

**ACADEMIC REGULATIONS,
COURSE STRUCTURE
and
DETAILED SYLLABUS**

CHOICE BASED CREDIT SYSTEM

R21

**B.Tech – Computer Science & Engg
(Internet of Things)**

**B.Tech - Regular Four Year Degree Programme
(For batches admitted from the academic year 2021 - 2022)**



Holy Mary Institute of Technology & Science

Bogaram (V), Keesara (M), Medchal (Dist) - 501 301

FOREWORD

The autonomy is conferred on Holy Mary Institute of Technology & Science by UGC, based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own **curriculum, examination system and monitoring mechanism**, independent of the affiliating University but under its observance.

Holy Mary Institute of Technology & Science is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a two decades in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the college in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought, at appropriate time with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

PRINCIPAL

ACADEMIC REGULATIONS

B. Tech. - Regular Four Year Degree Programme
(For batches admitted from the academic year 2021-22)
&
B. Tech. - Lateral Entry Scheme
(For batches admitted from the academic year 2022-23)

For pursuing four year Under Graduate Degree Programme of study in Engineering & Technology (UGP in E&T) offered by Holy Mary Institute of Technology & Science under Autonomous status is herein referred to as HITS (Autonomous):

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2021-22 onwards. Any reference to “Institute” or “College” in these rules and regulations shall stand for Holy Mary Institute of Technology & Science (Autonomous).

All the rules and regulations, specified hereafter shall be read as a whole for the purpose of interpretation as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, Holy Mary Institute of Technology & Science shall be the chairman Academic Council.

1. ADMISSION

1.1. Admission into first year of four year B. Tech. degree programmes of study in Engineering

1.1.1. Eligibility:

A candidate seeking admission into the first year of four year B. Tech. degree Programmes should have:

- (i) Passed either Intermediate Public Examination (I.P.E) conducted by the Board of Intermediate Education, Telangana, with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by Board of Intermediate Education, Telangana or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Telangana or equivalent Diploma recognized by Board of Technical Education for admission as per guidelines defined by the Regulatory bodies of Telangana State Council for Higher Education (TSCHE) and AICTE.
- (ii) Secured a rank in the EAMCET examination conducted by TSCHE for allotment of a seat by the Convener, EAMCET, for admission.

1.1.2. Admission Procedure:

Admissions are made into the first year of four year B. Tech. Degree Programmes as per the stipulations of the TSCHE.

- (a) Category ‘A’ seats are filled by the Convener, TSEAMCET.
- (b) Category ‘B’ seats are filled by the Management.

1.2 Admission into the second year of four year B. Tech. degree Program in Engineering**1.2.1 Eligibility:**

A candidate seeking admission under lateral entry into the II year I Semester B. Tech. degree Programmes should have passed the qualifying exam (B.Sc. Mathematics or Diploma in concerned course) and based on the rank secured by the candidate at Engineering Common Entrance Test ECET (FDH) in accordance with the instructions received from the Convener, ECET and Government of Telangana.

1.2.2 Admission Procedure:

Admissions are made into the II year of four year B. Tech. degree Programmes through Convener, ECET (FDH) against the sanctioned strength in each Programmes of study as lateral entry students.

2. PROGRAMMES OFFERED

Holy Mary Institute of Technology & Science, an autonomous college affiliated to JNTUH, offers the following B.Tech Programmes of study leading to the award of B. Tech degree under the autonomous scheme.

- 1) B.Tech. - Civil Engineering
- 2) B.Tech. - Computer Science and Engineering
- 3) B.Tech. – Computer Science and Engineering (Artificial Intelligence & Machine Learning)
- 4) B.Tech – Computer Science and Engineering (Data Science)
- 5) B.Tech – Computer Science and Engineering (IoT)
- 6) B.Tech – Computer Engineering (Software Engineering)
- 7) B.Tech. - Electronics and Communication Engineering
- 8) B.Tech - Electrical & Electronics Engineering
- 9) B.Tech. - Mechanical Engineering

The medium of instructions for the entire under graduate programme in Engineering & Technology will be English only.

3. DURATION OF THE PROGRAMMES**3.1 Normal Duration**

3.1.1 B. Tech. degree programme extends over a period of four academic years leading to the Degree of Bachelor of Technology (B.Tech.) of the Jawaharlal Nehru Technological University Hyderabad.

3.1.2 For students admitted under lateral entry scheme, B. Tech. degree programme extends over a period of three academic years leading to the Degree of Bachelor of Technology (B. Tech.) of the Jawaharlal Nehru Technological University Hyderabad.

3.2 Maximum Duration

3.2.1 The maximum period within which a student must complete a full-time academic programme is 8 years for B. Tech. If a student fails to complete the academic programme within the maximum duration as specified above, he shall forfeit the seat in B.Tech and his admission shall stand cancelled.

3.2.2 For students admitted under lateral entry scheme in B. Tech. degree programme, the maximum period within which a student must complete a full-time academic programme is 6 years. If a student fails to complete the academic programme within the maximum duration as specified above, he shall forfeit the seat in B.Tech and his admission shall stand cancelled.

3.2.3 The period is reckoned from the academic year in which the student is admitted first time into the degree Programme.

4. AWARD OF B.Tech DEGREE

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

- 4.1 The candidate shall pursue a course of study as specified in section 3.1 and 3.2.
- 4.2 The candidate shall register for 160 credits and secure 160 credits (Excluding Mandatory Courses).

5. PROGRAMME STRUCTURE

- 5.1 UGC/AICTE specified Definitions/ Descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations/ Norms, which are listed below.

Semester Scheme:

Each UGP is of 4 Academic Years (8 Semesters), each year divided into two Semesters of 22 weeks (≥ 90 working days), each Semester having - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)' under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as denoted by UGC, and Curriculum/Course Structure as suggested by AICTE are followed.

- 5.1.1 The B.Tech. Programme of Holy Mary Institute of Technology & Science is Semester pattern, with 8 Semesters constituting 4 Academic Years, each Academic Year having TWO Semesters (First/Odd and Second/Even Semesters). Each Semester shall be of 16-18 Weeks duration with a minimum of 90 Instructional Days per Semester.

- 5.1.2 Credit Courses:

a) All Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Subject/ Course in a L: T: P: C (Lecture Periods: Tutorial Periods: Practical Periods : Credits) Structure, based on the following general pattern .

- One Credit - for One hour / Week / Semester for Theory / Lecture(L) / Tutorial(T) Courses; and
- One Credit - for Two hours/Week/Semester for Laboratory/Practical (P) Courses, Mini Project...
- Mandatory Courses Credits shall not be counted for credit requirements for award of degree. However all the mandatory courses have to be passed by the student.

- 5.1.3 **Course Classification:**

All Courses offered for the UGP are broadly classified as:

- **Basic Science Courses (BSC):** Includes Mathematics, Physics, Chemistry, Biology etc.
- **Engineering Science Courses (ESC):** Courses include Materials, Workshop, Basics of Electrical/Electronics/ Mechanical/Computer Science & Engineering, Engineering Graphics, Instrumentation, Engineering Mechanics, Instrumentation etc.
- **Humanities and Social Science including Management Courses (HSMC):** Courses include English, Communication skills, Management etc.
- **Professional Core Courses (PCC):** Relevant to the chosen specialization/branch.
- **Professional Elective Courses (PEC):** Relevant to the chosen specialization/ branch offered as electives.
- **Open Elective Courses (OEC):** Other technical and/or emerging subject areas offered in the College by the Departments of Engineering, Science and Humanities.
- **Mandatory Course:** Course work on peripheral subjects in a programme, wherein familiarity considered mandatory. To be included as non-Credit, Mandatory Courses, with only a pass in each required to qualify for the award of degree from the concerned institution.

- **Project Work:** and/or internship in industry or elsewhere, seminar.
- **MOOCS** – Massive Open Online Courses in a variety of disciplines available at both introductory and advanced levels, accessible from e-resources in India and abroad.

5.1.4 Course Nomenclature:

The Curriculum Nomenclature or Course-Structure Grouping for the each of the UGP E&T (B.Tech Degree Programme), is as listed below.

S. No	Broad Course Classification	Course Group/ Category	Course Description	Credits
1)	BSC,ESC & HSMC	BSC – Basic Sciences Courses	Includes - Mathematics, Physics and Chemistry Subjects	25
2)		ESC - Engineering Sciences Courses	Includes fundamental engineering subjects.	24
3)		HSMC – Humanities and Social Sciences including Management	Includes subjects related to Humanities, Social Sciences and Management.	12
4)	PCC	PCC – Professional Core Courses	Includes core subjects related to the Parent Discipline/ Department/ Branch of Engg.	57
5)	PEC	PEC– Professional Elective Courses	Includes Elective subjects related to the Parent Discipline / Department / Branch of Engg.	18
6)	OEC	OEC – Open Elective Courses	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the Parent Discipline/ Department / Branch of Engg.	09
7)	PWC	Project Work	Major Project.	15
8)		Industrial Training/ Mini- Project	Industrial Training/ Internship/ Mini-Project.	
9)		Seminar	Seminar / Colloquium based on core contents related to Parent Discipline/ Department/ Branch of Engg.	
10)	MC	Mandatory Courses	Mandatory Courses (non-credit)	--
Total Credits for UGP (B. Tech.)Programme				160

- Minor variations as per AICTE / UGC guidelines

6. COURSE REGISTRATION

- 6.1 A 'Faculty Advisor or Counsellor' shall be assigned to each student, who advises him/her about the UGP, its Course Structure and Curriculum, Choice/Option for Subjects/Courses, based on his/her competence, progress, pre-requisites and interest.

- 6.2 Academic Section of the College invites 'Registration Forms' from students prior (before the beginning of the Semester), ensuring 'DATE and TIME Stamping'. The Registration Requests for any 'CURRENT SEMESTER' shall be completed BEFORE the commencement of SEEs (Semester End Examinations) of the 'PRECEDING SEMESTER'.
- 6.3 A Student can apply for Registration, which includes approval from his faculty advisor, and then should be submitted to the College Academic Section through the Head of Department (a copy of the same being retained with Head of Department, Faculty Advisor and the Student).
- 6.4 A student may be permitted to register for his/her course of CHOICE with a Total of prescribed credits per Semester (permitted deviation being $\pm 12\%$), based on his PROGRESS and SGPA/CGPA, and completion of the 'PRE-REQUISITES' as indicated for various courses in the Department Course Structure and Syllabus contents.
- 6.5 Choice for 'additional Courses' must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/Counsellor.
- 6.6 If the Student submits ambiguous choices or multiple options or erroneous (incorrect) entries during Registration for the Course(s) under a given/specified Course Group/ Category as listed in the Course Structure, only the first mentioned Course in that Category will be taken into consideration.
- 6.7 Dropping of Courses or changing of options may be permitted, ONLY AFTER obtaining prior approval from the Faculty Advisor, 'within 15 Days of Time' from the commencement of that Semester. Course Options exercised through Registration are final and CANNOT be changed, and CANNOT be inter-changed; further, alternate choices will also not be considered. However, if the Course that has already been listed for Registration (by the Head of Department) in a Semester could not be offered due to any unforeseen or unexpected reasons, then the Student shall be allowed to have alternate choice - either for a new Subject (subject to offering of such a Subject), or for another existing Subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by Head of the Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that Semester.

7. COURSES TO BE OFFERED

- 7.1 A typical section (or class) strength for each semester shall be 60.
- 7.2 Courses may be offered to the Students, only if minimum of 20 students ($1/3^{\text{rd}}$ of the section strength) opt for it.
- 7.3 More than ONE TEACHER may offer the SAME SUBJECT (Lab/Practical's may be included with the corresponding Theory Subject in the same Semester) in any Semester. However, selection choice for students will be based on - 'CGPA Basis Criterion' (i.e., the first focus shall be on early Registration in that Semester, and the second focus, if needed, will be on CGPA of the student).
- 7.4 If more entries for Registration of a Subject come into picture, then the concerned Head of the Department shall take necessary decision, whether to offer such a Subject/Course for TWO (or multiple) SECTIONS or NOT.
- 7.5 OPEN ELECTIVES will be offered by a department to the students of other departments.

8. B.Tech (Honours) DEGREE

A new academic programme B.Tech (Hons.) is introduced in order to facilitate the students to choose additionally the specialized courses of their choice and build their competence in a specialized area.

- 8.1 B.Tech students in regular stream can opt for B.Tech (Hons.), provided they have a CGPA of 8.0 and above up to the end of IV-Semester without any history of arrears and attempting of betterment.
- 8.2 For B. Tech (Honors), a student needs to earn additional 20 credits (over and above the required 160 credits for B. Tech degree). Student to opt for the courses from NPTEL/SWAYAM/Coursera/other MOOC platform as recommended by concern BOS relevant to her/his discipline through MOOCs as recommended by the BOS.
- 8.3 If the credits of NPTEL/ SWAYAM/ Coursera /other MOOC platform courses do not match with the existing subject the BOS will take appropriate decision.
- 8.4 After registering for the B.Tech (Honours) programme, if a student fails in any course he/she will not be eligible for B.Tech (Honours).
- 8.5 Students who have obtained “C grade” or “reappear” or “Repeat Course” / “Re Admitted” or “Detained” category in any course, including the MOOCs courses, are not eligible for B.Tech (Hons.) degree. Up to 8 semesters without any history of arrears and attempting of betterment is not eligible to get B.Tech (Hons.).
- 8.6 Those who opted for B. Tech (Honours) but unable to earn the required additional credits in 8 semesters or whose final CGPA is less than 8 shall automatically fall back to the B.Tech programme. However, additional course credits and the grades thus far earned by them will be shown in the grade card but not included for the CGPA.
- 8.7 The students have to pay the requisite fee for the additional courses.

