table

II-Year-II Semester	Engineering Economics and Management	L	T	P	C
ES2201		3	0	0	3

Course objectives: The student should be able to

1. To understand the concept and nature of Economics and Demand. And to familiarize about the Production function, Input Output relationship, Cost-Output relationship and Break Even Analysis.
2. To understand the nature of markets and the concepts of Money and RBI functions.
3. To familiarize with the process of management, principles, and to provide conceptual knowledge on functional management that is on Human resource management and Marketing management.
4. To learn different Accounting Systems, preparation of Financial Statement and to familiarize with the tools of project Management.
5. To understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

Unit-1: Introduction to Economics and Theory of Production:

Introduction to Economics; Definitions, Nature, Scope, Difference between Microeconomics & Macroeconomics –Concept of Demand, Types of Demand, Determinants of Demand-Law of Demand -Elasticity of Demand, Types of Elasticity of Demand. Theory of production; production function, Law of variable proportions & law of returns to scale, Cost; meaning, short run & long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost. Break even analysis; meaning, explanation, simple problems

Unit-2: Introduction to Markets and Money:

Markets: meaning, types of markets & their characteristics (Perfect Competition, Monopoly, Monopolistic Completion, Oligopoly).National Income, GNP, GDP, NNP,NDP, Personal income and GST (Goods & Service Tax).Money: meaning, functions, types, Monetary policy- meaning, objectives, tools, fiscal policy-meaning, objectives, tools, Banking; meaning, types, functions, Central Bank- RBI; its functions, concepts; CRR, bank rate, repo rate, reverse repo rate, SLR.

Unit-3: Introduction to Management:

Concept –nature and importance of Management Functions of Management, Principles of Management.

Human Resource Management: Meaning and difference between Personnel Management and Human Resource Management, Functions of Human Resource Management.Marketing Management: Functions of Marketing - Marketing strategies based on product Life Cycle, Channels of distributions.

Unit-4: Introduction to Accounting & Project Management:

Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements.Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path (Simple Problems).

Unit-5: Capital and Capital Budgeting:

Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods (payback period, accounting rate of return) and modern methods (Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index).

Content Beyond the syllabus:

Introduction to Managerial Economics and demand Analysis: Managerial Economics, Nature & Scope, Demand forecasting Concept of supply.

Theory of Production and Cost Analysis: Production Process, Types of production, Iso- quants, Iso costs. Introduction to Markets: Price Output determination, Pricing Methods.

Introduction to Management: Evolution of Management thought, theories of Motivation, Leadership styles. Project Management: Brief about Project crashing

Text books:

1. Engineering Economy and Management 1 Edition Pravin Kumar – Wiley Publication.
2. Engineering Economics & Management- Dr. Vilas Kulkarni & Hardik Bavishi - Vikas Publishing.
3. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005. 2.
Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.
4. S A Siddhiqui & AS Siddhiqui, Managerial Economics and Financial Analysis, New Age international publishers 2013.
5. M. Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi 2012.
6. Principles of Management by Tripathy and Reddy. Delhi, 2015.

Reference books:

1. Management Fundamentals - Concepts, Application, Skill Development - Robers Lusier - Thomson
2. Basics of Engineering Economy, Leland Blank & Anthony Tarquin, McGraw Hill Publication (India) Private Limited
3. Engineering Economics, R. Paneerselvam, PHI publication
4. Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins S.P. and Decenzo David A.
5. Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning
6. Modern Economic Theory, By Dr. K. K. Dewett & M. H. Navalur, S. Chand Publications
7. Koontz & Weihrich: 'Essentials of management' TMH 2011
8. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
9. Biswajit Patnaik: Human Resource Management, PHI, 2011
Anil Bhat & Arya Kumar: Principles of Management, Oxford University Press, New Delhi, 2015.

e-resources:

1. www.managementstudyguide.com
www.tutorialspoint.com

II-Year-II Semester	Computer Networks	L T P C
ES2201		3 0 0 3

Course objectives:

The main objectives are

1. Study the basic taxonomy and terminology of the data communications & computer networking and enumerate the layers of OSI model and TCP/IP model.
2. Familiarize with the concepts of signals, transmission and its components.
3. Study data link layer concepts, design issues, and protocols
4. Gain core knowledge of Network layer routing protocols and IP addressing
5. Study transport layer services, protocols, and acquire knowledge of application layer paradigms and protocols.

Unit–1: Introduction to computer networks and Network Models

The Computer Network, Types of Networks, Network Topologies.

Network Models: Layered tasks, layers in the OSI model, TCP/IP protocol suite.

Physical Layers: Types of Media, Data Rates and Encoding

Switching in Networks: Circuit, Packet Switching Circuits

Unit–2: Data Link Layer

Error Detection and Correction: Block Coding, Cyclic Codes, Checksum

Data Link Control: Framing, Error Control and Flow Control (For Both Noisy And Noiseless Channels). HDLC.

Multiple Access: Random Access, Wireless LAN.

Unit–3: Network Layer

Internetworking, Internet Protocols IPV4 and IPV6, Addressing, ARP and ICMP. Routing: Distance Vector and Link state method basics, RIP

Unit–4: Transport Layer

Meaning of Process-to-Process Delivery, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), TCP connection basics and basics of Congestion Control

Unit–5: Internet Application

Application Layer Examples, Domain Naming System(DNS), Electronic Mail Basics, Role of SMTP, POP and File Transfer

Text books:

1. “Data Communications and Networking with TCP/IP Protocol Suite”, Behrouz A. Forouzan, 6th edition, TMH.
2. “Data and Computer Communications”, William Stallings, 10th edition, Pearson.
3. “Understanding Data Communication & Networks”, William A. Shay, 3rd edition, BSP..

Reference books:

1. “Data Communications and Computer Networks”, Prakash C. Gupta, 2nd edition, PHI.
2. “Computer Networks: A Systems Approach”, Larry L. Peterson, Bruce S. Davie, 5th edition, Morgan Kauffman publisher.
3. “Computer Networking: A Top-Down Approach”, Kurose James F., Ross Keith W., 6th edition, Pearson

II- Year II- Semester	Name of the Course	L	T	P	C
PC2201	Operating Systems	3	0	0	3

Course Objectives:

1. Study the basic concepts and functions of operating system
2. Learn about Processes, Threads and Scheduling algorithms
3. Understand the principles of concurrency and Deadlocks
4. Learn various memory management schemes
5. Study I/O management and File systems

UNIT-I

Introduction to Operating System Concepts:

What Operating Systems do, Computer System Organization, Functions of Operating systems, Types of Operating Systems, Operating Systems Services, System calls, Types of System calls, Operating System Structures, Distributed Systems, Special purpose systems.

UNIT-II

Process Management:

Process concept, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Scheduling Criteria, Scheduling algorithms and their evaluation, Operations on Processes, Inter-process Communication.

Threads: Overview, User and Kernel threads, Multi-threading Models.

UNIT-III

Concurrency:

Process Synchronization, The Critical- Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Monitors, and Classic Problems of Synchronization.

Principles of deadlock:

System Model, Deadlock Characterization, Methods for Handling Deadlocks: Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock.

UNIT- IV

Memory Management:

Logical vs physical address space, Swapping, Contiguous Memory Allocation, Paging, Structures of the Page Table, Segmentation.

Virtual Memory Management:

Virtual memory overview, Demand Paging, Page-Replacement & its algorithms, Allocation of Frames, Thrashing.

UNIT-V

File system Interface:

The concept of a file, Access Methods, Directory structure, files sharing, protection.

File System implementation:

File system structure, Allocation methods, and Free-space management.

Mass-storage structure: overview of Mass-storage structure, Disk scheduling, Swap space management.

Text Books:

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012
2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011

Reference Books:

1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley.
2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata McGraw Hill Education.
3. Operating Systems: A Concept-Based Approach, D M Dhamdhare, Second Edition, Tata McGraw-Hill Education

e-Resources

1. https://en.wikipedia.org/wiki/Operating_system
2. https://www.tutorialspoint.com/operating_system/

II- Year II- Semester	Name of the Course	L	T	P	C
PC2202	Database Management System	3	0	0	3

Course Objectives:

1. Study the basic concepts and importance of Database Management Systems
2. Learn and understand the conceptual design of database and information retrieval
3. Learn various commands and writing of queries for information retrieval
4. Understand the concepts of Database design
5. Study of internal storage and its access

Unit-I: Introduction

Introduction to Database, Applications of Database, Purpose of Database, View of Data, Data Independence, Data Models, Users of Database, DBA, Query Processor, Storage Manager, Database Architecture

Unit-II: Conceptual Design & Relational Query Languages

Conceptual Design of Database using ER Model, Notations, Types of attributes, Relation, Mapping Constraints, Features of ER Diagram, Weak Entity Set, Examples of Conceptual Design

Relational Algebra: Selection, Projection, Set Operations, Rename, Cartesian-Product, Join, Outer Join, Examples

Relational Calculus: Tuple Relational Calculus and Domain Relational Calculus, Safety Expressions

Unit-III: SQL & PL/SQL

SQL Commands: DDL, DML, TCL, DCL

Types of Constraints (Primary, Alternate, Not Null, Check, Foreign), Basic form of SQL query, joins, outer joins, set operations, group operations, various types of queries, PL/SQL (Cursor, Procedures, Functions, Packages, Triggers...)