Table: Assigned Credits

Hour/Week	Online Course Duration	Assigned Credits
2 hours / week	04 Weeks	01 Credit
3 hours / week	08 Weeks	03 Credits
3 hours / week	12 Weeks	04 Credits

9. B.Tech (Minor) DEGREE

This concept is introduced in the curriculum of all conventional B. Tech. programmes offering a major degree. The main objective of Minor in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme. In order to earn a Minor in a discipline a student has to earn 20 extra credits by studying any five theory subjects from the programme core & professional elective courses of the minor discipline or equivalent MOOC courses available under SWAYAM platform. The list of courses to be studied either in MOOCs or conventional type will be decided by the department at the time of registration for Minor degree.

- B.Tech students in regular stream can opt for B.Tech (Minor.), provided they have a CGPA of 8.0 and above up to the end of IV-Semester without any history of arrears and attempting of betterment.
- Students aspiring for a Minor must register from V-Semester onwards and must opt for a Minor in a discipline other than the discipline he/she is registered in. However, Minor discipline registrations are not allowed before V-Semester and after VI-Semester.
- Students will not be allowed to register and pursue more than extra two subjects in any semester.
- Completion of a Minor discipline programme requires no addition of time to the regular Four year Bachelors' programme. i.e. Minor discipline programme should be completed by the end of final year B. Tech. program along with the major discipline.

- e. A student registered for Minor in a discipline shall pass in all subjects that constitute the requirement for the Minor degree programme. No class/division (i.e., second class, first class and distinction, etc.) shall be awarded for Minor degree programme.

10. ATTENDANCE REQUIREMENTS

- a. A student will be eligible to appear for the End Semester Examinations, if he acquires a minimum of 75% of attendance in aggregate of all the Subjects/Courses (excluding Mandatory or Non-Credit Courses) for that Semester.
- b. Condoning of 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 on genuine and valid grounds, based on the student's representation with supporting evidence by following the govt. rules in vogue.
- c. A stipulated fee shall be payable towards condoning of shortage of attendance.
- d. Shortage of Attendance below 65% in aggregate shall in No case be condoned.
- e. A student shall not be promoted to the next Semester unless he/she satisfies the attendance requirements of the current Semester. The student may seek readmission for the Semester when offered next. He / She shall not be allowed to register for the subjects of the Semester while he/she is in detention. A student detained due to shortage of attendance, will have to repeat that Semester when offered next. The academic regulations under which the student has been readmitted shall be applicable.
- f. Students whose attendance is less than 75% are not entitled to get the scholarship / fee reimbursement in any case as per the TS Govt. Rules in force.

11. ACADEMIC REQUIREMENTS FOR PROMOTION/COMPLETION OF REGULAR B.TECH PROGRAMME COURSE STUDY.

- 11.1 A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to each Course, if he secures not less than 35% marks in the End Semester Examination, and a minimum of 40% of marks in the sum Total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of Letter Grades, this implies securing P Grade or above in that Course.
- 11.2 A Student will not be promoted from I Year to II Year, unless he/she fulfils the Attendance and Academic Requirements and secure a Total 40% of Credits up to I Year II Semester from all the relevant regular and supplementary examinations.
- 11.3 A Student will not be promoted from II Year to III Year, unless he/she fulfils the Attendance and Academic Requirements and secure a Total 50% of Credits up to II Year II Semester from all the relevant regular and supplementary examinations.
- 11.4 A Student will not be promoted from III Year to IV Year, unless he/she fulfils the attendance and Academic Requirements and secure a Total 60% of Credits up to III Year II Semester, from all the regular and supplementary examinations.
- 11.5 After securing the necessary 160 Credits as specified for the successful completion of the entire UGP, resulting in 160 Credits for UGP performance evaluation, i.e., the performance of the Student in these 160 Credits shall alone be taken into account for the calculation of the final CGPA.
If a Student registers for some more 'extra courses' (in the parent Department or other Departments/Branches of Engg.) other than those listed courses Totalling to 160 Credits as specified in the Course Structure of his/her Department, the performances in those 'extra courses' (although evaluated and graded using the same procedure as that of the required 160 Credits) will not be taken into account while calculating the SGPA and CGPA. For such

'extra courses' registered, % marks and Letter Grade alone will be indicated in the Grade Card, as a performance measure, subject to completion of the Attendance and Academic Requirements as stated in items 8 and 9.1-9.5.

- 11.6 Students who fail to earn minimum of 160 Credits as per the Course Structure, and as indicated above, within 8 Academic Years from the Date of Commencement of their I Year shall forfeit their seats in B.Tech Programme and their admissions shall stand cancelled.

When a Student is detained due to shortage of attendance/lack of credits in any Semester, he may be re-admitted into that Semester, as and when offered. However the regulations at the time of admissions hold good.

12. EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS

- 12.1 The performance of a student in each Semester shall be evaluated Course-wise (irrespective of Credits assigned) with a maximum of 100 marks for Theory. The B.Tech Project Work (Major Project) will be evaluated for 100 marks in Phase-I and 100 Marks in Phase-II.

- 12.2 For all Theory Courses as mentioned above, the distribution shall be 30 marks for CIE, and 70 marks for the SEE.

12.3

- a) For Theory Subjects (inclusive of Minor Courses), during the semester, there shall be two Continues Internal Evaluations (CIE) examinations for **30 marks** each. Each CIE examination consists of one subjective paper for **25 marks**, and assignment for **5 marks** for each subject. Question paper contains Two Parts (Part-A & Part-B) the distribution of marks for PART-A and PART-B will be 10 marks & 15 marks respectively for UG programme. Average of two CIE examinations will be taken as part of external assessment.

Pattern of the question paper is as follows:

PART-A

Consists of **one compulsory question** with five sub questions each carrying two mark. For the I-Mid examinations the sub question would be from first 2 ½ units and for the II-Mid examination the sub question would be from the remaining 2 ½ units.

PART-B

Consists of five questions (out of which students have to answer three questions) carrying five marks each. Each question there will be an "either" "or" choice (that means there will be two questions from each unit and the student should answer any one question). The questions can consist of sub questions also.

- b) The first mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus.
- c) First Assignment should be submitted before the commencement of the first mid-term examinations, and the Second Assignment should be submitted before the commencement of the second mid-term examinations. The assignments shall be specified/given by the concerned subject teacher.
- d) If any candidate is absent for the CIE examinations or those who want to improve their internal marks in any subject can opt for improvement exam as and when offered. The improvement exam is a 45 minutes duration and consisting of 30 objective questions from the entire syllabus of the subject. Best marks are considered as final marks from the average of two mid examinations or improvement examination marks. The

- improvement can be taken after the payment of prescribed fee. There is no Internal Improvement for the courses Machine Drawing, Production Drawing, Engineering Drawing, Engineering Graphics and practical, mandatory courses.
- 12.4 For Practical Courses, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 30 internal marks, and 70 marks are assigned for Lab/Practical End Semester Examination (SEE). Out of the 30 marks for internals, day-to-day work in the laboratory shall be evaluated for 20 marks; and for the remaining 10 marks - two internal practical tests (each of 10 marks) shall be conducted by the concerned laboratory teacher and the average of the two tests is taken into account. The SEE for Practical's shall be conducted at the end of the Semester by Two Examiners appointed by the Chief Controller of Examinations in consultation with the Head of the Department.
- 12.5 For the Subjects having Design and/or Drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing, Production Drawing Practice, and Estimation), the distribution shall be 30 marks for CIE (10 marks for day-to-day work and 20 marks for internal tests) and 70 marks for SEE. There shall be two internal tests in a semester and the average of the two shall be considered for the award of marks for internal tests.
- 12.6 Open Elective Course: Students can choose one open elective course (OE-I) during III-B.Tech I-semester, one (OE-II) during III-B.Tech II-semester, one (OE-III) in IV-B.Tech I-semester, and one (OE-IV) in IV-B.Tech II-semester from the list of open elective courses given. However, students cannot opt for an open elective courses offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any Semester.
- 12.7 There shall be an Industrial Oriented Mini Project/Summer Internship, in collaboration with an industry of their specialization. Students will register for this immediately after II year II semester examinations and pursue it during summer vacation. Industrial Oriented Mini Project/Summer Internship shall be submitted in a report form and presented before the committee in III year I semester. It shall be evaluated for 100 external marks. The committee consists of an external examiner, Head of the Department, Supervisor of the Industrial Orientated Mini Project/Summer Internship and a senior faculty member of the department. There shall be no internal marks for Industrial Orientated Mini Project/Summer Internship.
- 12.8 There shall be a Comprehensive Viva (Independent Study) in III-B.Tech II-Semester and will be conducted SEE through a test or a committee consisting of One External Examiner, Head of the Department and two senior faculty members of the Department. The independent study is intended to assess the student's understanding of the subjects he/she studied during the B.Tech course of study and evaluated for 100 marks. There shall be no CIE for Comprehensive Viva.
- 12.9.
- a) UG project work shall be carried out in two stages: Project Stage – I during IV Year I Semester, Project Stage – II during IV Year II Semester. Each stage will be evaluated for 100 marks. Student has to submit project work report at the end of each semester. First report includes project work carried out in IV Year I semester and second report includes project work carried out in IV Year I & II Semesters. SEE for both project stages shall be completed before the commencement of SEE Theory examinations.
 - b) For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall evaluate the project work and project supervisor shall evaluate for 100 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the

same before the evaluation committee as per schedule, or (ii) secures less than 40% marks in the total of the CIE.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

- c) For Project Stage – II, the external examiner shall evaluate the project work for 70 marks and the project supervisor shall evaluate it for 30 marks. The topics for industrial oriented mini project and Project Stage – I shall be different from one another. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

For conducting viva-voce of project stage – II, Chief Controller of Examinations selects an external examiner from the list of experts in the relevant branch submitted by the department HODs of the College.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if student fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

12.10. Semester End Examination:

- a) Question paper contains 2 Parts (Part-A and Part-B) having the questions distributed equally among all units.
b) The distribution of marks for i) PART-A for 20 marks ii) PART-B for 50 marks. Pattern of the question paper is as follows:

PART-A

Consists of one question which is compulsory. The question consists of ten sub-questions one from each unit and carry 2 marks each.

PART-B

Consists of 5 questions carrying 10 marks each. Each of these questions is from one unit and may contain sub questions. Each question there will be an "either" "or" choice (that means there will be two questions from each unit and the student should answer any one question).

- 12.11. For Mandatory Non-Credit Courses offered in a Semester, after securing $\geq 65\%$ attendance and has secured not less than 35% marks in the SEE, and a minimum of 40% of marks in the sum Total of the CIE and SEE taken together in such a course, then the student is **PASS** and will be qualified for the award of the degree. No marks or Letter Grade shall be allotted for this courses/activities. However, for non credit courses '**Satisfactory**' or "**Unsatisfactory**' shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.
- 12.12. SWAYAM: College intends to encourage the students to do a minimum of one MOOC in discipline and open elective during third year. The respective departments shall give a list of standard MOOCs providers including SWAYAM whose credentials are endorsed by the BoS. In general, MOOCs providers provide the result in percentage. In such case, specified by the college shall follow the grade table mentioned in 14.2. The Credits for MOOC(s) shall be transferred same as given for the respective discipline or open electives. In case a student fails to complete the MOOCs he/she shall re-register for the same with any of the providers from the list provided by the department. The equivalence of the courses shall be established by the department committee. Still if a student fails to clear the course/s, or in case a provider fails to offer a MOOC in any semester, then in all such cases the college shall

conduct the end semester examinations for the same as per the college end semester examination pattern. The syllabi for the supplementary examinations shall be same as that of MOOCs. There shall be no internal assessment however the marks obtained out of 70 shall be scaled up to 100 marks and the respective letter grade shall be allotted. The details of MOOC(s) shall be displayed in Memorandum of Grades of a student, provided he/she submits the proof of completion of it or them to the examination branch through the Coordinator/Mentor, before the end semester examination of the particular semester.

13. AWARD OF DEGREE

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

Table: Declaration of Class based on CGPA (Cumulative Grade Point Average)

Class Awarded	Grade to be Secured
First Class with Distinction	CGPA \geq 8.00
First Class	\geq 6.50 to $<$ 8.00 CGPA
Second Class	\geq 5.50 to $<$ 6.50 CGPA
Pass Class	\geq 5.00 to $<$ 5.50 CGPA
FAIL	CGPA $<$ 5

14. LETTER GRADE AND GRADE POINT

14.1 Marks will be awarded to indicate the performance of each student in each Theory Subject, or Lab/Practical's, or Seminar, or Project, or Internship*/Mini-Project, Minor Course etc., based on the %marks obtained in CIE+SEE (Continuous Internal Evaluation + Semester End Examination, both taken together), and a corresponding Letter Grade shall be given.

14.2 As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed...

% of Marks Secured (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
90% and above (\geq 90% , \leq 100%)	O (Outstanding)	10
Below 90% but not less than 80% (\geq 80% , $<$ 90%)	A ⁺ (Excellent)	9
Below 80% but not less than 70% (\geq 70% , $<$ 80%)	A (Very Good)	8
Below 70% but not less than 60% (\geq 60% , $<$ 70%)	B ⁺ (Good)	7
Below 60% but not less than 50% (\geq 50% , $<$ 60%)	B (above Average)	6
Below 50% but not less than 40% (\geq 40% , $<$ 50%)	C (Average)	5
Below 40% ($<$ 40%)	F (FAIL)	0
Absent	AB	0

14.3 A student obtaining F Grade in any Subject shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' in the End Semester Examination (SEE), as and when offered. In such cases, his Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

- 14.4 A Letter Grade does not imply any specific % of Marks.
- 14.5 In general, a student shall not be permitted to repeat any Subject/Course (s) only for the sake of ‘Grade Improvement’ or ‘SGPA/CGPA Improvement’. However, he has to repeat all the Subjects/Courses pertaining to that Semester, when he is detained.
- 14.6 A student earns Grade Point (GP) in each Subject/Course, on the basis of the Letter Grade obtained by him in that Subject/Course (excluding Mandatory non-credit Courses). Then the corresponding ‘Credit Points’ (CP) are computed by multiplying the Grade Point with Credits for that particular Subject/Course.

$$\text{Credit Points (CP)} = \text{Grade Point (GP)} \times \text{Credits} \dots \text{ For a Course}$$

- 14.7 The Student passes the Subject/Course only when he gets $GP \geq 4$ (P Grade or above).
- 14.8 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (ΣCP) secured from ALL Subjects/Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

$$\text{SGPA} = \{ \sum_{i=1}^N C_i G_i \} / \{ \sum_{i=1}^N C_i \} \dots \text{ For each Semester,}$$

where ‘i’ is the Subject indicator index (takes into account all Subjects in a Semester), ‘N’ is the no. of Subjects ‘REGISTERED’ for the Semester (as specifically required and listed under the Course Structure of the parent Department), C_i is the no. of Credits allotted to that ix Subject, and G_i represents the Grade Points (GP) corresponding to the Letter Grade awarded for that i Subject.