Unit-IV: Database Design

Database Design: Normalization, Purpose of Normalization, Functional Dependency, Closure, 1NF, 2NF, 3NF, BCNF, MVFD, 4NF, Join Dependency, 5NF Why NoSQL? Importance of NoSQL

Unit-V: Transaction, Data Recovery & Storage Management

Transaction Management: ACID Properties of Transactions, Conflict & View serializability, Lock based protocols, Time Stamp based protocol, Thomas Write Rule, Validation Based Protocol, Deadlock detection, Deadlock avoidance, Deadlock prevention: wait-die and wound-wait

Recovery Management: Types of failures, ideal storage, Log, Log records, log-based recovery techniques, Shadow Paging, ARIES

File Organization & Indexing: Types of File Organizations, Primary Indexing, Secondary Indexing, Multi-level Indexing, Hash Indexing, Tree Indexing

Text Books:

1. Data base System Concepts,5/e, Silberschatz, Korth, TMH
2. Introduction to Database Systems, CJ Date, Pearson

Reference Books:

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, and TATA McGraw Hill 3rd Edition
2. Fundamentals of Database Systems, ElmasriNavate Pearson Education

II- Year II - Semester	Unix and Network Programming Lab	L	T	P	C
ES2201L		0	0	3	1.5

Prerequisites: C Programming Course Objectives:

1. To illustrate the working of datalink layer and network layer protocols
2. To illustrate the use of client/server architecture in application development
3. To illustrate how to use TCP and UDP based sockets and their differences.
4. To get acquainted with Unix system networking commands and Socket system calls.
5. To Design reliable servers using both TCP and UDP sockets

List of Experiments:

1. Implement the framing methods such as character stuffing and bit stuffing.
2. Implement on a data set of characters the three CRC polynomials.
3. Implement Dijkstra's algorithm to compute the Shortest path thru a graph.
4. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table at each node using distance vector routing algorithm
5. Understanding and using of commands like ifconfig, netstat, ping, arp, telnet, ftp, finger, traceroute, whois etc. Usage of elementary socket system calls (socket (), bind(), listen(), accept(), connect(), send(), recv(), sendto(), recvfrom()).
6. Implementation of Connection oriented concurrent service (TCP).
7. Implementation of Connectionless Iterative time service (UDP).
8. Implementation of Select system call.
9. Implementation of gesockopt(), setsockopt() system calls.
10. Implementation of getpeername() system call.
11. Implementation of remote command execution using socket system calls.
12. Implementation of Distance Vector Routing Algorithm.
13. Implementation of SMTP.
14. Implementation of FTP.
15. Implementation of HTTP.

II- Year II - Semester	OPERATING SYSTEMS LAB	L	T	P	C
PC2201L		0	0	3	1.5

Course Objectives:

1. Ability to apply computational thinking to a diverse set of problems.
2. Ability to analyze the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS.
3. Proficiency in the design and implementation of algorithms.

LIST OF EXPERIMENTS

1. Simulate the following CPU scheduling algorithms
 - a) FCFS
 - b) SJF (Preemptive, Non Preemptive)
 - c) Priority (Preemptive, Non Preemptive)
 - d) Round Robin
2. Simulate the following Process Synchronization techniques
 - a) Bounded-Buffer problem
 - b) Readers-Writers problem
 - c) Dining philosophers problem using semaphores
 - d) Dining-Philosophers Solution using Monitors
4. Simulate Bankers Algorithm for
 - a) Dead Lock Avoidance
 - b) Dead Lock Prevention
4. Simulate the following page replacement algorithms.
 - a) FIFO
 - b) LRU
 - c) LFU
 - d) MFU
5. Simulate the following
 - a) Multiprogramming with a fixed number of tasks (MFT)
 - b) Multiprogramming with a variable number of tasks (MVT)
6. Simulate the following File allocation strategies
 - a) Contiguous
 - b) Linked
 - c) Indexed
7. Simulate the following disk-scheduling algorithms

a) FCFS	b) SSTF	c) SCAN
d) C-SCAN	e) LOOK	f) C-LOOK

II- Year II - Semester	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
PC2202L	LAB	0	0	3	1.5

Course Objectives:

1. To familiarize the participant with the distinctions of database environments towards an information-oriented framework
2. To give a good formal foundation on the relational model of data
3. To present SQL and procedural interfaces to SQL comprehensively

List of experiments:

SQL

1. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints
2. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
3. Queries using operators in SQL
4. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update
5. Queries using Group By, Order By, and Having Clauses
6. Queries on Controlling Data: Commit, Rollback, and Save point
7. Queries to Build Report in SQL *PLUS
8. Queries on Joins and Correlated Sub-Queries
9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features

PL/SQL

1. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation
2. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL
3. Write a PL/SQL block using SQL and Control Structures in PL/SQL
4. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types
5. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS
6. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc.
7. Demonstration of database connectivity

II- Year II - Semester	Programming with Microcontroller	L	T	P	C
SOC2201		1	0	2	2

Course objectives:

This course will give the students an overview of microcontroller programming. The following is a list of topics, which will be covered in this course.

1. Introduction to Microcontroller and 8051 family
2. Architectural aspects of 8051 microcontroller
3. Assembly language programming with various types of instruction sets
4. Programming the internal resources such as serial ports, I/O ports, timers and counters etc
5. Interfacing with memory and hardware's devices
6. To interface different analog and digital sensors which are basic building blocks for any interactive system design.

Unit 1: Introduction

Introduction to Microcontrollers and Embedded Processors Microcontrollers survey-4-bit, 8-bit, 16-bit, 32-bit Microcontrollers --Comparing Microprocessors and Microcontrollers-Overview of the 8051 family.

Unit 2: The 8051 Architecture

Internal architecture of 8051- Pin configuration of 8051, Oscillator and clock - Register organization, Memory organization, Power-on-Reset, Input / Output Ports- Timers and Counters - Serial port Interrupts. Structure of Assembly language-Assembling and running an 8051 program- Addressing modes- Accessing memory using various addressing modes- Instruction set. Introduction to 8051 programming with C- Simple programs and on hardware kits

Unit 3: Introduction to ARDUINO

Pin configuration and architecture, Device and Platform Features, Concept of digital and analog ports, Interfacing Arduino. Introduction to Python and Arduino platform

Unit 4: Programming ARDUINO Boards

Arduino data types, Variables and Constants, Operators, Control Statements, Arrays, Functions, Pins Configured as input, Pull-up Resistors, Pins Configured as Output, pin modes() Functions, Digital write () function, analog read () function.

Unit 5: Interfacing Sensors with ARDUINO

Humidity Sensors, Temperature Sensors, Water Detector/ Sensors, PIR Sensors, Ultrasonic Sensors, Connecting Switches, Buzzers, LEDs, LCD.

Hardware: 8051 Kits, Arduino UNO, NANO

Softwares: 1. Keil, and 2. Proteus softwares 3. Arduino IDE

III-Year-I Semester	Name of the Course	L	T	P	C
PC3101	Cryptography and Network Security	3	0	0	3

Course Objectives:

1. To understand and classify various security attacks, services mechanisms and classical cryptographic techniques
2. To analyse the design principles of block ciphers and their implementation.
3. To compute and analyse asymmetric key cryptographic algorithms
4. To evaluate Authentication, Hash Codes and verify the digital signatures
5. To impart the knowledge on Network security concepts.

UNIT-I: Introduction to Cryptography and Network Security

Introduction: Security attacks, services & mechanisms, Network Security Model, Symmetric Cipher Model, Mathematics of Cryptography, Substitution Ciphers, Transposition Ciphers Techniques, what is Steganography.

UNIT-II: Symmetric Key Cryptography

Modern Block Ciphers: Modes of Block Ciphers, Design Principles of Block Ciphers, Feistel Cipher, Data Encryption Standard, Double DES, Triple DES, International Data Encryption Algorithm, CAST-128, Blowfish, Advanced Encryption Standard

UNIT-III: Asymmetric (Public) Key Cryptography

Number Theory: Mathematics of Asymmetric Key Cryptography: Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorem, Chinese Remainder Theorem, Primitive Roots, Discrete Logarithms,

Principles of Public Key Cryptosystems: Applications, RSA, Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography, El-Gammal Key Exchange.

UNIT-IV: Data Integrity, Digital Signatures, Authentication Protocols

Hashing: Requirements of Hash Functions and Message Authentication Codes

Hash Algorithms: MD5, SHA-160,256,512, RIPEMD, Properties of Digital Signatures, DSS, Authentication Applications: Kerberos Version4 and Version 5.

UNIT – V: Network Security

Web Security: Overview, IPSEC layers, Secure Socket Layer and Transport Layer Security.

Email Security: Pretty Good Privacy, S/MIME.

Text Books:

1. Cryptography and Network Security Principles and Practices: William Stallings, Pearson Education, 5th Edition
2. Cryptography and Network Security, Behrouz A Forouzan, Tata McGraw Hill, 3rd Edition

Reference Book:

1. Practical Cryptography, Bruce Schneier, Wiley, Deamtech India Pvt Ltd.

Web Resources:

<https://crypto.stanford.edu/~dabo/courses/OnlineCrypto/>

<https://nptel.ac.in/courses/106105162>

III-Year-I Semester	Name of the Course	L	T	P	C
PC3102	Introduction to IoT	3	0	0	3

OBJECTIVES

The objective of this course is to impart necessary and practical knowledge of components of Internet of Things and develop skills required to build real-life IoT based projects.

Unit–1: Introduction

Definition and Characteristics of IoT – IoT Architectures-Challenges and Issues - Physical Design of IoT, Logical Design of IoT - IoT Functional Blocks, Security.

Unit–2: Control units

Communication modules – Bluetooth – Zigbee – Wi-Fi –IoT Application and Network Layer Protocols.