Illustration of Computation of SGPA Computation

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit x Grade)
Course1	3	A	8	3 x 8 = 24
Course2	4	B+	7	4 x 7 = 28
Course3	3	B	6	3 x 6 = 18
Course4	3	O	10	3 x 10 = 30
Course5	3	C	5	3 x 5 = 15
Course6	4	B	6	4 x 6 = 24

Thus, $\text{SGPA} = 139/20 = 6.95$

- 14.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all Semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in ALL registered Courses in ALL Semesters, and the Total Number of Credits registered in ALL the Semesters. CGPA is rounded off to TWO Decimal Places. CGPA is thus computed from the I Year Second Semester onwards, at the end of each Semester, as per the formula

$$\text{CGPA} = \{ \sum_{j=1}^M C_j G_j \} / \{ \sum_{j=1}^M C_j \} \dots \text{ for all S Semesters registered}$$

(i.e., up to and inclusive of S Semesters, $S \geq 2$),

where ‘M’ is the TOTAL no. of Subjects (as specifically required and listed under the Course Structure of the parent Department) the Student has ‘REGISTERED’ from the 1st Semester onwards up to and inclusive of the Semester S (obviously $M > N$), ‘j’ is the Subject indicator index (takes into account all Subjects from 1 to S Semesters), C_j is the no. of Credits allotted

to the j th Subject, and G_j represents the Grade Points (GP) corresponding to the Letter Grade awarded for that j th Subject. After registration and completion of I Year I Semester however, the SGPA of that Semester itself may be taken as the CGPA, as there are no cumulative effects.

For CGPA Computation

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
Credits : 19.5	Credits : 20.5	Credits : 18.0	Credits : 19.0	Credits : 21.5	Credits : 21.5	Credits : 23	Credits : 17
SGPA : 6.9	SGPA : 7.8	SGPA : 5.6	SGPA : 6.0	SGPA : 6.3	SGPA : 8.0	SGPA : 8.0	SGPA : 8.0

$$\text{Thus, CGPA} = \frac{19.5 \times 6.9 + 20.5 \times 7.8 + 18.0 \times 5.6 + 19.0 \times 6.0 + 21.5 \times 6.3 + 21.5 \times 8.0 + 23 \times 8.0 + 17 \times 8.0}{160} = 7.10$$

- 14.10 For Merit Ranking or Comparison Purposes or any other listing, ONLY the ‘ROUNDED OFF’ values of the CGPAs will be used.
- 14.11 For Calculations listed in Item 12.6–12.10, performance in failed Subjects/Courses (securing F Grade) will also be taken into account, and the Credits of such Subjects/Courses will also be included in the multiplications and summations. However, Mandatory Courses will not be taken into consideration.
- 14.12 Conversion formula for the conversion of GPA into indicative percentage is
% of marks scored = (final CGPA - 0.50) x 10

15. DECLARATION OF RESULTS

Computation of SGPA and CGPA are done using the procedure listed in 12.6– 12.10.

No SGPA/CGPA is declared, if a candidate is failed in any one of the courses of a given Semester.

16. WITH HOLDING OF RESULTS

If the student has not paid fees to College at any stage, or has pending dues against his name due to any reason what so ever, or if any case of indiscipline is pending against him, the result of such student may be withheld, and he will not be allowed to go into the next higher Semester. The Award or issue of the Degree may also be withheld in such cases.

17. REVALUATION

Students shall be permitted for revaluation after the declaration of end Semester examination results within due dates by paying prescribed fee. After revaluation if there is any betterment in the grade, then improved grade will be considered. Otherwise old grade shall be retained.

18. SUPPLEMENTARY EXAMINATIONS

Supplementary examinations for the odd Semester shall be conducted with the regular examinations of even Semester and vice versa, for those who appeared and failed or absent in regular examinations. Such candidates writing supplementary examinations may have to write sometimes one or two examinations per day.

ADVANCED SUPPLEMENTARY EXAMINATION

Advanced supplementary examinations will be conducted for IV year II Semester after announcement of regular results.

19. TRANSCRIPTS

After successful completion of prerequisite credits for the award of degree a Transcript containing performance of all academic years will be issued as a final record. Duplicate PC, CMM & Transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

20. RULES OF DISCIPLINE

- 20.1 Any attempt by any student to influence the teachers, Examiners, faculty and staff of controller of Examination for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice cases and the student can be debarred from the college.
- 20.2 When the student absents himself, he is treated as to have appeared and obtained zero marks in that course(s) and grading is done accordingly.
- 20.3 When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, he is awarded zero marks in that subject(s).
- 20.4 When the student's answer book is confiscated for any kind of attempted or suspected malpractice the decision of the Examiner is final.

21. MALPRACTICE PREVENTION COMMITTEE

A malpractice prevention committee shall be constituted to examine and punish the students who involve in malpractice / indiscipline in examinations. The committee shall consist of:

- a) Controller of examinations - Chairman
- b) Addl. Controller of examinations.- Member Convenor
- c) Subject expert - member
- d) Head of the department of which the student belongs to. - Member
- e) The invigilator concerned – member

The committee shall conduct the meeting after taking explanation of the student and punishment will be awarded by following the malpractice rules meticulously.

Any action on the part of candidate at the examination like trying to get undue advantage in the performance at examinations or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff who are in charge of conducting examinations, valuing examination papers and preparing / keeping records of documents relating to the examinations, in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and will be recommended for appropriate punishment after thorough enquiry.

22. TRANSITORY REGULATIONS

Student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the Degree Programme, may be considered eligible for readmission to the same Subjects/Courses (or equivalent Subjects/Courses, as the case may be), and same Professional Electives/Open Electives (or from set/category of Electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the Date of Commencement of his I Year I Semester).

23. AMENDMENTS TO REGULATIONS

The Academic Council of Holy Mary Institute of Technology & Science reserves the right to revise, amend, or change the regulations, scheme of examinations, and / or syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

There shall be no Branch transfers after the completion of Admission Process. Transfer of student is permitted subjected to the rules and regulations of TSCHE (TE Department) and JNTUH in vogue.

The College shall have its own Annual Graduation Day for the award of Degrees issued by the College/University.

Institute will award Medals to the outstanding students who complete the entire course in the first attempt within the stipulated time.

- i) Where the words “he”, “him”, “his”, occur in the write-up of regulations, they include “she”, “her”.
- ii) Where the words “Subject” or “Subjects”, occur in these regulations, they also imply “Course” or “Courses”.
- iii) The Academic Regulations should be read as a whole, for the purpose of any interpretation.
- iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman of the Academic Council is final.

Academic Regulations for B. Tech. (Lateral Entry Scheme)
(Effective for the students getting admitted into II year
from the Academic Year 2022-2023 on wards)

1. The Students have to acquire 120 credits from II to IV year of B.Tech Programme (Regular) for the award of the degree.
2. Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.
3. The same attendance regulations are to be adopted as that of B. Tech. (Regular)

Promotion Rule:

A Student will not be promoted from III Year to IV Year, unless he/she fulfils the Attendance and Academic Requirements and (i) secures a Total of 60% Credits up to III Year II Semester, from all the regular and supplementary examinations.

Award of Class:

After the student has satisfied the requirements prescribed for the completion of the programme and is eligible for the award of B. Tech. Degree, he/she shall be placed in one of the following four classes: The marks obtained for 120 credits will be considered for the calculation of CGPA and award of class shall be shown separately.

Table: **Declaration of Class based on CGPA (Cumulative Grade Point Average)**

Class Awarded	Grade to be Secured
First Class with Distinction	CGPA \geq 8.00
First Class	\geq 6.50 to $<$ 8.00 CGPA
Second Class	\geq 5.50 to $<$ 6.50 CGPA
Pass Class	\geq 5.00 to $<$ 5.50 CGPA
FAIL	CGPA $<$ 5

All other regulations as applicable for B. Tech. Four-year degree programme (Regular) will hold good for B.Tech (Lateral Entry Scheme).

**MALPRACTICES 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 Principal.
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's 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 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 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 Addl. Controller of examinations / 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 addl. Controller of examinations or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the addl. Controller of examinations, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the 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 case is registered against them.

7	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the 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 examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the 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.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the 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 principal for further action to award suitable punishment.	

COURSE STRUCTURE

Dept. of Computer Science and Engineering (IoT)

I B.Tech.- I-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1MA101BS	Linear Algebra and Calculus	BSC	3	1	-	4	30	70	100
A1AP104BS	Applied Physics	BSC	3	1	-	4	30	70	100
A1EE107ES	Basic Electrical and Electronics Engineering	ESC	3	1	-	4	30	70	100
A1ME108ES	Engineering Graphics	ESC	1	-	4	3	30	70	100
A1AP112BS	Applied Physics Lab	BSC	-	-	3	1.5	30	70	100
A1EE115ES	Basic Electrical and Electronics Engineering Lab	ESC	-	-	2	1	30	70	100
A1ME116ES	Workshop Manufacturing Practice	ESC	-	-	4	2	30	70	100
A1IO117ES	Social Innovation	ESC	-	-	3	1.5	30	70	100
Total			10	3	16	21	240	560	800
Mandatory Course (Non-Credit)									
A1IO101MC	Technical Seminar - I	MC	-	-	2	-	100	-	100

I B.Tech.- II-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1MA201BS	Ordinary Differential Equations and Advanced Calculus	BSC	3	1	-	4	30	70	100
A1CH202BS	Engineering Chemistry	BSC	3	1	-	4	30	70	100
A1CS206ES	Programming for Problem Solving	ESC	3	-	-	3	30	70	100
A1EN205HS	English for Effective Communication	HSMC	2	-	-	2	30	70	100
A1CS214ES	Programming for Problem Solving Lab	ESC	-	-	4	2	30	70	100
A1CH210BS	Engineering Chemistry Lab	BSC	-	-	3	1.5	30	70	100
A1EN213HS	English Language Communication Skills Lab	HSMC	-	-	3	1.5	30	70	100
A1IO218PW	Engineering Exploration	PWC	-	-	2	1	30	70	100
Total			11	2	12	19	240	560	800
Mandatory Course (Non-Credit)									
A1IO202MC	Technical Seminar-II	MC	-	-	2	-	100	-	100

II-B.Tech (I-Semester)									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1IO302ES	Digital Logic Design	ESC	3	-	-	3	30	70	100
A1IO303PC	Data Structures	PCC	3	-	-	3	30	70	100
A1IO304PC	Database Management Systems	PCC	3	-	-	3	30	70	100
A1IO301BS	Computer Oriented Statistical Methods	BSC	3	1	-	4	30	70	100
A1IO305ES	Digital Logic Design Lab	ESC	-	-	3	1.5	30	70	100
A1IO306PC	Data Structures Lab	PCC	-	-	3	1.5	30	70	100
A1IO307PC	Database Management Systems Lab	PCC	-	-	3	1.5	30	70	100
Total			12	1	9	17.5	210	490	700
Mandatory Course (Non-Credit)									
A1IO303MC	Environmental Studies	MC	2	-	-	-	100	-	100
A1IO304MC	Human Values & Professional Ethics	MC	3	-	-	-	100	-	100

II-B.Tech (II-Semester)									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1IO401PC	Computer Organization and Architecture	PCC	3	-	-	3	30	70	100
A1IO402PC	Sensors and Devices	PCC	3	-	-	3	30	70	100
A1IO403PC	Operating Systems	PCC	3	-	-	3	30	70	100
A1IO404PC	Discrete Mathematics	PCC	3	-	-	3	30	70	100
A1IO405PC	Python Programming	PCC	3	-	-	3	30	70	100
A1IO406PC	Sensors and Devices Lab	PCC	-	-	3	1.5	30	70	100
A1IO407PC	Operating Systems Lab	PCC	-	-	3	1.5	30	70	100
A1IO408PC	IT Workshop	PCC	-	-	3	1.5	30	70	100
Total			15	-	9	19.5	240	560	800
Mandatory Course (Non-Credit)									
A1IO405MC	Gender Sensitization	MC	-	-	2	-	100	-	100

III-B.Tech-I-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1IO501PC	Software Engineering	PCC	3	-	-	3	30	70	100
A1IO502ES	Micro Processor & Microcontroller	ESC	3	-	-	3	30	70	100
A1IO503PC	Computer Networks	PCC	3	-	-	3	30	70	100
A1IO504HS	Economics and Accounting for Engineers	HSMC	3	-	-	3	30	70	100
A1IO505PC	Machine Learning	PCC	3	-	-	3	30	70	100
	Professional Elective-I	PEC	3	-	-	3	30	70	100
A1IO506ES	Micro Processor & Microcontroller Lab	ESC	-	-	3	1.5	30	70	100
A1IO507PC	Machine Learning Lab	PCC	-	-	3	1.5	30	70	100
A1IO508PW	Internship/Mini Project	PWC	-	-	4	2	-	100	100
	MOOC's (for B.Tech Hon's Degree)								
Total			18	-	10	23	240	660	900
Mandatory Course (Non-Credit)									
A1IO506MC	Constitution of India	MC	2	-	-	-	100	-	100

III-B.Tech-II-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
A1IO601PC	IoT Communication Protocols	PCC	3	-	-	3	30	70	100
A1IO602PC	Computer Vision and Robotics	PCC	3	-	-	3	30	70	100
	Professional Elective-II	PEC	3	-	-	3	30	70	100
	Professional Elective-III	PEC	3	-	-	3	30	70	100
	Open Elective-I	OEC	3	-	-	3	30	70	100
A1IO603PC	IoT Communication Protocols Lab	PCC	-	-	3	1.5	30	70	100
A1IO604PC	Computer Vision and Robotics Lab	PCC	-	-	3	1.5	30	70	100
A1EN605HS	Advanced English Communication Skills Lab	HSMC	-	-	2	1	30	70	100
A1IO606PW	Comprehensive Viva	PWC	-	-	-	1	100	-	100
	MOOC's (for B.Tech Hon's Degree)								
Total			15	-	8	20	340	560	900
Mandatory Course (Non-Credit)									
A1IO607MC	Essence of Indian Traditional Knowledge	MC	2	-	-	-	100	-	100

IV-B.Tech -I-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
AIO701PC	IoT Cloud Processing and Analytics	PCC	3	-	-	3	30	70	100
AIO702PC	IoT Security	HSMC	2	-	-	2	30	70	100
AIO703PC	Distributed Systems	PCC	3	1	-	4	30	70	100
	Professional Elective-IV	PEC	3	-	-	3	30	70	100
	Professional Elective-V	PEC	3	-	-	3	30	70	100
	Open Elective-II	OEC	3	-	-	3	30	70	100
AIO704PC	IoT Security and Cloud Computing Lab	PCC	-	-	2	1	30	70	100
AIO705PW	Project Phase - I	PWC	-	-	8	4	100	-	100
	MOOC's (for B.Tech Hon's Degree)								
Total			17	1	10	23	310	490	800

IV-B.Tech-II-Semester									
Course Code	Course Title	Course Area	Hours per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
AIO801PC	Deep Learning	PCC	3	-	-	3	30	70	100
AIO802HS	Organizational Behaviour	HSMC	3	-	-	3	30	70	100
	Open Elective-III	OEC	3	-	-	3	30	70	100
AIO803PW	Project Phase - II	PWC	-	-	16	8	30	70	100
	MOOC's (for B.Tech Hon's Degree)								
Total			9	-	16	17	120	280	400

Total Credits-160

PROFESSIONAL ELECTIVES			
PE-I		PE-II	
A1IO501PE	Design and Analysis of algorithms	A1IO604PE	Automata Theory of Compiler Design
A1IO502PE	IoT System Architecture	A1IO605PE	Smart Sensor Technologies
A1IO503PE	Python for IoT	A1IO606PE	Embedded Systems
PE-III		PE-IV	
A1IO607PE	Software Testing Methodology	A1IO710PE	Ad-hoc and Sensor Networks
A1IO608PE	Artificial Intelligence	A1IO711PE	Cloud Computing
A1IO609PE	Mobile Application Development for IoT	A1IO712PE	IoT Automation
PE-V			
A1IO713PE	Industrial IOT 4.0		
A1IO714PE	Agile Software Development		
A1IO715PE	Cyber Security		

OPEN ELECTIVES			
OE-I		OE-II	
A1IO601OE	Sensor and Devices	A1IO703OE	IoT for Architects
A1IO602OE	IoT Sensor Technologies	A1IO704OE	Python for IoT
OE-III			
A1IO805OE	IoT System Design		
A1IO806OE	Internet of Medical Things		

MANDATORY COURSE (NON-CREDIT)			
A1IO101MC	Technical Seminar - I	A1IO405MC	Gender Sensitization
A1IO202MC	Technical Seminar-II	A1IO506MC	Constitution of India
A1IO303MC	Environmental Studies	A1IO607MC	Essence of Indian Traditional Knowledge
A1IO304MC	Human Values & Professional Ethics		

DETAILED SYLLABUS

I-YEAR (I-SEMESTER)

LINEAR ALGEBRA AND CALCULUS

I-B. Tech I-Semester

Course Code: AIMA101BS

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COURSE OBJECTIVES:

To learn

1. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
2. Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
3. Methods of solving the differential equations of first order.
4. Evaluation of improper integrals using Beta and Gamma functions.
5. Partial differentiation and finding maxima and minima of function of two and three variables.

COURSE OUTCOMES:

Upon the successful completion of this course, the students will be able to:

1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
2. Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations.
3. Identify whether the given differential equation of first order is exact or not.
4. Solve the applications on the mean value theorems and evaluate the improper integrals using Beta and Gamma functions.
5. Find the extreme values of functions of two variables with/ without constraints.

UNIT-I MATRICES

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; Orthogonal matrices; Unitary Matrices; Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; Solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method.

UNIT –II EIGEN VALUES AND EIGEN VECTORS

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); Finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to Canonical forms by Orthogonal Transformation.

UNIT-III FIRST ORDER ORDINARY DIFFERENTIAL EQUATION

Exact, linear and Bernoulli's equations: Orthogonal Trajectories (in Cartesian and polar coordinates) Newton's law of cooling, Law of natural growth and decay, Equations not of first degree: Equations solvable for p , Equations solvable for y , Equations solvable for x and Clairaut's type.

UNIT –IV CALCULUS

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series . Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-V MULTIVARIABLE CALCULUS

Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

REFERENCE BOOKS:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010

APPLIED PHYSICS

I-B. Tech (I-Semester)
Course Code: A1AP104BS

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COURSE OBJECTIVES:

1. To impart the knowledge of quantum mechanics to explore the behavior of subatomic particles.
2. To extend the competency and understanding of the concepts of Semiconductor physics.
3. To acquire the knowledge of Optoelectronics and able to apply it to various systems like communications, solar cell, photo cells and so on.
4. To differentiate the properties of laser with the ordinary light and describe the principle and propagation of light through optical fibers.
5. To understand the concepts of electromagnetism and study the properties of magnetic materials and its various applications.

COURSE OUTCOMES: Upon graduation, the students will be able to:

1. Explain the concepts of the quantum mechanics and point out the shortcomings of classical mechanics.
2. Acquire the knowledge of Semiconductor physics and apply it to day to day issues.
3. Compare the working of several day-to-day optoelectronic devices.
4. Study and characterize the properties of Lasers and optical fibers and prepare new models for various engineering applications.
5. Evaluate the different parameters of magnetic materials and their applications, and analyze the fundamentals of Electromagnetic theory.

UNIT-I: QUANTUM MECHANICS

Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect (qualitative treatment), de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, G.P. Thompson Experiment, Heisenberg's Uncertainty principle and its applications, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

UNIT-II: BAND THEORY AND SEMICONDUCTOR PHYSICS

Bloch theorem, Band theory of solids, Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p-n junction diode, Energy level diagram of p-n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation.

UNIT-III: OPTOELECTRONICS

Radiative and non-radiative recombination mechanisms in semiconductors, LED and semiconductor lasers: Device structure, Materials, Characteristics and figures of merit, Semiconductor photo detectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

UNIT-IV: LASERS AND FIBRE OPTICS

Lasers: Introduction to interaction of radiation with matter, Coherence, Characteristics of LASER, Principle and working of Laser, Einstein coefficients, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO₂) laser, He-Ne laser, Nd-Yag laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

UNIT-V: ELECTROMAGNETISM AND MAGNETIC PROPERTIES OF MATERIALS

Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, Polarization, Permittivity and Dielectric constant, Internal fields in a solid, Clausius-Mossotti equation(qualitative treatment),Ferroelectrics and Piezoelectrics. Magnetisation, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials.

TEXT BOOKS:

- 1.EngineeringPhysics,B.K.Pandey,S.Chaturvedi- CengageLearning.
- 2.HallidayandResnick,Physics-Wiley.
- 3.AtextbookofEngineeringPhysics,Dr.M.N.Avadhanulu,Dr.P.G.Kshirsagar -S.Chand
4. Solid state physics by Dr. M.Arumugam

REFERENCE BOOKS:

1. RichardRobinett,Quantum Mechanics
2. J. Singh,SemiconductorOptoelectronics:PhysicsandTechnology,McGraw-Hillinc.(1995).
3. Solid state physics by A. J. Dekker.
4. <https://nptel.ac.in/courses/113/106/113106065/>

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

I-B. Tech (I-Semester)
Course Code:A1EE107ES

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COURSE OBJECTIVES

The course should enable the students to:

1. Develop fundamentals, including Ohm's law, Kirchhoff's laws and be able to solve for currents, voltages and power in electrical circuits.
2. Develop EMF equation and analyze the operation of DC Machines.
3. Analyze the working principle of Transformer.
4. Discuss the operation of AC Machines.
5. Analyze the operation of PN junction diode and rectifiers.
6. Discuss the operation and characteristics of Transistors

COURSE OUTCOMES:

1. Analyze and solve for current values in resistive circuits with independent sources.
2. Analyze the working of DC machines and solve the numerical problems
3. Analyze the working of AC electrical machines and solve the numerical problems.
4. Analyze the V-I characteristics of PN – junction diode and describe the operation of rectifiers.
5. Analyze the different configurations of Transistors and obtain its characteristics

UNIT I ELECTRICAL CIRCUITS

Basic definitions-Ohm's Law, types of elements, types of sources, Kirchhoff's Laws – simple problems. Series & parallel resistive networks with DC excitation star to delta and delta to star transformations. **Norton's, Thevenin's theorems**

UNIT II D.C. MACHINES

Principle of Operation of DC Motor, types of DC motor, Torque equation & Losses and problems. DC Generator construction and working Principle, EMF Equation types of generators and problems.

UNIT III A.C. MACHINES

Working principle and Construction of transformer, Emf Equation & problems, Principle operation of 3- phase induction motor, slip and torque Equation, Torque –slip Characteristics & problems, principle Operation of 3- phase Alternator, Emf Equation of Alternator & problems.

UNIT IV DIODE AND ITS CHARACTERISTICS

PN JUNCTION DIODE: Operation of PN junction Diode: forward bias and reverse bias, Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics. Rectifiers, Half wave, Full wave and bridge Rectifiers –capacitor filters, inductor filters.

UNIT V TRANSISTORS

Bipolar Junction Transistor and its types, Transistor as an Amplifier CB, CE, CC Configurations comparison of transistor configurations, the operating point
FETs: J-FET, MOSFET, V-I characteristics, MOSFET as a switch

TEXT BOOKS:

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshaiah TMH.
2. Electronic Devices and circuits by J.Millman, C.C.Halkias and SatyabrataJit2ed.,
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th Edition

REFERENCE BOOKS:

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basic Electrical, Electronics and Computer Engineering”,Tata McGraw Hill, Second Edition, (2006).
2. Nagsarkar T K and Sukhija M S, “Basics of Electrical Engineering”, Oxford press (2005).
3. Mehta V K, “Principles of Electronics”, S.Chand& Company Ltd, (1994).
4. MahmoodNahvi and Joseph A. Edminister, “Electric Circuits”, Schaum’ Outline Series, McGraw Hill,(2002).

ENGINEERING GRAPHICS

I-B. Tech (I-Semester)
Course Code: A1ME108ES

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COURSE OBJECTIVES

1. To provide basic concepts in engineering drawing.
2. To impart knowledge about standard principles of orthographic projection of objects.
3. To draw sectional views and pictorial views of solids.

COURSE OUTCOMES

Upon the successful completion of this course, the students will be able to:

1. Preparing working drawings to communicate the ideas and information.
2. Read, understand and interpret engineering drawings.

UNIT-I INTRODUCTION

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales –Plain & Diagonal

UNIT -II PROJECTIONS

Projections of Points, Lines and Planes: Principles of Orthographic Projections –Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. —Auxiliary Planes.

UNIT -III PROJECTION OF SOLIDS

Projection of Solids and Sectioned Solids: Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere

UNIT -IV DEVELOPMENT OF LATERAL SURFACES

Development of Lateral Surfaces: Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone

UNIT-V ISOMETRIC PROJECTIONS

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views –Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions

Introduction to CAD: For Internal Evaluation Weightage only):

Introduction to CAD Software Package Commands. - Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package

TEXT BOOKS

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

APPLIED PHYSICS LAB

I-B. Tech (I-Semester)
Course Code: A1AP112BS

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COURSE OBJECTIVES:

The course should enable the students:

1. To discuss the energy gap (Eg) of a semiconductor diode and the fill factor of solar cell using the V-I characteristics.
2. To explain the electrical resonance by using the LCR circuit and calculate the time constant by using RC circuit.
3. To develop skills to impart practical knowledge in real time solution of various optoelectronic devices like LED and LASER.
4. To understand the bending losses and numerical aperture of an optical fiber cable.
5. To impart the practical knowledge on the concept of photo electric effect and Hall Effect and compare the results with theoretical calculations.

COURSE OUTCOMES: After completion of the course, the students will be able to

1. Analyze various properties of the semi-conductor devices and determine the energy gap of semiconductors.
2. Discuss the working of various electronic components like inductor, capacitor, resistor and built the circuits by selecting the appropriate components.
3. Explain the working and characteristics of the various optoelectronic devices and develop the skills of practical knowledge in real time solution.
4. Compare the bending losses of optical fibers at various working areas and recall the applications of optical fibers.
5. Understand the properties of magnetic materials and determine the related parameters of magnetic fields..