Unit–3: Four Pillars of IoT Paradigm

RFID, Wireless Sensor Networks, SCADA (Supervisory Control and Data Acquisition), M2M - IoT Enabling Technologies – Big Data Analytics, Cloud Computing, Embedded Systems.

Unit–4: IoT System Design

Working principles of sensors – IoT deployment for Raspberry Pi /Arduino/Equivalent platform – Reading from Sensors, Communication: Connecting microcontroller with mobile devices – communication through Bluetooth, wifi and USB - Contiki OS Cooja Simulator. Clustering, Clustering for Scalability, Clustering Protocols for IoT.

Unit–5: API Development Tools

Python based API development, Set up cloud environment –Cloud access from sensors– Data Analytics for IoT- Case studies- Smart Healthcare – Smart Cities – Other recent projects.

TEXT BOOKS

1. Vijay Madiseti, ArshdeepBahga, Internet of Things, “A Hands on Approach”, University Press
2. Dr. SRN Reddy, RachitThukral and Manasi Mishra, “Introduction to Internet of Things: A practical Approach”, ETI Labs
3. Pethuru Raj and Anupama C. Raman, “The Internet of Things: Enabling Technologies, Platforms, and Use Cases”, CRC Press
4. Jeeva Jose, “Internet of Things”, Khanna Publishing House, Delhi
5. Adrian McEwen, “Designing the Internet of Things”, Wiley
6. Raj Kamal, “Internet of Things: Architecture and Design”, McGraw Hill

III-Year-I Semester	Name of the Course	L	T	P	C
PC3103	Web Technologies	3	0	0	3

Course Objectives:

1. Creating web pages using HTML5 and CSS
2. Implementing Interactive web interfaces with client side technologies.
3. Create and validate XML documents.
4. Understanding Server Side Scripting.
5. Interactive Server side Scripting for an application

UNIT - I

HTML: Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Html styles, Elements, Attributes, Heading, Layouts, Html media, Iframes Images, Hypertext Links, Lists, Tables, Forms, GET and POST method, HTML 5, Dynamic HTML.

CSS: Cascading style sheets, Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model, Conflict Resolution, CSS3

UNIT - II

Client-side Scripting: Introduction to Javascript, declaring variables, scope of variables, Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions, Form validation.

UNIT - III

Working with XML: Document type Definition (DTD), XML schemas, XSLT, Document object model, Parsers - DOM and SAX.

AJAX A New Approach: Introduction to AJAX, Basics of AJAX, XML Http Request Object, AJAX UI tags, Integrating PHP and AJAX

UNIT - IV

PHP Programming: XAMPP, LAMP and WAMP servers. Introduction to PHP, Creating PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Data types, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions

UNIT - V

File Operations: including and requiring Files, File Handling – Reading from file, Copying Files, Deleting a File, Updating a File and Uploading Files.

My SQL: Creating Database, Data Types, Basic Operations on tables (Create, Select, Delete and Update)

Working with Database & Forms: Querying a My SQL Database with PHP, Get and PostMethods, Query strings, HTML form handling.

Maintaining User State: Cookies and Sessions

Text Books:

1. HTML5 Black Book Covers CSS3, Javascript, XML, XHTML, AJAX, PHP and jQuery ,Dreamtech Press (2011).
2. Robin Nixon, Learning PHP, My SQL, Java Script & CSS, 2nd Edition, O'REILLY (2012).

Reference Books

1. H. M. Deitel and P. J. Deitel, Internet & World Wide Web How to Program, 5th Edition,Prentice Hall, 2008

e- Resources & other digital material

<http://php.net/manual/en/book.mysql.php>

III-Year-I Semester	Name of the Course	L	T	P	C
PE3101	Design and Analysis of Algorithms	3	0	0	3

Course Objectives:

1. To provide an introduction to formalisms to understand, analyse and denote time complexities of algorithms
2. To introduce the different algorithmic approaches for problem solving through numerous example problems
3. To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness.

UNIT-I:

Introduction: Algorithm Definition, Algorithm Specification, Performance Analysis, Performance Measurement, Asymptotic notations.

Divide and Conquer: General Method, Binary Search, Finding the Maximum and Minimum, Quick Sort.

UNIT-II:

The Greedy Method: The General Method, Knapsack Problem, Single Source Shortest Path Problem, Optimal Storage on Tapes Problem, Optimal Merge Patterns Problem.

UNIT- III:

Dynamic Programming: The General Method, 0/1 Knapsack Problem, Single Source Shortest Path – General Weights, All Pairs-Shortest Paths Problem, Traveling Salesperson Problem, String Editing Problem.

UNIT-IV:

Backtracking: The General Method, The N-Queens Problem, Sum of Subsets Problem, Graph Colouring Problem, Hamiltonian Cycles Problem.

UNIT – V:

Branch and Bound: The General Method, FIFO Branch-and-Bound, LC Branch-and-Bound, 0/1 Knapsack Problem, Travelling Salesperson Problem.

NP-Hard and NP-Complete problems: Basic concepts, Cook’s Theorem.

Textbooks:

1. Ellis Horowitz, Sartaj Sahni, SanguthevarRajasekaran, “Fundamentals of Computer Algorithms”, 2nd Edition, Universities Press

Reference Book:

2. Harsh Bhasin, “Algorithms Design & Analysis”, Oxford University Press.
3. S. Sridhar, “Design and Analysis of Algorithms”, Oxford University Press.

Web Resources:

1. <https://www.geeksforgeeks.org/fundamentals-of-algorithms/>
2. <https://www.javatpoint.com/daa-tutorial>
3. <https://nptel.ac.in/courses/106106131>
4. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm

III-Year-I Semester	Name of the Course	L	T	P	C
PE3101	Software Testing Methodologies	3	0	0	3

Course Objectives:

- 1) To study fundamental concepts in software testing and discuss Various Software testing issues and solutions
- 2) To learn how to plan a test project, design test cases and data, Conduct Testing, manage Software problems and defects, and generate a test report
- 3) To expose the advanced software testing concepts such as object-oriented Software testing methods, web-based and component-based software testing
- 4) To understand software test automation problems and solutions
- 5) To learn how to write software test documents and communicate with Engineers in various forms

UNIT – I: Software Testing

Introduction, Evolution, Myths & Facts, Goals, Psychology, definition, Model for testing, Effective Vs Exhaustive Software Testing. Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, Software Testing Methodology.

Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, verifying code, Validation.

UNIT – II: Dynamic Testing-Black Box testing techniques

Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table-based testing, Cause-Effect Graphing based testing, Error guessing.

White-Box Testing: need, Logic Coverage criteria, Basis Path testing, Graph matrices, Loop testing, data flow testing, mutation testing.

UNIT – III: Static Testing

Inspections, Structured Walkthroughs, Technical Reviews. Validation activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing. Regression testing: Progressives Vs regressive testing, Regression test ability, Objectives of regression testing, Regression testing types, Regression testing techniques.

UNIT – IV: Efficient Test Suite Management

Growing nature of test suite, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite Software Quality Management: Software Quality metrics, SQA models. Debugging: process, techniques, correcting bugs.

UNIT – V: Automation and Testing Tools

need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools such as Win Runner, Load Runner, Jmeter and JUnit.

Test Automation using Selenium tool. Testing Object Oriented Software: basics, Object oriented testing Testing Web based Systems: Challenges in testing for web-based software, quality aspects, web engineering, testing of web-based systems, Testing mobile systems

TEXT BOOKS

1. Software Testing, Principles and Practices, Naresh Chauhan, Oxford
2. Software Testing, Yogesh Singh, CAMBRIDGE

Reference Books:

1. Foundations of Software testing, Aditya P Mathur, 2ed, Pearson
2. Software testing techniques – Baris Beizer, Dreamtech, second edition.
3. Software Testing, Principles, techniques and Tools, M G Limaye, TMH
4. Effective Methods for Software testing, Willian E Perry, 3ed, Wiley

III-Year-I Semester	Name of the Course	L	T	P	C
PE3101	Introduction to Data Science	3	0	0	3

COURSE OBJECTIVES:

The objective of this course is to impart necessary knowledge of the mathematical foundations needed for data science and develop programming skills required to build data science applications

Course Contents:

UNIT- I Introduction to Data Science

Concept of Data Science, Traits of Big data, Web Scraping, Analysis vs Reporting

UNIT-II Introduction to Programming Tools for Data Science

Toolkits using Python: Matplotlib, NumPy, Scikit-learn, NLTK , Visualizing Data: Bar Charts, Line Charts, Scatterplots,3 Working with data: Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction

UIT- III Mathematical Foundations for Data Science

Linear Algebra: Vectors, Matrices, Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, Correlation and Causation , Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem, Hypothesis and Inference: Statistical Hypothesis Testing, Confidence Intervals, hacking, Bayesian Inference

UNIT- IV Introduction to machine Learning

Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised, Unsupervised, Reinforced learning, Introduction to Bayes Theorem, Linear Regression- model assumptions, regularization (lasso, ridge, elastic net), Classification

UNIT- V Case Studies of Data Science Application

Weather forecasting, Stock market prediction, Object recognition, Real Time Sentiment Analysis..

Text Books:

1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media
2. AurélienGéron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media
3. Jain V.K., "Data Sciences", Khanna Publishing House, Delhi. 4. Jain V.K., "Big Data and Hadoop", Khanna Publishing House, Delhi.

Course Outcomes

At end of this course, the students will be able to:

1. Demonstrate understanding of the mathematical foundations needed for data science.
2. Collect, explore, clean, munge and manipulate data.
3. Implement models such as k-nearest Neighbors, Naive Bayes, linear and logistic regression, decision trees, neural networks and clustering.
4. Build data science applications using Python based toolkit
5. Building various classification models

III-Year-I Semester	Name of the Course	L	T	P	C
PE3101	Computer Graphics	3	0	0	3

Course Objectives:

1. To develop, design and implement two- and three-dimensional graphical structures
2. To enable students to acquire knowledge Multimedia compression and animations.
3. To learn Creation, Management and Transmission of Multimedia objects.