LIST OF EXPERIMENTS:

1. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.
2. Solar Cell: To study the V-I Characteristics of solar cell.
3. R-C Circuit: To determine the time constant of R-C circuit.
4. LCR Circuit: To determine the Quality factor of LCR Circuit.
5. Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.
6. LASER: To study the characteristics of LASER sources.
7. Optical fibre: To determine the bending losses of Optical fibres.
8. Photoelectric effect: To determine work function of a given material.
9. Stewart – Gee’s experiment: Determination of magnetic field along the axis of a current carrying coil.
10. Hall effect: To determine Hall co-efficient of a given semiconductor.

Note: Any 8 experiments are to be performed

REFERENCE BOOKS:

1. Engineering Physics Lab Manual by Dr.Y. Aparna&Dr.K.Venkateswarao (V.G.S.Book links).
2. Physics practical manual, Lorven Publications.

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

I-B. Tech (I-Semester)

Course Code: A1EE115ES

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COURSE OBJECTIVES

1. Develop fundamentals, including Ohm's law, Kirchhoff's laws and be able to solve for currents, voltages and power in electrical circuits.
2. Develop EMF equation and analyze the operation of DC Machines.
3. Analyze the working principle of Transformer.
4. Discuss the operation of AC Machines.
5. Analyze the operation of PN junction diode and rectifiers.
6. Discuss the operation and characteristics of Transistors

COURSE OUTCOMES:

By the end of the course students will be able:

1. Analyze and solve for current values in resistive circuits with independent sources.
2. Analyze the working of DC machines and solve the numerical problems.
3. Analyze the working of AC electrical machines and solve the numerical problems.
4. Analyze the V-I characteristics of PN – junction diode and describe the operation of rectifiers
5. Analyze the different configurations of Transistors and obtain its characteristics

LIST OF EXPERIMENTS

PART-A (Electrical Engineering):

Experiment-1 Verification of Norton's, Thevenin's theorems

Experiment- Verification of KVL and KCL

Experiment-3 Brake test on DC shunt motor.

Experiment-4 Swinburne's test on D.C. Shunt machine (predetermination of efficiency of a given D.C. shunt machine working as motor and generator).

Experiment-5 O.C and S.C test on single phase transformer (predetermination of Efficiency and regulation at given power factor

Experiment-6 Brake test on 3- phase induction motor (determination of performance Characteristics).

Experiment-7 No-Load Characteristics of a Three-phase Alternator

PART-B (Electronics Engineering)

Experiment-8 Study and operation of

(i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.

Experiment-9 PN Junction diode characteristics

Experiment-10 Zener diode characteristics and Zener as voltage Regulator

Experiment-11 Input & Output characteristics of Transistor in CB , CE & CC configuration

Experiment-12 Full Wave Rectifier with & without filters

TEXT BOOKS:

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshaiah TMH.
2. Electronic Devices and circuits by J.Millman, C.C.Halkias and SatyabrataJit 2ed.,
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th Edition

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1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basic Electrical, Electronics and Computer Engineering”, Tata McGraw Hill, Second Edition, (2006).
2. Nagsarkar T K and Sukhija M S, “Basics of Electrical Engineering”, Oxford press (2005).
3. Mehta V K, “Principles of Electronics”, S.Chand& Company Ltd, (1994).
4. Mahmood Nahvi and Joseph A. Edminister, “Electric Circuits”, Schaum’ Outline Series, McGraw Hill,(2002).

WORKSHOP MANUFACTURING PRACTICES

I-B. Tech (I-Semester)

Course Code: A1ME116ES

L T P C

- - 4 2

COURSE OBJECTIVES:

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

COURSE OUTCOMES:

By the end of the course students will be able to:

1. Study and practice on machine tools and their operations
2. Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
3. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. Apply basic electrical engineering knowledge for house wiring practice.

LIST OF EXPERIMENTS

I. TRADES FOR EXERCISES:

At least two exercises from each trade:

Experiment-1	Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
Experiment-2	Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)
Experiment-3	Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)
Experiment-4	Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
Experiment-5	Welding Practice – (Arc Welding & Gas Welding)
Experiment-6	House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
Experiment-7	Black Smithy – (Round to Square, Fan Hook and S-Hook)

II. TRADES FOR DEMONSTRATION & EXPOSURE:

Experiment-1	Plumbing, Machine Shop, Metal Cutting
Experiment-2	Power tools in construction and Wood Working

TEXT BOOKS:

1. Workshop Practice /B. L. Juneja /Cengage
2. Workshop Manual / K. Venugopal /Anuradha.

REFERENCE BOOKS:

1. Workshop Practice /B. L. Juneja /Cengage
2. Workshop Manual / K. Venugopal /Anuradha.
3. Workshop Manual - P. Kannaiah/ K. L. Narayana/SciTech
4. Workshop Manual / Venkat Reddy/BSP

SOCIAL INNOVATION

I-B. Tech (I-Semester)
Course Code:AIIO117ES

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COURSE DESCRIPTION:

Course Overview

Social Innovation is an open-ended course to develop social connectedness in engineering students through social awareness and social consciousness. This can be done through live field exposure along with faculty led conceptual presentations, real case reviews, self-study assignments, literature and field survey. Through this course, the students are expected to use their engineering knowledge to provide innovative solutions to existing social problems. This course also develops critical thinking ability among the students to develop sustainable solutions.

COURSE OUTCOMES

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

1. Develop awareness on social issues faced by local regions.
2. Identify the mind set of human Race and interpret the societal issues as simple, complicated, and
3. Complex problems.
4. Identify the need statement along with its main causes and effects.
5. Develop an innovative and sustainable solution for social issues by thinking critically and creatively

UNIT – I INTRODUCTION TO SOCIAL INNOVATION

Introduction to Social Innovation: Core definitions, core elements and common features of social innovation, a typology of social innovation, awakening social consciousness.

UNIT – II CREATE MINDSETS AND WICKED PROBLEMS

Create Mindsets and Wicked Problems: Seven mindsets – Empathy, Optimism, Iteration, Creative confidence, making it, embracing ambiguity, learning from failures. Distinguish between simple, complicated, and complex problems; describe the characteristics of wicked problems, breakdown a given problem by unpacking its complexity.

UNIT – III CRITICAL AND CREATIVE THINKING FOR SOCIAL INNOVATION

Critical and Creative Thinking for Social Innovation: Definition, engineering thinking and learning, distinguish between creativity and innovation. Models of Creative thinking. [Appreciative Inquiry (AI), Asset Based Community Development (ABCD) and Concept of Bricolage.]

UNIT – IV PROCESS OF SOCIAL INNOVATION

Process of Social Innovation: Community study, develop questionnaire, identifying the causes of a particular problem. Identify needs, record your learning's, Generate ideas, and select promising ideas, prototyping, and testing.

UNIT – V SOCIAL INNOVATION ACROSS FOUR SECTORS AND STAGES OF INNOVATION

Social Innovation across Four Sectors: The non-profit sector, public sector, the private sector, the informal sector, links between and cross sectors.

Stages of Innovation: Social organizations and enterprises, social movements, social software and open source methods, common patterns of success and failure.

TEXT BOOKS:

1. Robin Murray, Julie Caulier-Grice, Geoff Mulgan, “The open book of social innovation: Ways to Design, Develop and Grow Social Innovation”, The Young Foundation, 2010.
2. Julie Caulier-Grice, Anna Davies, Robert Patrick & Will Norman, The Young Foundation (2012) Social Innovation Overview: A deliverable of the project: “The theoretical, empirical and policy foundations for building social innovation in Europe” (TEPSIE), European Commission – 7th Framework Programme, Brussels: European Commission, DG Research.

REFERENCE BOOKS:

1. Geoff Mulgan, “Social Innovation: What it is, Why it matters and How it can be accelerated”, The Young Foundation, 2007.
2. Asset Based Community Development (ABCD) Model – <http://www.nurturedevelopment.org/assetbased-community-develop>
3. Diana Whitney & Amanda Trosten-Bloom, “The Power of Appreciative inquiry – A Practical Guide to Positive Change”, 2nd Edition, Berrett-Koehler Publishers, Inc, 2010.

I-YEAR (II-SEMESTER)

ORDINARY DIFFERENTIAL EQUATIONS AND ADVANCED CALCULUS

I-B.Tech (II-Semester)

Course Code: A1MA201BS

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COURSE OBJECTIVES:

The students would be able to learn

1. Different methods of solving the differential equations of higher order.
2. Concept, properties of Laplace transforms and Solving ordinary differential equations using Laplace transforms techniques.
3. Evaluation of multiple integrals and their applications.
4. The physical quantities involved in engineering field related to vector valued functions.
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals.

COURSE OUTCOMES:

Upon the successful completion of this course, the students will be able to:

1. Solve higher differential equation and apply the concept of differential equation to real world Problems
2. Use the Laplace Transform techniques for solving ODE's.
3. Evaluate the multiple integrals and apply the concept to find areas, volumes.
4. Evaluate the line, surface and volume integrals and converting them from one to another.
5. Apply Green, Gauss, and Stokes theorem to the integrals.

UNIT –I ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax}(x)$ and $x V(x)$; method of Variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation .Application to Electrical circuits.

UNIT –II LAPLACE TRANSFORMS

Laplace Transform of standard functions; first shifting theorem, Second shifting theorem: Laplace transforms of functions when they are multiplied and divided by t . Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Specific functions(Unit step function ,Unit impulsive function); Laplace transform of Periodic functions.

Inverse Laplace transform by different methods, Convolution theorem (without Proof), Solving ODEs by Laplace Transform method.

UNIT –III MULTIVARIABLE CALCULUS (INTEGRATION)

Evaluation of Double Integrals (Cartesian and polar coordinates); Change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

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

UNIT –IV VECTOR DIFFERENTIATION

Vector point functions and Scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-V VECTOR INTEGRATION

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes theorems (statement & their verification)

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,

REFERENCE BOOKS:

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
3. Advance engineering mathematics by RK Jain & S.R.K. Iyengar 3rd edition Narosa publishing house Delhi.

ENGINEERING CHEMISTRY

I-B. Tech (II-Semester)**Course Code: A1CH202BS****L T P C****3 1 - 4**

COURSE OBJECTIVES:

1. To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand & remember the technology based on them.
2. Able to understand the concepts of hardness & analyze hardness of water.
3. To acquire the knowledge of electrochemistry & corrosion
4. To acquire the skills pertaining to spectroscopy and able to evaluate the structure of organic compounds.
5. To impart the knowledge of stereochemistry and synthesis of Aspirin & Paracetamol

COURSE OUTCOMES: Student must be able to

1. Evaluate the MOELD of N₂, O₂ & F₂.
2. Analyze hardness of water.
3. Apply electrochemistry concepts to solve the problem of corrosion.
4. Evaluate the structure of Organic compounds by using spectroscopy.
5. Synthesize Organic medicines like Paracetamol & Aspirin & predict the structure based on stereochemistry.

UNIT - I: MOLECULAR STRUCTURE AND THEORIES OF BONDING

Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams(MOELD) of N₂, O₂ and F₂ molecules. Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion d-orbitals in Tetrahedral, Octahedral and square planar geometries. Band structure of solids and effect of doping on conductance.

UNIT - II: WATER AND ITS TREATMENT

Introduction – Hardness of water, Causes of hardness - Types of hardness: temporary and permanent , expression and units of hardness .Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonisation.

Boiler Troubles-Priming and Foaming, Caustic Embrittlement, Boiler Corrosion, Sludge and Scale formation
Boiler feed water and its treatment – Calgon conditioning, Phosphate conditioning and Colloidal conditioning.
External treatment of water – Ion exchange process. Desalination of water – Reverse osmosis. Numerical problems.

UNIT - III: ELECTROCHEMISTRY AND CORROSION

Electro chemical cells – electrode potential, standard electrode potential, Types of electrodes – Calomel, Quinhydrone and glass electrode. Determination of pH of a solution by using quinhydrone and glass electrode. Measurement of emf of a cell(solution). Electrochemical series and its applications. Numerical problems. Potentiometric titrations. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery, Lithium ion battery) &Fuel cells-Hydrogen-Oxygen fuel cell. Corrosion: Causes and effects of corrosion

Theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion. Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings – methods of application. Electroless plating of Nickel.

UNIT - IV: STEREOCHEMISTRY, REACTION MECHANISM AND SYNTHESIS OF DRUG MOLECULES

Introduction to representation of 3-dimensional structures, Structural and stereoisomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation analysis of n- butane. Organic reactions:Types of Fissions, Types of reagents &types of reactions Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN1, SN2 reactions. Addition reactions: Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions.Grignard additions on carbonyl compounds. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule. Oxidation reactions: Oxidation of alcohols using KMnO4 and chromic acid. Reduction reactions: Reduction of carbonyl compounds using LiAlH4 & NaBH4. Hydroboration of olefins. Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

UNIT - V: INTRODUCTION OF SPECTROSCOPY, SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

Principles of spectroscopy, Classification of spectra(UV-VIS,IR,NMR, Raman spectra, etc), Selection rules and applications of electronic spectroscopy. Vibrational and rotational spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift. Introduction to Magnetic resonance imaging.

TEXT BOOKS:

1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
3. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
4. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5th Edition.
5. University Chemistry, by B.M. Mahan, Pearson IV Edition.
6. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan

REFERENCE BOOKS:

1. Organic chemistry by Morryson and Boyd
2. Organinc Chemistryby Y.R. Sharma.

PROGRAMMING FOR PROBLEM SOLVING

I-B. Tech (II-Semester)

Course Code: A1CS206ES

L T P C

3 - - 3

COURSE OBJECTIVES

1. To impart knowledge about problem solving and algorithmic thinking.
2. To familiarize with the syntax and semantics of C programming language.
3. To learn the usage of structured programming approach in solving problems.
4. To use arrays, pointers, strings and structures in solving problems.
5. To understand how to solve problems related to matrices, Searching and sorting.