UNIT - I

Introduction to Computer Graphics: Applications of Computer Graphics,

2D Primitives: -Output Primitives: Points, Lines, Planes, Frame- Buffers, Video-display devices, Line Drawing Algorithms: DDA Line drawing, Bresenham's Line Drawing, Parallel Line Drawing, Circle and Ellipse Generation, Polygon Generation, Polygon Filling Algorithms, Attributes of Output Primitives.

UNIT - II

2D Transformations & Viewing: Basic Transformations: Translation, Rotation, Scaling, and Other Transformations: Reflection, Shear, Composite Transformations, Coordinate Transformation, and Viewing Pipeline: Viewing Reference Frame, window, view-port, window-to-view-port Transformation, Multiple window transformation, Clipping: Line Clipping: cohen-sutherland line clipping algorithm, Polygon Clipping: Sutherland-Hodgeman polygon clipping algorithm, Text Clipping.

UNIT - III

3D Concepts: 3D Object Representation: Polygons, Curved Lines, Splines, Quadric Surfaces, **3D Transformations: Basic: Translation,** Coordinate-axis-Rotation, Arbitrary-axis Rotation, Scaling, Other: Reflection, Shear, Composition of 3D transformations, Projections: Parallel, Perspective, 3D Viewing, Visible-Surface Detection Algorithms: Back face removal, Z-Buffer, A-Buffer, Area-sub-division, Depth-Sorting (painter's), BSP-Tree, Octree, 3D Clipping

UNIT - IV

Graphics Programming Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Key frame Graphics programming using OPENGL – Basic graphics primitives – Drawing three dimensional objects - Drawing three dimensional scenes
 Rendering Introduction to Shading models – Flat and Smooth shading – Adding texture to faces – Adding shadows of objects – Building a camera in a program – Creating shaded objects– Rendering texture – Drawing Shadows

UNIT - V

Fractals: Fractals and Self similarity – Peano curves – Creating image by iterated functions – Mandelbrot sets – Julia Sets – Random Fractals.
 Overview of Ray Tracing Intersecting rays with other primitives – Adding Surface texture – Reflections and Transparency – Boolean operations on Objects.

Text Books:

1. Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition Pearson Education, 2004.
2. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003.

Reference Books:

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007.

III-Year-I Semester	Name of the Course	L	T	P	C
OE3101	Fundamentals Of Computing & Digital Logic Design	3	0	0	3

COURSE OBJECTIVES

1. To recognize basic structures of computers and to summarize various machine instructions.
2. To learn and use the addressing modes and types of instructions.
3. To analyze ALU & I/O organization of a computer.
4. To summarize various memory systems.
5. To analyze functionalities done by processing unit and also learn micro programmed control.

SYLLABUS

UNIT-I: BASIC STRUCTURE OF A COMPUTER

Introduction: Introduction, Functional unit, Basic Operational concepts, Bus structures, System Software, Performance. **Number Representation:** Integer - unsigned, signed (sign magnitude, 1's complement, 2's complement); **Characters -** ASCII coding, other coding schemes; **Real numbers -** fixed and floating point, IEEE754 representation.

Machine Instructions: Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types

UNIT-II: ADDRESSING MODES AND TYPES OF INSTRUCTIONS

Addressing Modes: Addressing Modes, Basic Input/output Operations, and role of Stacks and Queues in computer programming equation. **Components of Instructions:** Logical Instructions, shift and Rotate Instructions. **Type of Instructions:** Arithmetic and Logic Instructions, Branch Instructions, Input and output operations.

UNIT-III ALU AND I/O ORGANIZATION

Basic Building Blocks for the ALU: Adder, Subtractor, Shifter, Multiplication and division circuits. **I/O Organization:** Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access. **Buses:** Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

UNIT-IV: THE MEMORY SYSTEMS

Memory: Basic memory circuits, Memory System Consideration, Read- Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, Interleaving. **Secondary Storage:** Magnetic Hard Disks, Optical Disks.

UNIT-V: PROCESSING UNIT

Fundamental Concepts: Register Transfers, Performing an Arithmetic or Logic Operation, Fetching a Word from Memory, Execution of Complete Instruction, Hardwired Control. Micro Programmed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field. Pipeline: Parallel Processing, Pipelining, Instruction Pipeline, RISC Pipeline, Array Processor.

TEXT BOOKS

1. Computer Organization, Carl Hamacher, ZvonksVranesic, SafeaZaky, 5th Edition, McGraw Hill.
2. Computer Architecture and Organization by William Stallings, PHI Pvt. Ltd., Eastern Economy Edition, Sixth Edition, 2003

REFERENCE BOOKS

1. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill.
2. Computer System Architecture by M Morris Mano, Prentice Hall of India, 2001

III-Year-I Semester	Name of the Course	L	T	P	C
OE3101	Social Networks	3	0	0	3

Course Objectives:

1. To train on the concepts and techniques in social networking
2. To emphasize include social networking for business and professional use
3. To comprehend social networking analysis and social network developer tools
4. To apply social network concepts for solving real-world issues

Unit-1: Introduction to Networks, Social Networks: The Challenge, Google Page Rank, Searching in a Network, Link Prediction, The Contagions, Importance of Acquaintances, Marketing on Social Networks

Handling Real-world Network Datasets: Introduction to Datasets, Ingredients Network, Synonymy Network, Web Graph, Social Network Datasets, Datasets: Different Formats, How to Download, Analysing using Network and Analysing using Gephi, Emergence of Connectedness: Introduction, Advanced Material, and Programming Illustration, Summary to Datasets

Strength of Weak Ties: Introduction, Granovetter’s Strength of weak ties, Triads, clustering coefficient and neighbourhood overlap, Structure of weak ties, bridges and local bridges, Validation of Granovetter’s experiment using cell phone data, Embeddedness, Structural Holesm Social Capital, Finding Communities in a graph (Brute Force Method), Community Detection using Girvan Newman Algorithm, Visualising Communities using Gephi, The Strength, Social Media and Passive Engagement, Between Measures and Graph Partitioning, Strong and Weak Relationship – Summary

Unit-2: Homophily:

Should you watch your company? Selection and Social Influence, Interplay between Selection and Social Influence, Homophily - Definition and measurement, Foci Closure and Membership Closure, Introduction to Fatman Evolutionary model, Fatman Evolutionary Model- The Base Code (Adding people), The Base Code (Adding Social Foci), Implementing Homophily, Quantifying the Effect of Triadic Closure, Fatman Evolutionary Model-Implementing Closures, Implementing Social Influence, Storing and analysinglongitudinal data

Spatial Segregation: Introduction, Simulation of the Schelling Model – Introduction, Base Code, Visualization and Getting a list of boundary and internal nodes, getting a list of unsatisfied nodes, Shifting the unsatisfied nodes and visualizing the final graph

Unit-3: Hubs and Authorities: PageRank Revisited – An example, convergence in the example, conservation and convergence, Matrix Multiplication (Pre-requisite 1), Convergence in Repeated Matrix Multiplication (Pre-requisite 1), Addition of Two Vectors (Pre-requisite 2), Convergence in Repeated Matrix Multiplication- The Details, PageRank as a Matrix Operation, PageRank Explained

Powerlaw: Introduction, Power Law emerges in WWW graphs, Detecting the Presence of Powerlaw, Rich Get Richer Phenomenon, Implementing Rich-getting-richer Phenomenon, Implementing a Random Graph, Forced Versus Random Removal of Nodes

Unit-4: Epidemics: Introduction, Simple Branching Process for Modelling Epidemics, Modeling epidemics on complex networks, SIR and SIS spreading models, Comparison between SIR and SIS spreading models, Basic Reproductive Number Revisited for Complex Networks, Percolation model, Analysis of basic reproductive number in branching model, The Generative Model, Decentralized Search

Unit-5: Small world networks: Introduction, Base code, making homophily based edges, adding weak ties, plotting change in diameter, Myopic Search, Myopic Search comparison to optimal search, Time Taken by Myopic Search, PseudoCores: Introduction, how to be Viral, finding the right key nodes, Coding K-Shell Decomposition, Coding cascading Model

Text Books:

1. Social Networks, Prof. Sudharshan Iyengar, Computer Science and Engineering, IIT Ropar
2. Perspectives on Social Media: A Yearbook. Piet A.M. Kommers, Pedro Isaias, and Tomayess Issa

III-Year-I Semester	Name of the Course	L	T	P	C
OE3101	Internetworking with TCP/IP	3	0	0	3

COURSE OBJECTIVES:

1. Understand the architecture of the Internet protocols as a layered model.
2. Describe the functions implemented by each protocol, the design of the protocol and the characteristics of typical implementations.
3. Analyze the relationships and dependencies between the protocols.

UNIT- I INTRODUCTION

Introduction to internetworking, Overview of OSI Model, TCP/IP protocol suite, Basics of switching technologies and switches, Comparisons of different models, Gateways.

UNIT-II INTERNET PROTOCOL

Purpose of Internet Protocol, Internet datagram, Options, Checksum, ARP and RARP, Routing Methods: Routing Table and Routing module, ICMP, IGMP. IP Addresses: Introduction, Address Classification, A sample internet with classful addressing, Subnetting, Supernetting, Classless addressing, Security at the IP Layer, IPsec, IPv4 and IPv6 packet formats.

UNIT- III ROUTING PROTOCOLS

Unicast Routing Protocols: Interior and Exterior routing, RIP, OSPF, BGP. Multicasting: Introduction, Multicast Routing, Multicast Routing Protocols, Multicast Trees, DVMRP, MOSPF, CBT, PIM, MBONE.

UNIT- IV TRANSPORT CONTROL PROTOCOL TCP:

TCP operation, Segment, Sliding window, Silly window, Options, TCP state machine, Karn's Algorithm, Congestion control- Leaky bucket and Token bucket algorithms. UDP: User Datagram, UDP operations, Checksum calculation.

UNIT- V TCP/IP OVER ATM NETWORKS

ISDN and B-ISDN, ATM reference model, ATM Switch, Interconnection Network, Virtual circuit in ATM, Paths, Circuits and identifiers, ATM cell transport and adaptation layers, packet type and multiplexing, IP Address binding in an ATM Network, Logical Subnet Concept and Connection Management.

Text Books:

1. Internetworking with TCP/IP by Comer (Vol. 1) (PHI Pub.)
2. Data Communication and Networking by Behrouz A. Forouzan
3. TCP/IP Protocol Suite by Behrouz A. Forouzan

Reference Books:

1. Computer Networking by James F. Kurose, Keith W. Ross (Pearson Education)
2. TCP/IP Illustrated By Wright and Stevens (Vol.2) (Pearson Education)
3. An Introduction to Computer Networks by Kenneth C. Mansfield Jr. James L. Antonakes (PHI)

III-Year-I Semester	Name of the Course	L	T	P	C
OE3101	Unix and Shell Programming	3	0	0	3

Course Objectives:

1. Introduce Unix Operating System and its features while exploring file system and security
2. Learn UNIX Filters related to text processing, communication and search utilities
3. Learn programming filters and interactive shell scripting
4. Learn shell programming constructs writing advanced scripts
5. Learn kernel programming on file operations and managing processes

UNIT-I

Introduction to Unix OS, File Systems, Security and File Permissions, Introduction to Shells.

UNIT-II

Filters, Communications, Regular Expressions, global regular expression and print (grep)

UNIT-III

Stream editor (sed), Programming filter (awk), Interactive shell programming

UNIT- IV

Shell Programming concepts, Advanced Shell Programming

UNIT-V

Introduction System calls and Signals, File I/O, Files & Directories, Process control

Text Books:

1. UNIX and Shell Programming, Behrouz A, Forouzan and Richard F.Gilberg, Cengage Learning, 2003.
2. Advanced Programming in UNIX Environment, W.Richard Stevens, Stephen A Rago, 3rd Edition, Addison-Wesley Professional, 2013.

Reference Books:

1. UNIX and shell programming by B.M. Harwani, OXFORD university press.
2. Unix essentials by Sumitabha Das
3. Unix Shell Programming, Stephen G.Kochan, Patrick Wood, 3/e, Pearson

III-Year-I Semester	Name of the Course	L	T	P	C
PC3101L	IoT Laboratory	0	0	3	1.5

Course objectives:

The main objectives are

1. Understand the working of logic families and logic gates
2. Interpreting the design of combinational and sequential circuits.
3. Understand the concept of IoT and its design procedures
4. Study the IoT concepts and its applications.

List of Experiments:

Related to IoT

1. Design and implementation of cloud based smart home automation system.
2. Real time monitoring of water level of storage tank using IoT.
3. IoT based smart agricultural monitoring and Irrigation system.
4. Intelligent gas leakage detection system with IoT
5. Design and implementation of IoT based smart power management system.
6. An IoT based human intrusion detection and alerting system.

List of additional experiments:

7. Smart industry protection system using IoT.
8. IoT based smart health monitoring system.
9. IoT based fire accident alarming mechanism.
10. IoT based asset tracking mechanism.

Related to Jetson Nano:

11. Assembling Jetson Nano and Booting Up
12. Face Recognition system

III-Year-I Semester	Name of the Course	L	T	P	C
PC3102L	Web Technologies Lab	0	0	3	1.5

Course Objectives:

1. Creating web pages using HTML5 and CSS
2. Implementing Interactive web interfaces with client side technologies.
3. Create and validate XML documents.
4. Understanding Server Side Scripting.
5. Interactive Server side Scripting for an application

LIST OF EXPERIMENTS

- 1) Develop and demonstrate a HTML5 document that illustrates the use of headings, ordered list, unordered list, table, borders, padding, color, and the <div> & tag.
- 2) Design the following static web pages required for an online book store web site:

(a) HOME PAGE:

The static home page must contain three **frames**.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

Left frame: At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link “MCA” the catalogue for MCA Books should be displayed in the Right frame.

Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
mca mba BCA	Description of the Web Site			






(b) LOGIN PAGE:

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA MBA BCA	<p>Login : <input type="text" value="11a51f0003"/></p> <p>Password: <input type="password" value="*****"/></p> <p><input type="button" value="Submit"/> <input type="button" value="Reset"/></p>			

(c) CATALOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table: The details should contain the following:

1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
MCA		Book : XML Bible Author : Winston Publication : Wiedy	\$ 40.5	
MBA				
BCA		Book : AI Author : S.Russel Publication : Princeton hall	\$ 63	
		Book : Java 2 Author : Watson Publication : BPB publications	\$ 35.5	
		Book : HTML in 24 hours Author : Sam Peter Publication : Sam	\$ 50	

(d). REGISTRATION PAGE:

Create a “*registration form* “with the following fields

- 1) Name (Text field)
 - 2) Password (password field)
 - 3) E-mail id (text field)
 - 4) Phone number (text field)
 - 5) Sex (radio button)
 - 6) Date of birth (3 select boxes)
 - 7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
 - 8) Address (text area)
- 3) Design a web page using **CSS (Cascading Style Sheets)** which includes the following: Use different font, styles: In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles
- 4) Design a dynamic web page with validation using JavaScript
- 5) Design a HTML having a text box and four buttons viz Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate javascript function should be called to display
- a. Factorial of that number
 - b. Fibonacci series up to that number
 - c. Prime numbers up to that number
 - d. Is it palindrome or not

- 6) Write JavaScript programs on Event Handling
- Validation of registration form
 - Open a Window from the current window
 - Change color of background at each click of button or refresh of a page
 - Display calendar for the month and year selected from combo box
 - On Mouse over event
- 7) Write an XML file which will display the Book information which includes the following:
- Title of the book
 - Author Name
 - ISBN number
 - Publisher name
 - Edition
 - Price
- Write a Document Type Definition (DTD) to validate the above XML file.
 - Write a XML Schema Definition (XSD) to validate the above XML file.

8) Create Web pages using AJAX.

9) User Authentication:

Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.

- Create a Cookie and add these four user id's and passwords to this Cookie.
- Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user".

Use init-parameters to do this

10) Example PHP program for registering users of a website and login.

11) Install a database (Mysql).

Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form).

Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.

Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

12) Write a PHP which does the following job:

Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).

Text Books:

1. HTML5 Black Book Covers CSS3, Javascript, XML, XHTML, AJAX, PHP and jQuery , Dreamtech Press (2011).
2. Robin Nixon, Learning PHP, My SQL, Java Script & CSS, 2nd Edition, O'REILLY (2012).

Reference Books

1. H. M. Deitel and P. J. Deitel, Internet & World Wide Web How to Program, 5th Edition, Prentice Hall, 2008

e- Resources & other digital material

1. <http://php.net/manual/en/book.mysql.php>

.NET Programming (Skill Advanced Course-1)					
Course Code: SAC3101	Year and Semester: III - I	L	T	P	C
Prerequisites: OOP's Concept and Programming Skills		0	0	4	2

Course Objectives: at the end of the course, the student will be able

- To learn fundamentals of .Net frame work
- To understand preliminaries of C#
- To learn approaches to build web apps through ASP.NET
- To bind data with applications through ADO.NET
- To sensitize students about LINQ and entity frame work

Course Outcomes:

CO1: Summarize features of .NET frame work

CO2: Extract various components in C#.NET

CO3: Solve problems related to Web applications through ASP.NET

CO4: Articulate data binding through ADO.NET

CO5: Illustrate LINQ and entity frame work

Syllabus:

UNIT-I: Introduction to .NET Technology

Introduction: Introduction to .NET Framework, Visual Studio, Features of .NET, .NET Framework Architecture.

UNIT-II: Introduction to C#.NET

Introduction to C#.NET, OOPS in C#.NET, IDE OF Forms, Assemblies, and Namespaces, Streams, Multithreading.

UNIT- III: Introduction to ASP.NET and Programming

Introduction to ASP.NET and Programming, Web Form Fundamentals, Web Controls, State Management, Tracing, Session tracking, Fundamentals of ASP.net core.

UNIT-IV: Introduction to ADO.NET Fundamentals

ADO.NET Fundamentals, Data Binding-Single valued, Multi valued, The Data Controls-Form View, Grid View.

UNIT – V: Introduction to LINQ and Entity Framework.

LINQ and the Entity Framework, working with Services, Putting ASP.NET MVC in Context, Your First MVC Application.

Indian Constitution					
Course Code:	Year and Semester: III - I	L	T	P	C
Prerequisites: Basics of Sciences		2	0	0	0

Course Objectives:

1. To Enable the student to understand the importance of constitution
2. To understand the structure of executive, legislature and judiciary
3. To understand philosophy of fundamental rights and duties
4. To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
5. To understand the central and state relation financial and administrative.