COURSE OUTCOMES

1. At the end of the course, student will be able to:
2. Apply algorithmic thinking to understand, define and solve problems
3. Develop computer programs using programming constructs and control structures
4. Decompose a problem into functions to develop modular reusable code.
5. Use arrays, pointers, strings and structures to formulate algorithms and programs.
6. Use files to perform read and write operations.

UNIT – I: INTRODUCTION - PROBLEM SOLVING AND ALGORITHMIC THINKING

Introduction to Computer System, Types of memories, Application and System Software, Problem Solving and Algorithmic Thinking Overview – Problem Definition, logical reasoning, Algorithm definition, practical examples, properties, representation, flowchart, algorithms vs programs.

Algorithmic Thinking – Constituents of algorithms - Sequence, Selection and Repetition, input- output; Computation – expressions, logic; Problem Understanding and Analysis – problem definition, variables, name binding, data organization: lists, arrays etc. algorithms to programs.

UNIT – II: OPERATORS, EXPRESSIONS AND CONTROL STRUCTURES

Introduction to C language: Structure of C programs, C tokens, data types, data inputs, output statements, Operators, precedence and associativity, evaluation of expressions, type conversions in expressions.

Control structures: Decision statements; if and switch statement; Loop control statements: while, for and do while loops, jump statements, break, continue, goto statements.

UNIT - III: ARRAYS AND FUNCTIONS

Arrays: Concepts, one dimensional array, declaration and initialization of one-dimensional arrays, two dimensional arrays, initialization and accessing, multi-dimensional arrays, Basic Searching Algorithms: Linear and Binary search

Functions: User defined and built-in Functions, storage classes, Parameter passing in functions, call by value, call by reference, passing arrays to functions, Recursion as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Towers of Hanoi etc.

UNIT - IV: STRINGS AND POINTERS

Strings: Arrays of characters, variable length character strings, inputting character strings, character library functions, string handling functions.

Pointers: Pointer basics, pointer arithmetic, pointers to pointers, generic pointers, array of pointers, functions returning pointers, Dynamic memory allocation.

UNIT – V: STRUCTURES AND FILE HANDLING

Structures and unions: Structure definition, initialization, accessing structures, nested structures, arrays of structures, structures and functions, self-referential structures, unions, typedef, enumerations.

File handling: command line arguments, File modes, basic file operations read, write and append, example programs.

TEXT BOOKS:

1. Riley DD, Hunt K.A. Computational Thinking for the Modern Problem Solver. CRC press, 2014 Mar 27.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Byron Gottfried, “Programming with C”, Schaum's Outlines Series, McGraw Hill Education, 3rd edition, 2017.

REFERENCE BOOKS:

1. W. Kernighan Brian, Dennis M. Ritchie, “The C Programming Language”, PHI Learning, 2nd Edition, 1988.
2. Yashavant Kanetkar, “Exploring C”, BPB Publishers, 2nd Edition, 2003.
3. Schildt Herbert, “C: The Complete Reference”, Tata McGraw Hill Education, 4th Edition, 2014.
4. R. S. Bichkar, “Programming with C”, Universities Press, 2nd Edition, 2012.
5. Dey Pradeep, Manas Ghosh, “Computer Fundamentals and Programming in C”, Oxford University Press, 2nd Edition, 2006.
6. Stephen G. Kochan, “Programming in C”, Addison-Wesley Professional, 4th Edition, 2014.

ENGLISH FOR EFFECTIVE COMMUNICATION

I-B. Tech (II-Semester)
Course Code: A1EN205HS

L T P C
2 - - 2

INTRODUCTION:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students. In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.

COURSE OBJECTIVES:

1. Improve language proficiency with emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Apply the theoretical and practical components of English syllabus to study academic subjects more effectively and critically.
3. Analyze a variety of texts and interpret them to demonstrate in writing or speech.
4. Write clearly and creatively, and adjust writing style appropriately to the content, the context, and nature of the subject.
5. Develop language components to communicate effectively in formal and informal situations.

COURSE OUTCOMES: Students should be able to:

1. Use English Language effectively in spoken and written forms.
2. Comprehend the given texts and respond appropriately.
3. Communicate confidently in various contexts and different cultures.
4. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
5. Generate dialogues for various situations.

UNIT –I: ‘THE RAMAN EFFECT’ FROM THE PRESCRIBED TEXTBOOK ‘ENGLISH FOR ENGINEERS’ PUBLISHED BY CAMBRIDGE UNIVERSITY PRESS.

Vocabulary: The Concept of Word Formation --The Use of Prefixes and Suffixes. Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions. Reading: Reading and Its Importance- Techniques for Effective Reading. Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – Paragraph writing – Types, Structures and Features of a Paragraph – Creating Coherence-Organizing Principles of Paragraphs in documents.

UNIT –II: ‘ANCIENT ARCHITECTURE IN INDIA’ FROM THE PRESCRIBED TEXTBOOK ‘ENGLISH FOR ENGINEERS’ PUBLISHED BY CAMBRIDGE UNIVERSITY PRESS.

Vocabulary: Synonyms and Antonyms. Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement. Reading: Improving Comprehension Skills – Techniques for Good Comprehension Writing: Format of a Formal Letter-Writing Formal Letters, E.g. Letter of Complaint, Letter of Requisition, and Job Application with Resume.

UNIT –III: ‘ENERGY: ALTERNATIVE SOURCES’ FROM THE PRESCRIBED TEXT BOOK ‘ENGLISH FOR ENGINEERS AND TECHNOLOGISTS’ TEXT BOOK- ORIENT BLACK SWAN.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives- Words from Foreign Languages and their Use in English Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses. Reading: Sub-skills of Reading-Skimming and Scanning Writing: Nature and Style of Sensible Writing- Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence.

UNIT –IV: ‘WHAT SHOULD YOU BE EATING’ FROM THE PRESCRIBED TEXTBOOK ‘ENGLISH FOR ENGINEERS’ PUBLISHED BY CAMBRIDGE UNIVERSITY PRESS.

Vocabulary: Standard Abbreviations in English Grammar: Redundancies and Clichés in Oral and Written Communication. Reading: Comprehension- Intensive Reading and Extensive Reading Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

UNIT –V: ‘GOOD MANNERS’ BY J C HILLS FROM FLUENCY IN ENGLISH – A COURSE BOOK FOR ENGINEERING STUDENTS

Vocabulary: Technical Vocabulary and their usage Grammar: Common Errors in English Reading: Reading Comprehension-Exercises for Practice . Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports -Writing a Report.

TEXT BOOKS:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers Cambridge University Press
2. Department of Humanities and Sciences, (2016) – Anna University - English for Engineers and Technologists –Orient BlackSwan
3. J.C.Hill, (2016) Fluency in English- A Course book for Engineering students- Orient BlackSwan

REFERENCE BOOKS:

1. Swan, M. (2016). Practical English Usage Oxford University Press
2. Kumar, S and Lata, P.(2018). Communication Skills Oxford University Press
3. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well Harper Resource Book
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press
6. Exercises in Spoken English. Parts I –III CIEFL, Hyderabad. Oxford University Press

PROGRAMMING FOR PROBLEM SOLVING LAB

I-B. Tech (II-Semester)
Course Code: A1CS214ES

L T P C
- - 4 2

COURSE OBJECTIVES

1. To be familiarize with flowgorithm to solve simple problems
2. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3. To develop modular, reusable and readable C Programs using the concepts like functions, arrays, strings pointers and structures.

COURSE OUTCOMES

1. At the end of the course, student will be able to
2. Solve simple mathematical problems using Flowgorithm.
3. Correct syntax errors as reported by the compilers and logical errors encountered at run time
4. Develop programs by using decision making and looping constructs.
5. Implement real time applications using the concept of array, pointers, functions and structures.
6. Solve real world problems using matrices, searching and sorting

WEEK – 1:

- a) Installation and working of Flowgorithm Software.
- b) Write and implement basic arithmetic operations using Flowgorithm – sum, average, product, difference, quotient and remainder of given numbers etc.

WEEK – 2:

- a) Draw a flowchart to calculate area of Shapes (Square, Rectangle, Circle and Triangle).
- b) Draw a flowchart to find the sum of individual digits of a 3 digit number.
- c) Draw a flowchart to convert days into years, weeks and days.
- d) Draw a flowchart to read input name, marks of 5 subjects of a student and display the name of the student, the total marks scored, percentage scored.

WEEK – 3:

- a) Draw a flowchart to find roots of a quadratic equation.
- b) Draw a flowchart to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number is even or odd
- c) Draw a flowchart to check whether the triangle is equilateral, isosceles or scalene triangle

WEEK – 4:

- a) Write a C program to swap values of two variables with and without using third variable.
- b) Write a C program to enter temperature in Celsius and convert it into Fahrenheit.
- c) Write a C program to calculate Simple and Compound Interest.
- d) Write a C program to calculate $s = ut + (1/2)at^2$ where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2).

WEEK – 5:

- a) Write a C program to find largest and smallest of given numbers.
- b) Write a C program which takes two integer operands and one operator from the user(+, -, *, /, % use switch)
- c) Write a program to compute grade of students using if else ladder. The grades are assigned as followed:

marks<50	F
50≤marks< 60	C
60≤marks<70	B
70≤marks	B+
80≤marks<90	A
90≤mars≤ 100	A+

WEEK – 6:

- Write a C program to find Sum of individual digits of given integer
- Write a C program to generate first n terms of Fibonacci series
- Write a C program to generate prime numbers between 1 and n
- Write a C Program to find the Sum of Series $SUM=1-x^2/2!+x^4/4!-x^6/6!+x^8/8!-x^{10}/10!$
- Write a C program to generate Pascal's triangle.
- Write a C program to generate pyramid of numbers.

```
1
1   3   1
1   3   5   3   1
```

WEEK – 7:

- Write a C Program to implement following searching methods
 - Binary Search
 - Linear Search
- Write a C program to find largest and smallest number in a list of integers
- Write a C program
 - To add two matrices
 - To multiply two matrices
- Write a C program to find Transpose of a given matrix

WEEK – 8:

- Write a C program to find the factorial of a given integer using functions
- Write a C program to find GCD of given integers using functions
- Write a C Program to find the power of a given number using functions

WEEK – 9:

- Write a C Program to find binary equivalent of a given decimal number using recursive functions.
- Write a C Program to print Fibonacci sequence using recursive functions.
- Write a C Program to find LCM of 3 given numbers using recursive functions

WEEK – 10:

- Write a C program using functions to
- Insert a sub string into a given main string from a given position
- Delete n characters from a given position in a string
- Write a C program to determine if given string is palindrome or not

WEEK – 11:

- Write a C program to print 2-D array using pointers
- Write a C program to allocate memory dynamically using memory allocation functions (malloc, calloc, realloc, free)

WEEK – 12:

- I. Write a C Program using functions to
 - a) Reading a complex number
 - b) Writing a complex number
 - c) Add two complex numbers
 - d) Multiply two complex numbers
 - e) Note: represent complex number using structure

- II. Write a C program to read employee details employee number, employee name, basic salary, hra and da of n employees using structures and print employee number, employee name and gross salary of n employees.

TEXT BOOKS:

1. Riley DD, Hunt K.A. Computational Thinking for the Modern Problem Solver. CRC press, 2014 Mar 27.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Yashavant Kanetkar, “Let Us C”, BPB Publications, New Delhi, 13th Edition, 2012.

REFERENCE BOOKS:

1. Ferragina P, Luccio F. Computational Thinking: First Algorithms, Then Code. Springer; 2018
2. King KN, “C Programming: A Modern Approach”, Atlantic Publishers, 2nd Edition, 2015.
3. Kochan Stephen G, “Programming in C: A Complete Introduction to the C Programming Language”, Sam’s Publishers, 3rd Edition, 2004.
4. Linden Peter V, “Expert C Programming: Deep C Secrets”, Pearson India, 1st Edition, 1994.

ENGINEERING CHEMISTRY LAB

I- B. Tech (II-Semester)
Course Code: A1CH210BS

L T P C
- - 3 1.5

COURSE OBJECTIVES:

The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. To determine the rate of corrosion of different metals
3. The measurement of physical properties like adsorption and viscosity.
4. To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.
5. To determine the acid content by Potentiometry.

COURSE OUTCOMES: The experiments will make the student must able to:

1. Analyse the hardness and chloride content in water.
2. Estimate rate corrosion of different metals.
3. Determine physical properties like adsorption and viscosity.
4. Calculate Rf values of some organic molecules by TLC technique.
5. Determine the acid content in the given sample by using potentiometer.

LIST OF EXPERIMENTS:

I. Conductometry

1. Estimation of an HCl by Conductometric titrations
2. Estimation of Acetic acid by Conductometric titrations

II. Potentiometry:

3. Estimation of HCl by Potentiometric titrations
4. Estimation of Fe²⁺ by Potentiometry using KMnO₄

III. Complexometry:

5. Determination of total hardness of water by complexometric method using EDTA

IV. Argentometry:

6. Determination of chloride content of water by Argentometry

V. Rate of corrosion:

7. Measurement of rate of acid corrosion of different metals

VI. Water Quality Parameters (Analytical Chemistry):

8. Determination of BOD & COD

VII. Saponification

9. Determination of acid value of coconut oil

VIII. Partition Coefficient:

10. Determination of partition coefficient of acetic acid between n-butanol and water.

IX. Chromatography

11. Thin layer chromatography calculation of Rf values. eg separation of ortho and para nitro Phenols

X. Colligative properties

12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of surface tension of a give liquid using stalagnometer.