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

LEARNING OUTCOMES:

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyse the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

LEARNING OUTCOMES: - After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organization, Structure and Functions

LEARNING OUTCOMES: - After completion of this unit student will

- Understand the structure of state government
- Analyse the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV

Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Panchayats: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

LEARNING OUTCOMES: - After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration role and importance
- Analyse the role of Myer and elected representatives of Municipalities
- Evaluate Zilla panchayat block level organisation

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissioner ate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women

LEARNING OUTCOMES: - After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissioner ate
- Analyse role of state election commission
- Evaluate various commissions of viz SC/ST/OBC and women

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt.Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt.Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

III-Year-II Semester	Name of the Course	L	T	P	C
PC3201	Foundations of Blockchain Technology	2	1	0	3

PRE-REQUISITES

Cryptography Techniques, Data Structures and Algorithms
Introduction to Programming

OBJECTIVES

- To provide conceptual understanding of how block chain technology can be used to innovate and improve business processes.
- Underpinning of block Chain operations in both theoretical and practical implementation of solutions using block Chain technology.

UNIT-I: Introduction

What is Blockchain, Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions And Blocks, P2P Systems, Keys As Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain.

UNIT-II: BLOCKCHAIN CONCEPTS

Introduction, Changing of Blocks, Hashing, Merkle-Tree, Consensus, Mining and Finalizing Blocks, Currency aka tokens, security on blockchain, data storage on blockchain, wallets, coding on blockchain: smart contracts, peer-to-peer network, types of blockchain nodes, risk associated with blockchain solutions, life cycle of blockchain transaction.

UNIT- III: ARCHITECTING BLOCKCHAIN SOLUTIONS

Introduction, Obstacles for Use of Blockchain, Blockchain Relevance Evaluation Framework, Blockchain Solutions Reference Architecture, Types of Blockchain Applications, Cryptographic Tokens, Typical Solution Architecture for Enterprise Use Cases, Types of Blockchain Solutions, Architecture Considerations, Architecture with Blockchain Platforms, Approach for Designing Blockchain Applications.

UNIT-IV: Understanding Block chain with Crypto currency

A basic cryptocurrency, Bitcoin and Block chain: Creation of coins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay.

UNIT – V: Block chain application development

What is Hyperledger? Distributed Ledger Technology & its Challenges, Hyperledger & Distributed Ledger Technology, Hyperledger Fabric, Hyperledger Composer.

Textbooks:

1. “Blockchain for Enterprise Application Developers”, Ambadas, Arshad SarfarzAriff, Sham – Wiley
2. Anshul Kaushik, “Block Chain and Crypto Currencies”, Khanna Publishing House, Delhi.

Reference Book:

1. Josh Thompsons, “Block Chain: The Block Chain for Beginners- Guide to Block chain Technology and Leveraging Block Chain Programming”
2. Daniel Drescher, “Block Chain Basics”, Apress; 1st edition, 2017

Web Resources:

<https://github.com/blockchainedindia/>

III-Year-II Semester	Name of the Course	L	T	P	C
PC3202	Ethical Hacking and Penetration Testing	2	1	0	3

Course Objectives:

1. This course teaches students the underlying principles and many of the techniques associated with the cybersecurity practice known as penetration testing or ethical hacking.
2. Students will learn about the entire penetration testing process including planning, reconnaissance, scanning, exploitation, post-exploitation, and result reporting.
3. The course will provide the fundamental information associated with each of the methods employed and insecurities identified. In all cases, remedial techniques will be explored.
4. Students will develop an excellent understanding of current cybersecurity issues and ways that user, administrator, and programmer errors can lead to exploitable insecurities.

UNIT-I:

Introduction: Introduction to Ethical Hacking and penetration testing, Software Installation, Pre-engagement, Scope of penetration testing, Ethical hacking requirements, Legal issues, Penetration test report structure and components

UNIT-II:

Reconnaissance, DNS reconnaissance, Web reconnaissance, TCP Connections, UDP Connections, Scanning using Nmap, FTP, HTTP, telnet, SSL and TLS encryption, NetBIOS and NFS.

UNIT- III:

Encryption essentials, Cryptography weaknesses, Windows passwords, Hashes, Rainbow tables, Linux Passwords, Hashes with salt, Pentesting Windows and Linux vulnerabilities

UNIT-IV:

Metasploit exploitation framework, Use of netcat and pivoting, VOIP, Wireless networks and their encryption standards, Lock picking, Master Keys, and Oracle hacks, Databases, SQL, SQL Injection

UNIT – V:

Browser Proxies and non-rendered content, Cross-site scripting, Cross-site request forgery, Web authentication, Session Management, Mobile device security issues.

Textbooks:

1. *Hacking Exposed 7: Network Security Secrets and Solutions*, Stuart McClure, Joel Scambray, George Kurtz, © 2012, McGraw Hill, ISBN 978-0-07-178028-5.

Web Resources:

1. Open Web Application Security (OWASP): <https://owasp.org/>
2. Certified Ethical Hacker(CEH) by EC-Council

III-Year-II Semester	Name of the Course	L	T	P	C
PC3203	Front End Application Development	2	1	0	3

Course Objectives:

1. To learn Client-side application development using HTML and CSS
2. To understand Java script ES6 features
3. To focus on contemporary front-end technologies like React
4. To understand data access through NodeJS

Unit-1:

Introduction to HTML 5, syntax, attributes, events, SVG, Web storage, Introduction to Canvas, Audio & Video, Geolocations, Drag & Drop, Web workers, working with Fonts, working with other graphics.

Style sheets: Introduction CSS, Applying CSS to HTML, Selectors, Properties and Values, CSS Colors and Backgrounds, CSS Box Model, CSS Margins, Padding, and Borders, CSS Text and Font Properties

Unit-2: Java script ES6

Introduction to ES6 features, Arrow functions, default parameters, destructuring elements, Higher order functions, defining classes, accessing data members, constructors, inheritance, super.

Unit-3: ReactJS:

Introduction, Installing Node JS server, creating a simple react project, Templating using JSX, Components, Rendering, State and Props, Types of Components – Component Lifecycle, Forms and User Input, Event Handling.

Unit-4: React JS:

Pure Components, Controlled Components, Introduction to Hooks, State management, Types of Hooks - useState, useEffect, useContext, useReducer, useRef, useMemo, useCallback, Usage of Web API calls- fetch and axios, Error Handling.

Unit-5:

React Date picker, Communicate Between Components, Portals, React Routing – Router, BrowserRouter, Unit Testing in React. Introduction to MongoDB, Creating databases, Operations – insert, update, delete and Querying.

Text Books:

1. HTML5, Black book, Dreamtech Publications
2. Beginning React, Greg Lim
3. Learning AngularJS: A Guide to AngularJS Development, O’ Reilly Publication

References:

1. React Cook Book, Carlos Santana Roldan
2. Learning React, 2nd Edition, O’ Reilly publications.
3. React in Action by Mark Tielens Thomas

Web Resources:

<https://developer.mozilla.org/en-US/docs/Web/JavaScript>
<https://reactjs.org/docs/getting-started.html>
<https://nodejs.org/en/docs/>

III-Year-II Semester	Name of the Course	L	T	P	C
PE3203	Dataware Housing and Mining	2	1	0	3

Course Objectives:

- 1) Distinguishes the certainty of various classical approaches for mining data in warehouse.
- 2) Prepares students in identifying various problems and its corresponding approaches for mining data.
- 3) Outlines a student about merits and demerits of mining approaches contextually.

UNIT - I

Introduction: Data Warehousing: Architecture, OLAP vs OLTP, Data Cube and their operations.

Data Mining: Patterns of data mining, issues in data mining, Statistical descriptions, data visualizations, similarity and dissimilarity measures of data.

UNIT - II

Data Pre-processing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

UNIT - III

Classification: Basic concepts, General approach for solving a classification problem, Decision tree algorithm working and attribute selection measures, **Alternative techniques:** Bayes' Theorem, Naïve Bayesian classification Algorithm, Bayesian Belief networks.

UNIT - IV

Association Analysis: Basic Concepts, Frequent item set generation, compact representation of frequent item sets and FP-Growth Algorithm.

UNIT - V

Cluster Analysis: Basic Concepts, Different types of Clustering and cluster, **Algorithms:** K-means algorithm and their additional issues, Bisecting K-means, Agglomerative Hierarchical Clustering Algorithm, DBSCAN Algorithm strengths and their weaknesses.

TEXT BOOKS:

1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

REFERENCE BOOKS:

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Mining :VikramPudi and P. Radha Krishna, Oxford.
3. Data Mining and Analysis - Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford
4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.

e-RESOURCES:

1. https://www.saedsayad.com/data_mining_map.htm
2. <https://nptel.ac.in/courses/106/105/106105174/>
3. (NPTEL course by Prof.PabitraMitra)
http://onlinecourses.nptel.ac.in/noc17_mg24/preview
4. (NPTEL course by Dr. NandanSudarshanam& Dr. BalaramanRavindran)
http://www.saedsayad.com/data_mining_map.htm

III-Year-II Semester	Name of the Course	L	T	P	C
PE3203	Artificial Intelligence	2	1	0	3

OBJECTIVES:

1. To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
2. To improve analytical and problem solving skills based on the characteristics of the problem using various heuristic search techniques and to improve designing and playing a game
3. To have knowledge on propositional calculus, proportional and predicate logic to understand few systems such as natural deduction, axiomatic system, etc.
4. To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
5. To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning
6. To have basic knowledge on probabilistic analysis and networks as well as fuzzy systems and fuzzy logics.