XI. Synthesis

14. Synthesis of Aspirin and Paracetamol.

REFERENCE BOOKS:

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
3. Vogel's text book of practical organic chemistry 5th edition
4. Text book on Experiments and calculations in Engineering chemistry – S.S. Dara

ENGLISH FOR EFFECTIVE COMMUNICATION SKILLS LAB

I-B. Tech (II-Semester)

Course Code: A1EN213HS

L T P C

- - 3 1.5

The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

COURSE OBJECTIVES:

1. Facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. Enhance English language skills, communication skills and to practice soft skills.
3. Improve fluency and pronunciation intelligibility by providing an opportunity for practice in speaking.
4. Train students in different interview and public speaking skills such as JAM, debate, role play, group discussion etc.
5. In still confidence and make them competent enough to express fluently and neutralize their mother tongue influence.

COURSE OUTCOMES: Students will be able to

1. Recognize differences among various accents and speak with neutralized accent.
2. Neutralization of accent for intelligibility
3. Take part in group activities.
4. Speaking skills with clarity and confidence which in turn enhances their employability
5. Generate dialogues for various situations.

English Language and Communication Skills Lab (ELCS) shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

LISTENING SKILLS

Objectives

1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions.

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

SPEAKING SKILLS

Objectives

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
 - Oral practice: Just A Minute (JAM) Sessions
 - Describing objects/situations/people
 - Role play – Individual/Group activities

Exercise – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

Exercise – II

CALL Lab:

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise - III

CALL Lab:

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations.

Practice: Formal Presentations.

Exercise – IV

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

Exercise – V

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Interview Skills.

Practice: Mock Interviews.

ENGINEERING EXPLORATION

I-B. Tech (II-Semester)

Course Code: A1IO218PW

L T P C

- - 2 1

COURSE OBJECTIVES:

The course should enable the students to:

1. Understand the Engineering attributes and Ethics.
2. Identify the community problem and its stakeholder.
3. Examine required specifications and gap in existing and required product.
4. Build sustaining interactions among people that create social value by transforming ideas into tangible products, services, or initiatives.
5. Develop skills to work collaboratively, reports and progress updates throughout the lifecycle of the project.

UNIT-I: INTRODUCTION TO ENGINEERING AND ENGINEERING EXPLORATION

Engineering Projects in Community Service, Design Thinking Process-Empathize, Define, Ideate, Prototype, Test.

Engineering Ethics: Introduction to ethics, moral values, significance of professional ethics, code of conduct for engineers, identify ethical dilemmas in different tasks of engineering, applying moral theories and codes of conduct for resolution of ethical dilemmas.

UNIT-II: PROBLEM IDENTIFICATION

Authentic need in the community or society. Identify a real user or stake holder, Interaction with Stakeholders, Viewpoints, Interviewing, Scenario.

UNIT-III: SPECIFICATION DEVELOPMENT

Clear and measurable requirements, criteria for success, Identifying relevant benchmarks, identifying the gap between the available and required products, requirements documentation.

UNIT-IV: CONCEPTUAL DESIGN

Ideation-generated multiple ideas, evaluation of ideas, systems model, Architectural Design, prototype development, testing real/simulated users, feedback.

UNIT-V: PROJECT MANAGEMENT

Importance of team work, importance of project life cycle, project management, tools, various tools used in electronics documentation, importance of communication, usage of communication media.

TEXT BOOKS:

1. Software Engineering: A Practitioner's Approach, Roger S. Pressman, 7th Edition, Mc Graw Hill Education (India) Pvt. Ltd.
2. Software Engineering, Sommerville Ian, 7th Edition, Pearson Education.
3. EPICS Design Process https://sharepoint.ecn.purdue.edu/epics/teams/Public%20Documents/EPICS_Design_Process.pdf
4. Examples of good practice in Special Needs Education & Community Based Programs, UNESCO PRESS.
5. Project Management, GRY R. Heerkens, McGraw-Hill

II-YEAR (I-SEMESTER)

DIGITAL LOGIC DESIGN

II-B.Tech (I-Semester)
Course Code: A1IO302ES

L T P C
3 - - 3

COURSE OBJECTIVES:

1. To understand basic number systems, codes and logical gates.
2. To understand the concepts of Boolean algebra.
3. To understand the use of minimization logic to solve the Boolean logic expressions..
4. To understand the design of combinational and sequential circuits.
5. To understand the state reduction methods for Sequential circuits.
6. To understand the basics of various types of memories.

COURSE OUTCOMES:

Upon completion of the Course, the students will be able to:

1. Able to understand number systems and codes.
2. Able to solve Boolean expressions using Minimization methods.
3. Able to design the sequential and combinational circuits.
4. Able to apply state reduction methods to solve sequential circuits.

UNIT-I:

Digital Systems, Binary Numbers, Number base conversions, Octal, Hexadecimal and other base numbers, complements, signed binary numbers, Floating point number representation, binary codes, Error detection and correction, binary storage and registers, binary logic, Boolean algebra and logic gates , Basic theorems and properties of Boolean Algebra, Boolean functions, canonical and standard forms, Digital Logic Gates.

UNIT-II:

Gate–Level Minimization, The K-Map Method, Three-Variable Map, Four-Variable Map, Five-Variable Map , sum of products , product of sums simplification, Don't care conditions , NAND and NOR implementation and other two level implementations, Exclusive-OR function.

UNIT-III:

.Combinational Circuits (CC), Analysis procedure, Design Procedure, Combinational circuit for different code converters and other problems, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, Demultiplexers.

UNIT-IV:

Synchronous Sequential Circuits, Latches, Flip-flops, analysis of clocked sequential circuits, Registers, Shift registers, Ripple counters, Synchronous counters, other counters. Asynchronous Sequential Circuits - Introduction, Analysis procedure, Circuits with latches, Design procedure, Reduction of state and follow tables, Race- free state assignment, Hazards

UNIT-V:

Memory: Introduction, Random-Access memory, Memory decoding, ROM, Programmable Logic Array, Programmable Array Logic, Sequential programmable devices. Register Transfer and Microoperations - Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit.

TEXT BOOKS:

1. Digital Design, M. Morris Mano, M.D.Ciletti, 5th edition, Pearson.(Units I, II, III, IV, Part of Unit V)
2. Computer System Architecture, M.Morris Mano, 3rd edition, Pearson.(Part of Unit V)

REFERENCE BOOKS:

1. Switching and Finite Automata Theory, Z. Kohavi, Tata McGraw Hill.
2. Fundamentals of Logic Design, C. H. Roth, L. L. Kinney, 7th edition, Cengage Learning.
3. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman, John Wiley.

DATA STRUCTURES

II-B.Tech (I-Semester)
Course Code: A1IO303PC

L T P C
3 - - 3

COURSE OBJECTIVES:

1. Impart the basic concepts of data structures and algorithms.
2. Understand concepts linked lists and their applications.
3. Understand basic concepts about stacks, queues and their applications.
4. Understand basic concepts of trees, graphs and their applications.
5. Enable them to write algorithms for sorting and searching and hashing.
6. Use advanced data structures like B-Trees, AVL-trees etc., for efficient problem solving.

COURSE OUTCOMES:

At the end of the course, student will be able to:

1. Evaluate algorithms in terms of time and memory complexity.
2. Formulate new solutions for problems or improve existing code using data structures and algorithms.
3. Implement basic data structures such as arrays, linked lists, stacks and queues.
4. Solve problem involving graphs, trees and heaps
5. Apply Algorithms for solving problems like sorting, searching, and hashing.
6. Implement advanced data structures such as B-Trees, Red-Black, and AVL-Trees

UNIT-I: INTRODUCTION TO DATA STRUCTURES

Basic concepts- Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big O, Omega and Theta notations, **Introduction to Linear and Non Linear data structures-**Singly Linked Lists-Operations-Insertion, Deletion, Concatenating singly linked lists, Circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists- Operations- Insertion, Deletion. Representation of single, two dimensional arrays, sparse matrices-array and linked representations.

UNIT-II: STACKS AND QUEUES

Stacks-Stack ADT, definition, operations, array and linked implementations in C, applications-infix to postfix conversion, Postfix expression evaluation, recursion implementation,
Queues-Queue ADT, definition and operations, array and linked Implementations in C, Circular queues-Insertion and deletion operations, Dequeue (Double ended queue) ADT, array and linked implementations in C.

UNIT-III: TREES AND GRAPHS

Trees – Terminology, Representation of Trees, Binary tree ADT, Properties of Binary Trees, Binary Tree Representations-array and linked representations, Binary Tree traversals, threaded binary trees,
Max Priority Queue-ADT-implementation-Max Heap-Definition, Insertion into a Max Heap, Deletion from a Max Heap. Graphs, Introduction, Definition, Terminology, Graph ADT, Graph Representations- Adjacency matrix, Adjacency lists, Graph traversals- DFS and BFS.

UNIT-IV: SEARCHING AND SORTING

Searching- Linear Search, Binary Search, Static Hashing-Introduction, hash tables, hash functions, Overflow Handling.
Sorting-Insertion Sort, Selection Sort, Radix Sort, Quick sort, Merge Sort, Heap Sort, Comparison of Sorting methods.

UNIT-V: BINARY SEARCH TREES

Search Trees-Binary Search Trees, Definition, Operations- Searching, Insertion and Deletion, AVL Trees- Definition and Examples, Insertion into an AVL Tree ,B-Trees, Definition, B-Tree of order m, operations- Insertion and Searching, Introduction to Red-Black and Splay Trees(Elementary treatment-only Definitions and Examples), Comparison of Search Trees.

Pattern matching algorithm- The Knuth-Morris-Pratt algorithm, Tries (examples only).

TEXT BOOKS:

1. “Fundamentals of Data Structures”, Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.
2. Fundamentals of Data structures in C, 2nd Edition, E.Horowitz, S.Sahni and Susan Anderson-Freed, Universities Press

REFERENCE BOOKS:

1. Algorithms, Data Structures, and Problem Solving with C++”, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
2. “How to Solve it by Computer”, 2nd Impression by R. G. Dromey, Pearson Education

DATA BASE MANAGEMENT SYSTEMS

II-B.Tech (I-Semester)**Course Code: AIIO304PC****L T P C****3 - - 3**

COURSE OBJECTIVES:

1. To understand the basic concepts and the applications of database systems.
2. To master the basics of SQL and construct queries using SQL.
3. To understand the relational database design principles.
4. To become familiar with the basic issues of transaction processing and concurrency control.
5. To become familiar with database storage structures and access techniques.

COURSE OUTCOMES:

1. Demonstrate the basic elements of a relational database management system.
2. Ability to identify the data models for relevant problems.
3. Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data.
4. Apply normalization for the development of application software.

UNIT –I

Introduction: Database System Applications, Purpose of Database Systems, View of Data, Database Languages – DDL, DML, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database Users and Administrators, History of Database Systems. Introduction to Data base design: Database Design and ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises.

Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base

Design: ER to Relational, Introduction to Views, Destroying /Altering Tables and Views

UNIT –II

Relational Algebra and Calculus: Preliminaries, Relational Algebra, Relational calculus –Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus.

SQL: Queries, Constraints, Triggers: Form of Basic SQL Query, UNION, INTERSECT, and EXCEPT, Nested Queries, Aggregate Operators, NULL values Complex Integrity Constraints in SQL, Triggers and Active Data bases, Designing Active Databases..

UNIT –III

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies - Reasoning about FDs, Normal Forms, Properties of Decompositions, Normalization, Schema Refinement in Database Design, Other Kinds of Dependencies

UNIT –IV

Transaction Management: Transactions, Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity Transaction Isolation Levels, Implementation of Isolation Levels.

Concurrency Control: Lock–Based Protocols, Multiple Granularity, Timestamp–Based Protocols, Validation–Based Protocols, Multiversion Schemes.

Recovery System–Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with loss of nonvolatile storage, Early Lock Release and Logical Undo Operations, Remote Backup systems

UNIT –V

Storage and Indexing: Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing, Index Data Structures, Comparison of File Organizations.

Tree-Structured Indexing: Intuition for tree Indexes, Indexed Sequential Access Method (ISAM), B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.

Hash- Based Indexing: Static Hashing, Extendible hashing, Linear Hashing, Extendible vs. Linear Hashing.

TEXT BOOK:

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw Hill Education (India) Private Limited, 3rd Edition. (Part of UNIT-I, UNIT-II,UNIT-III, UNIT-V)
2. Data base System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, McGraw Hill Education(India) Private Limited 1, 6th edition.(Part of UNIT-I,UNIT-IV).

REFERENCE BOOKS:

1. Database Systems, 6th edition, R Elmasri, Shamkant B.Navathe, Pearson Education.
2. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning.
3. Introduction to Database Management, M. L. Gillenson and others, Wiley Student Edition.
4. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
5. Introduction to Database Systems, C. J. Date, Pearson Education.

COMPUTER ORIENTED STATISTICAL METHODS

II-B.Tech (I-Semester)

Course Code: AIIO301BS

L T P C

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PRE-REQUISITES: Mathematics courses of first year of study.

COURSE OBJECTIVES:

1. Apply the concept of Correlation and regression with rank correlation.
2. To learn the basic ideas of probability and random variables.
3. Discuss various discrete and continuous probability distributions and their properties.
4. Explain the concept of Test of significance.
5. Understand the concept of stochastic process and Markov chains.

COURSE OUTCOMES: After learning the contents of this paper the student must be able to

1. Explain the concept of correlation and regression.
2. Understand the concept of probability and random variables.
3. Explain the concept of probability distributions.
4. Analyze the Testing of hypothesis.
5. Apply the Markov chain and stochastic process.

UNIT - I: APPLIED STATISTICS

Correlation, Coefficient of Correlation, Multiple Correlation, Rank Correlation, Regression, Regression Coefficient, The lines of Regression, Multiple Regression.

UNIT – II: BASIC PROBABILITY

Probability, Sample Space, Probability of an Event, Conditional probability Multiplication theorem(without proof), Independent events and Baye’s theorem.

Random variables: Discrete random variable, Probability distribution function Continuous random variables, Probability density function, Expectation and Variance of Random Variables.