UNIT-I: Introduction to AI and Problem solving

Introduction to artificial intelligence: Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends in AI

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, A*, AO*, constraint satisfaction

UNIT-II: Problem Reduction and Logic Concepts

Problem reduction and game playing: Introduction, problem reduction, game playing, alphabeta pruning, two-player perfect information games

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

UNIT-III: Knowledge representation

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames

Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

UNIT-IV: Expert system and applications

Introduction, phases in building expert systems, expert system versus traditional systems, rule-based expert systems, blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

UNIT-V: Uncertainty measure, Fuzzy sets and fuzzy logic

Probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, Dempster-Shafer theory

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic

TEXT BOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach , 2nded, Stuart Russel, Peter Norvig, PEA

REFERNCE BOOKS:

1. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Luger, 5thed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

III-Year-II Semester	Name of the Course	L	T	P	C
PE3203	Information Security	2	1	0	3

OBJECTIVES:

1. Provides an introduction and overview of information security/assurance for incoming students.
2. This course will also cover a broad spectrum of pertinent IS/IA base information, including voice and data network connectivity.
3. In addition an introduction to cryptography, intrusion detection systems, data firewalls, malicious software, information operations and warfare, and denial of service attacks, regulations, law and governance.

UNIT-I: INTRODUCTION

History, Information Security Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT-II: SECURITY INVESTIGATION

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues
Suggested Activities: Design a Secure Business Model

UNIT-III: SECURITY ANALYSIS

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk
Suggested Activities: Identifying and Assess the Risk

UNIT-IV: Logical Design

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity. Suggested Activities: To prepare a blueprint for security design of an organization

UNIT-V: PHYSICAL DESIGN

PHYSICAL DESIGN : Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

TEXT BOOKS:

Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2012

REFERNCE BOOKS:

- 1 Micki Krause, Harold F. Tipton, " Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
- 2 Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003.
- 3 Matt Bishop, " Computer Security Art and Science", Pearson/PHI, 2002.

WEB RESOURCES:

<https://dynamapper.com/blog/278-books-about-information-architecture>
<https://www.cyberark.com/blog/8-books-every-security-architect-must-read/>

III-Year-II Semester	Name of the Course	L	T	P	C
PE3203	Software Project Management	2	1	0	3

Course Objectives:

1. To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
2. To train software project managers and other individuals involved in software project planning
3. To Study Tracking and oversight in the implementation of the software project management process.
4. To understand successful software projects that support organization's strategic goals.
5. To study Software Project monitoring and control ,software quality.

UNIT -I:

Introduction to Project Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure.

UNIT -II:

Project Approach Lifecycle models, Choosing Technology, Prototyping Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows.

UNIT -III:

Effort estimation & activity Planning Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation , Activity Identification Approaches, Network planning models, Critical path analysis.

UNIT -IV:

Risk Management& Risk categories: Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach.

Project Monitoring & Control, Resource Allocation

Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling.

UNIT-V

Software Quality and Planning Quality:, Defining Quality – ISO 9016, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality

TEXT BOOKS:

1. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill
2. Software Project Management, Walker Royce: Pearson Education, 2005.
3. Software Project Management in practice, Pankaj Jalote, Pearson.

REFERENCE BOOKS: 1. Software Project Management, Joel Henry, Pearson Education.

III-Year-II Semester	Name of the Course	L	T	P	C
PC3201L	Blockchain Application Development Lab	0	0	3	1.5

Course Objectives:

- 1.Introduction to blockchain. What is a distributed ledger. Transactions. Digital Signatures.
2. Creation and deployment of blockchain network.
- 3.Execute transactions using Blockchain network.
4. Implement car auction network.

List of Experiments:

1. Create a Simple Blockchain in any suitable programming language.
2. Use Geth to Implement Private Ethereum Block Chain.
3. Build Hyperledger Fabric Client Application.
4. Create and deploy a block chain network using Hyperledger Fabric SDK for Java Set up and initialize the channel, install and instantiate chaincode, and perform invoke and query on your block chain network

(<https://developer.ibm.com/patterns/create-and-deploy-block-chain-network-using-fabric-sdk-java/>)

5. Interact with a block chain network. Execute transactions and requests against a block chain network by creating an app to test the network and its rules

(<https://developer.ibm.com/patterns/interacting-with-a-block-chain-network/>)

6. Deploy an asset-transfer app using block chain. Learn app development within a Hyperledger Fabric network (<https://developer.ibm.com/patterns/deploy-an-asset-transfer-app-using-block-chain/>)

7. Use block chain to track fitness club rewards Build a web app that uses Hyperledger Fabric to track and trace member rewards

(<https://developer.ibm.com/patterns/fitness-club-rewards-points-iot-and-retail-integration/>)

III-Year-II Semester	Name of the Course	L	T	P	C
PC3202L	Ethical Hacking and Penetration Testing Lab	0	0	3	1.5

Objectives : At the end of the session you will be able to

- familiarize with popular hacking tools.
- understand various hacking techniques in brief.
- learn some of the skills that you would require to become an expert in Ethical Hacking.

List of Experiments

1. Learning about Hacking tools
2. To study about Footprinting and Reconnaissance.
3. To study about Fingerprinting.
4. To study about system Hacking.
5. To learn & study about Sniffing & their tools
6. To study about Wireless Hacking.
7. Vulnerability Analysis

Resources:

<https://github.com/Samsar4/Ethical-Hacking-Labs>

III-Year-II Semester	Name of the Course	L	T	P	C
PC3203L	Front End Application Development Lab	0	0	3	1.5

Course Objectives

At the end of the course the students will understand

- ✓ Higher order functions
- ✓ Class Components.
- ✓ Functional Components.
- ✓ Different types of Hooks.
- ✓ React application with data base connectivity.

Course Outcomes:

At the end of the course the students will be able to

1. Use Higher Order functions like filter(), reduce(), map() .
2. Develop a react application using class components.
3. Develop a react application using functional components.
4. Develop a complete react application with data base connectivity.

List of experiments:

1. Try to recreate the following patterns using HTML and CSS only.



2. Implement Drag n Drop feature in HTML 5
3. Demonstrate Event bubbling with necessary examples.
4. Design a Calculator using Java script and relevant CSS.

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5. Demonstrate Higher order functions with necessary examples – filter(), reduce() and map()
6. Create a Class Component for Counter in React JS
7. Create a Class component for Changing the color of the text given in React JS
8. Class a Class Component for viewing an array of objects in a tabular form.
9. Display a digital clock in React JS.
10. Demonstrate useState Hook with the help sample text.
11. Demonstrate useContext Hook with necessary example.
12. Demonstrate useEffect Hook with necessary example.

13. Demonstrate consuming web API using fetch & axios (AXIOS API). Demonstrate with the help of fake URL.

14. Design a BMI calculator using React JS based on the description given below:

BMI is a measurement of a person's leanness or corpulence based on their height and weight, and is intended to quantify tissue mass. It is widely used as a general indicator of whether a person has a healthy body weight for their height.

Formula:

weight (kg) / [height (m)]² (or) [weight (kg) / height (cm) / height (cm)] x 10,000

BMI table for adults: This is the World Health Organization's (WHO) recommended body weight based on BMI values for adults. It is used for both men and women, age 18 or older.

Category	BMI range - kg/m ²
Severe Thinness	< 16
Moderate Thinness	16 - 17
Mild Thinness	17 - 18.5
Normal	18.5 - 25
Overweight	25 - 30
Obese Class I	30 - 35
Obese Class II	35 - 40
Obese Class III	> 40

15. Display a selected set of images in tabular format using React JS.

16. Implement Upload & down load options on a given file.

17. Create a React application to view EMI calculator. A specific view is given below:

$$E = P \times r \times \frac{(1 + r)^n}{(1 + r)^n - 1}$$

Where,

E is the EMI

P is the principal amount

r is the monthly rate of interest

n is the number of months

18. Design the following Hotel bill screen. User can select as many items as possible from the dropdown box and is allowed to enter in the text field provided. Each transaction must be added in the table given below along with the bill amount.

GREEN STAR HOTEL

Customer Bill

Date:

Items: No of Items:

1.	Biryani	2	Rs. 140 Each	Rs.280
2.	Fried Rice	1	Rs. 110 Each	Rs.110
3.	Chicken Curry	2	Rs. 230 Each	Rs.460

Total	Rs. 850
GST @5%	Rs. 42.50
Bill to be paid	Rs. 892.50

19. Demonstrate the procedure to create a schema in MongoDB.
20. Demonstrate CRUD operations using MongoDB.

III-Year-II Semester	Name of the Course	L	T	P	C
SAC-02	Soft Skills (Skill Advanced Course – 2)	0	0	4	2

Soft Skills amount to talents for adaptive and optimistic behavior that alter humans to deal effectively with the stress and challenges of life. This notion is additionally termed as psychosocial proficiency. The subject varies greatly reckoning on social norms and community expectations however skills that operate for well-being and aid people to change into active and productive members of their communities' square measure thought-about as Soft Skills.

They exemplify innovativeness, significant thinking, problem-solving, decision-making, the supremacy to speak-up and team-up, in aggregation with personal and social responsibility that contribute to sensible citizenship – all essential skills for achievement within the twenty first century, each for healthy societies and for employable people.

The course of soft skills is introduced to boost the standard of learning and living by complementing scholastic records with skill-based coaching. Realizing that the dual purpose of education i.e. is to foster educational excellence among students and additionally guide them to transform themselves into responsible people and professionals.

Soft Skills are a unit, a crucial facet of having the ability to fulfil the strain of daily & professional lives in a very unendingly dynamical world. The big changes in international economies over the last 5 years have coincided with technological transformations, all of that area unit leaving an impression on education, the geographic point, and our personal lives. Students need dynamically guided soft skills and hands on exposure, like the power to face / tackle stress and frustration, to address the growing pace and alter recent life. Over the course of their careers, today's engineering aspirants can have various new professions, each one with its own set of constraints and necessities, with flexibility & adaptability in demand of learn ability.

Objectives:

By the end of the program students will be able to:

1. communicate clearly, confidently, concisely, and persuasively both written as well as orally.
2. rediscover and boost self-confidence, to the zenith, and solve issues with ease.
3. recognize the results (change) of their behaviour / conduct and teach them to take ownership of
4. their acts rather than blaming others.
5. build confidence in their speaking / presentation skills and become industry-ready.
6. develop a stronger sense of consciousness and appreciation for others by analysing prospects, and
7. creating choices.
8. manage self-competence and self-confidence.

Preamble: Soft skills are character traits and interpersonal skills that portray a person's relationships with other people. In the workplace, soft skills are considered to be a balance to hard skills, which refer to a person's knowledge and professional skills.

Course Outcomes: After completion of the course the students will be able to:

CO1: master advanced nuances of both written and oral communication skills that are imperative for any professional to succeed coupled with being emphatic.

CO2: confidently ace different competitive exams and develop writing skills.

CO3: gain awareness of the industry expectations and craft CV / Résumé in lieu with desired job profiles.

CO4: crack behavioral (HR) interview confidently and exhibit professional persona.

CO5: make presentations effective and develop interview strategies while get rid of interview phobia.

Syllabus:

Module 1 Effective communication skills

- Start with self and connect with others.
- The art of narrating and storytelling.
- Enhance teamwork and influence change.

Module 2 Advanced verbal ability concepts – practice and Professional writing skills

- Nurture and enhance the verbal ability strength through practice.
- Conducting mock verbal (ability) tests and their timely review.
- List the steps of writing an email effectively & comprehend the importance of structuring an email.
- Overview of various elements related to accuracy, brevity and correctness in our everyday writing at the workplace (Project proposals / covering letters / blogs / short essays).

Module 3 Industry sneak and résumé / CV building strategies

- Industry & aspirant career expectations and tailoring action learning plan aptly.
- Crafting winning résumé(s) suiting to different profiles.
- Framing responses to résumé based interview questions.

Module 4 Behavioral competency building – Part II and psychometric test (HR Round Preparation)

- Listing personal characteristics and preparing blueprint to inculcate them.
- Assess the students’ ability to fit into a specific work environment or with specific personality types.
- Determine basic characteristics of an individual.

Module 5 Presentation skills & Mock interviews

- Illustration of presentation structure via impromptu / free speech – and essential criteria for an effective presentation
- Importance of non-verbal communication (signposting)
- Inciting the interview process by practicing a gamut of behavioral mock interviews.

Module 1 –Tasks

- Listening & comprehension skills – lessons from the corporate training videos / scenes in films.
- Role play – story telling & anchoring
- Extempore – students’ experience with college/program.
- Listening & comprehension skills – lessons from the corporate training videos / scenes in films

Module 2 -Tasks

- Story paraphrasing, peer introduction and monologue.
- Assignment on short essay and blog building/digital profile creation.

Module 3 -Tasks

- Overview & analysis of a Job Description(JD) and its reflection in resume / self-introduction

- Crafting of resumes by mapping skills & competences to different profiles offered for engineering graduates.
- An act on – one day in the life of an HR manager/ Project leader etc.

Module 4 -Tasks

- Case scenarios – to identify behavioural competencies and personality traits
- increase self-awareness and improve interactions with others

Module 5 -Tasks

- Pair & Group work – debating / demonstration of product promotion, etc.
- Peer mock interview practice on selected profiles.

Reference Books

1. The Ace of Soft Skills: Attitude, Communication and Etiquette for Success, Pearson Education; 1 edition, 2013.
2. Barun K. Mitra, “Personality Development & Soft Skills”, Oxford Publishers, Third impression, 2017.
3. ICT Academy of Kerala, "Life Skills for Engineers", McGraw Hill Education (India) Private Ltd., 2016.
4. Caruso, D. R. and Salovey P, “The Emotionally Intelligent Manager: How to Develop and Use the Four Key Emotional Skills of Leadership”, John Wiley & Sons, 2004.
5. Kalyana, “Soft Skill for Managers”; First Edition; Wiley Publishing Ltd, 2015.
6. Larry James, “The First Book of Life Skills”; First Edition, Embassy Books, 2016.
7. Shalini Verma, “Development of Life Skills and Professional Practice”; First Edition; Sultan Chand(G/L) & Company, 2014.
8. Daniel Goleman, "Emotional Intelligence"; Bantam, 2006.
9. Remesh S., Vishnu R.G., "Life Skills for Engineers", Ridhima Publications, First Edition, 2016.
10. Butterfield Jeff, “Soft Skills for Everyone”, Cengage Learning India Pvt. Ltd; 1 edition, 2011.
11. Training in Interpersonal Skills: Tips for Managing People at Work, Pearson Education, India; 6th Edition, 2015.

Digital References

1. Infosys Springboard (<https://infyspringboard.uk.onwingspan.com/web/en/login>)
2. AICTE Digital Learning Portal (<https://free.aicte-india.org/>)
3. APSICHE LMS – Bringing Learning to People (<https://apschelms.e-pragati.in/#/>)
4. Dale Carnegie Academy (<https://www.dalecarnegie.com/en>)
5. TedX Program (<https://www.ted.com/about/programs-initiatives/tedx-program>)
6. Toast Masters International (<https://www.toastmasters.org/>)
7. NPTEL (<https://nptel.ac.in/>)
8. Coursera / Udemy / Unacademy / Wikipedia (https://en.wikipedia.org/wiki/Main_Page)

III-Year-II Semester	Name of the Course	L	T	P	C
MC-04	Entrepreneurial Skill Development	0	0	4	2

Course Objective:

1. To impart the basics of entrepreneurship skills for better understanding of entrepreneurial scenario.
2. To familiarize the various components from I to E and promoting adaptability nature.
3. To aware of small scale ventures and registrations and patents related for entrepreneurship and startups management.
4. To familiarize with significance of institutional support at various levels for determining the marketing strategies.
5. To familiarize the strategic perspectives in entrepreneurship.

Course Outcomes: After completion of the course, students will be able to

CO 1: The basics of entrepreneurship skills for better understanding of entrepreneurial scenario are understood.

CO 2: The various components from I to E and promoting adaptability nature were made familiar.

CO 3: Awareness on small scale ventures and registrations and patents related for entrepreneurship and startups was explained.

CO 4: significance of institutional support at various levels for determining the marketing strategies was explained.

CO 5: Strategic perspectives in entrepreneurship are made familiar.

UNIT I

Entrepreneurial Perspectives

Introduction to Entrepreneurship – Evolution - Concept of Entrepreneurship - Types of Entrepreneurs - Entrepreneurial Competencies, Capacity Building for Entrepreneurs. Entrepreneurial Training Methods - Entrepreneurial Motivations - Models for Entrepreneurial Development - The process of Entrepreneurial Development.

UNIT - II

New Venture Creation

Introduction, Mobility of Entrepreneurs, Models for Opportunity Evaluation; Types of loans for entrepreneurship and startups. Business plans – Purpose, Contents, Presenting Business Plan, Procedure for setting up Enterprises, Central level - Startup and State level - T Hub, Other Institutions initiatives.

UNIT – III

Small Scale Ventures, MSME in India and their challenges

Concept of micro, small and medium enterprises and startups. Scope and trends of small entrepreneurship and startup in India. Role of government in promoting small scale industries. Management of MSMEs and Sick Enterprises Challenges of MSMEs, Preventing Sickness in Enterprises – Specific Management Problems; Industrial Sickness; Industrial Sickness in India – Symptoms, process and Rehabilitation of Sick Units.

UNIT – IV

Market growth for generating entrepreneurship opportunities

Entrepreneur’s legal and regulatory systems, Intellectual property rights, patents, Copy rights and trademark and their protection. Managing Marketing and Growth of Enterprises Essential Marketing

Mix of Services, Key Success Factors in Service Marketing, Cost and Pricing, Branding, New Techniques in Marketing, International Trade.

UNIT – V

Institutional Support to Entrepreneurship and Woman Entrepreneurship

Strategic perspectives in Entrepreneurship, Technology and Entrepreneurship, Training institutions “District Industry Centre (DIC), Entrepreneurship Development Institute of India (EDII)” Innovation council – Ministry of Human Resource Development (MHRD), Small Industries Development Bank of India (SIDBI), Industrial Development Bank of India (IDBI).

Women Entrepreneurs – Strategies to develop Women Entrepreneurs, Institutions supporting Women Entrepreneurship in India, Association of Lady Entrepreneurs of India (ALEAP)

TEXT BOOKS:

1. Entrepreneurship Development and Small Business Enterprises, Poornima M. Charantimath, 2e, Pearson, 2014.
2. P.Narayana Reddy, Entrepreneurship, Cengage Learning, New Delhi, 2010.
3. Steven Fisher, Ja-nae Duane, The startup equation – A visual guide book for building your startup, Indian edition, Mc Graw Hill Education India Pvt. Ltd. 2016

REFERENCE BOOKS:

1. Entrepreneurship, Arya Kumar, 4 e, Pearson 2015.
2. Entrepreneurship, a South – Asian Perspective, D.F. Kuratko and T. V. Rao, 3e, Cengage, 2012.
3. The Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publishing House, 2015.
4. Anajan Rai Chaudhuri, Managing new ventures, concepts and cases, Prentice Hall International, 2010
5. Rajeev Roy: Entrepreneurship, Oxford university press, New Delhi, 2010.

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