UNIT - III: PROBABILITY DISTRIBUTIONS

Binomial distribution, Poisson distribution, Evaluation of Statistical parameters for these distributions, Poisson approximation to the binomial distribution. Fitting of Binomial and Poisson distributions. Normal distribution, Properties and Evaluation of statistical parameters for Normal distribution.

UNIT – IV TESTING OF HYPOTHESIS

Test of significance: Basic of testing of Hypothesis. Null and alternate Hypothesis, Types of errors, Level of significance, Critical region.

Large sample test for Single proportion, Difference of proportions, Single mean, Difference of means; Small sample tests: Test for single mean, Difference of means and test for ratio of variances.

UNIT – V STOCHASTIC PROCESSES AND MARKOV CHAINS:

Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n- step transition probabilities, Markov chain, Steady state condition, Markov analysis.

TEXT BOOKS:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, keying Ye, Probability and statistics for engineers and scientists, 9th Edition, Pearson Publications
2. Fundamentals of Mathematical Statistics, Khanna Publications, S C Guptha and V.K. Kapoor.
3. S.D. Sharma, Operations research Kedarnath and ramnath publishers.

REFERENCE BOOKS:

1. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations
2. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
3. Probability and Statistics for engineers and scientists by Jay.I.Devore.

DIGITAL LOGIC DESIGN LAB

II-B.Tech (I-Semester)

Course Code: AIIO305ES

L T P C

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COURSE OBJECTIVES:

1. To understand basic number systems, codes and logical gates
2. To give understanding of various types of amplifier circuits
3. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems
4. To understand the concepts of combinational logic circuits and sequential circuit

COURSE OUTCOMES: Upon completion of the Course, the students will be able to

1. Know the characteristics of various components. Understand the utilization of components.
2. Design and analyze small signal amplifier circuits.
3. Postulates of Boolean algebra and to minimize combinational functions
4. Design and analyze combinational and sequential circuits
5. Known about the logic families and realization of logic gates

LIST OF EXPERIMENTS:

WEEK 1: Realization of Boolean Expressions using Gates

WEEK 2: Design and realization logic gates using universal gates

WEEK 3: Generation of clock using NAND / NOR gates

WEEK 4: Design a 4 – bit Adder / Subtractor

WEEK 5 Design and realization of a 4 – bit gray to Binary and Binary to Gray Converter

WEEK 6: Design and realization of an 8 bit parallel load and serial out shift register using flip-flops.

WEEK 7: Design and realization of a Synchronous and Asynchronous counter using flip-flops

WEEK 8: Design and realization of Asynchronous counters using flip-flops

WEEK 9: Design and realization of 8x1 MUX using 2x1 MUX

WEEK10: Design and realization of 4 bit comparator

WEEK 11: Design and Realization of a sequence detector-a finite state machine

Major Equipment's required for Laboratories:

1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated Power Supply.
2. 20 MHz Oscilloscope with Dual Channel.
3. Bread board and components/ Trainer Kit.

TEXT BOOKS:

1. Switching and Finite Automata Theory - Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge, 2010.
2. Modern Digital Electronics – R. P. Jain, 3rd Edition, 2007- Tata McGraw-Hill

REFERENCE BOOKS:

1. Digital Design- Morris Mano, PHI, 4th Edition,2006
2. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed John Wiley & Sons Inc.
3. Fundamentals of Logic Design- Charles H. Roth, Cengage Learning, 5th, Edition, 2004.
4. Switching Theory and Logic Design – A Anand Kumar, PHI, 2013

DATA STRUCTURES LAB

II-B.Tech (I-Semester)**Course Code: AIIO306PC****L T P C****- - 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to:

1. Ability to identify the appropriate data structure for given problem.
2. Design and analyze the time and space complexity of algorithm or program.
3. Effectively use compilers include library functions, debuggers and troubleshooting.
4. Write and execute programs using data structures such as arrays, linked lists to implement stacks, queues.
5. Write and execute programs in C to implement various sorting and searching.
6. Write and execute programs using data structures such as arrays, linked lists to implement trees, graphs, hash tables and search trees.

COURSE OUTCOMES:

The course should enable the students to:

1. Use appropriate data structure for given problem.
2. To analyze the time and space complexity of algorithm or program.
3. Use compilers include library functions, debuggers and troubleshooting.
4. Execute programs using data structures such as arrays, linked lists to implement stacks and queues.
5. Execute write programs in C to implement various sorting and searching.
6. Execute programs using data structures such as arrays, linked lists to implement trees, graphs, hash tables and search trees

LIST OF EXPERIMENTS

WEEK-1: SINGLE LINKED LIST

Write a C program that uses functions to perform the following:

- a) Create a singly linked list of integers.
- b) Delete a given integer from the above linked list.
- c) Display the contents of the above list after deletion.

WEEK-2: DOUBLE LINKED LIST

Write a C program that uses functions to perform the following:

- a) Create a doubly linked list of integers.
- b) Delete a given integer from the above doubly linked list.
- c) Display the contents of the above list after deletion.

WEEK-3: INFIX TOPOSTFIX CONERSION

Write a C program that uses stack operations to convert a given infix expression into its postfix Equivalent, Implement the stack using an array.

WEEK-4: DOUBLE ENDED QUEUE

Write C programs to implement a double ended queue ADT using i) array and ii) doubly linked list

WEEK-5: BINARY SEARCH TREES USING RESURSION

Write a C program that uses functions to perform the following:

- a) Create a binary search tree of characters.
- b) Traverse the above Binary search tree recursively in Postorder

WEEK-6: BINARY SEARCH TREES USING NON-RECURSION

Write a C program that uses functions to perform the following:

- a) Create a binary search tree of integers.
- b) Traverse the above Binary search tree non recursively in order.

WEEK-7: SORTING

Write C programs for implementing the following sorting methods to arrange a list of integers in Ascending order:

- a) Insertion sort
- b) Merge sort

WEEK-8: SORTING

Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order:

- a) Quicksort
- b) Selection sort

WEEK-9: AVL-TREES

- a) Write a C program to perform the following operations on AVL:
 - i. Insertion into an AVL.
 - ii. Display elements of AVL Tree
- b) Write a C program for implementing Heap sort algorithm for sorting a given list of integers in ascending order

WEEK-10: HASHING

Write a C program to implement all the functions of a dictionary (ADT) using hashing.

WEEK-11: PATTERN MATCHING ALGORITHM

Write a C program for implementing Knuth-Morris- Pratt pattern matching algorithm.

WEEK-12: GRAPH TRAVERSAL ALGORITHMS

Write C programs for implementing the following graph traversal algorithms:

- a) Depth first traversal
- b) Breadth first traversal

TEXT BOOKS:

1. C and Data Structures, Prof. P.S.Deshpande and Prof. O.G. Kakde, DreamtechPress.
2. Data structures using C, A.K.Sharma, 2nd edition, Pearson.
3. Data Structures using C, R.Thareja, Oxford UniversityPress.

DATABASE MANAGEMENT SYSTEMS LAB

II-B.Tech (I-Semester)
Course Code: AIIO307PC

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COURSE OBJECTIVES:

The course should enable the students to:

1. Apply the basic concepts of Database Systems and Applications.
2. Use the basics of SQL and construct queries using SQL in database creation and interaction
3. Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.
4. Analyze and Select storage and recovery techniques of database system.

COURSE OUTCOMES:

Upon successful completion of this course, student will be able to:

1. Apply the basic concepts of Database Systems and Applications.
2. Develop an ER model for a given database.
3. Use the basics of SQL and construct queries using SQL in database creation and interaction.
4. Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.

LIST OF EXPERIMENTS:

WEEK-1: INTRODUCTION TO E R MODEL

Student should select a case study from given ideas and formulate the problem statement.

WEEK-2: CONCEPTUAL DESIGNING USING ER DIAGRAMS

Conceptual Designing using ER Diagrams (Identifying entities, attributes, keys and relationships between entities, cardinalities, generalization, specialization etc.) Note: Student is required to submit a document by drawing ER Diagram to the Lab teacher.

WEEK-3: CONVERTING ER MODEL TO RELATIONAL MODEL

Converting ER Model to Relational Model (Represent entities and relationships in Tabular form, Represent attributes as columns, identifying keys) Note: Student is required to submit a document showing the database tables created from ER Model.

WEEK-4: NORMALIZATION

Normalization -To remove the redundancies and anomalies in the above relational tables, Normalize up to Third Normal Form

WEEK-5: CREATION OF TABLES USING SQL

Creation of Tables using SQL- Overview of using SQL tool, Data types in SQL, Creating Tables (along with Primary and Foreign keys), Altering Tables and Dropping Tables.

WEEK-6: DML COMMANDS

Practicing DML commands- Insert, Select, Update, Delete.

WEEK-7: QUERIES

Practicing Queries using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT, CONSTRAINTS etc.

WEEK-8: SUB QUERIES

Practicing Sub queries (Nested, Correlated) and Joins (Inner, Outer and Equi).

WEEK-9: AGGREGATE FUNCTIONS

Practice Queries using COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING, VIEWS Creation and Dropping.

WEEK-10: TRIGGERS

Practicing on Triggers - creation of trigger, Insertion using trigger, Deletion using trigger, Updating using trigger.

WEEK-11: PROCEDURES

Procedures- Creation of Stored Procedures, Execution of Procedure, and Modification of Procedure.

WEEK-12: CURSORS

Cursors- Declaring Cursor, Opening Cursor, Fetching the data, closing the cursor.

REFERENCE BOOKS:

1. Database System Concepts, by Silberschatz, Sudarshan, and Korth, 6th edition.
2. Database management System by Raghu Rama Krishna, 3rd edition.

ENVIRONMENTAL STUDIES

II-B.Tech (I-Semester)**Course Code: A1IO303MC****L T P C****2 - - -**

COURSE OBJECTIVES:

1. Understanding the importance of ecological balance for sustainable development.
2. Acquire the knowledge of importance of natural resources & apply conservation techniques.
3. Analyzing the importance of Biodiversity.
4. Estimate the impacts of Environmental pollution, developmental activities and mitigation measures.
5. Evaluation of the environmental policies and regulations.

COURSE OUTCOMES:

1. Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles.
2. Able to apply the conservation methods of natural resources.
3. Able to analyze the conservation techniques of biodiversity.
4. Able to apply pollution control methods.
5. Able to understand and apply environmental regulations which in turn helps in sustainable development.

UNIT-I: ECOSYSTEMS

Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio-magnification.

UNIT-II: NATURAL RESOURCES: CLASSIFICATION OF RESOURCES

Living and Non-Living resources, Water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III: BIODIVERSITY AND BIOTIC RESOURCES

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and optional values. Hot spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV ENVIRONMENTAL POLLUTION AND CONTROL TECHNOLOGIES

Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Concepts of bioremediation.

Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions /Protocols: Earth summit, Kyoto protocol, and Montréal Protocol.

UNIT-V ENVIRONMENTAL POLICY, LEGISLATION & EIA

Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). Towards Sustainable Future: Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building,

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

HUMAN VALUES & PROFESSIONAL ETHICS

II-B.Tech (I-Semester)

Course Code: A1IO403MC

L T P C

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COURSE OBJECTIVES:

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.

COURSE OUTCOMES:

1. It ensures students sustained happiness through identifying the essentials of human values and skills.
2. It facilitates a correct understanding between profession and happiness
3. It helps students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.
4. Ability to develop appropriate technologies and management patterns to create harmony in professional and personal life.

UNIT-I:

Course Introduction - Need, basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration - what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation - as the mechanism for self-exploration. Continuous Happiness and Prosperity - A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities - the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT-II:

Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT-III:

Understanding Harmony in the Family and Society - Harmony in Human – Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfilment to ensure Ubhay-tripti;

Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!

UNIT-IV:

Understanding Harmony in the nature and Existence - Whole existence as Co-existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature - recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astiva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT-V:

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order. At the level of individual: as socially and ecologically responsible engineers, technologists and managers

At the level of society: as mutually enriching institutions and organizations.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

REFERENCE BOOKS:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Susan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.

RELEVANT CDS, MOVIES, DOCUMENTARIES & OTHER LITERATURE:

1. Value Education website, <http://www.uptu.ac.in>
2. Story of Stuff, <http://www.storyofstuff.com>
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology - the Untold Story

II-YEAR (II-SEMESTER)

COMPUTER ORGANIZATION AND ARCHITECTURE

II-B.Tech (II-Semester)
Course Code: A1IO401PC

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COURSE OBJECTIVES:

1. The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
2. It begins with basic organization, design, and programming of a simple digital computer and
3. Introduces simple register transfer language to specify various computer operations.
4. Topics include computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

COURSE OUTCOMES:

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

1. Identify various components of computer and their interconnection
2. Identify basic components and design of the CPU: the ALU and control unit.
3. Compare and select various Memory devices as per requirement.
4. Compare various types of IO mapping techniques
5. Critique the performance issues of cache memory and virtual memory

UNIT-I:

Structure of Computers: Structure of Computers: Computer types, Functional units, Basic operational concepts, Von Neumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point. **COMPUTER ARITHMETIC:** Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations

UNIT-II:

Basic Computer Organization and Design: Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC.

UNIT-III:

Register Transfer and Micro-Operations: Register Transfer and Micro-Operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit.

Micro-Programmed Control: Control Memory, Address Sequencing, Micro-Program, Design of Control Unit.

UNIT-IV:

Memory System: MEMORY SYSTEM: Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Virtual memory, Secondary Storage, RAID.

UNIT-V:

Memory System: INPUT OUTPUT: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA. **MULTIPROCESSORS:** Characteristics of multiprocessors, Interconnection structures, Inter Processor Arbitration, Inter processor Communication and Synchronization, Cache Coherence

TEXT BOOKS:

1. M. Morris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.
2. John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGraw Hill.

REFERENCE BOOKS:

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.
2. William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersey.
3. Andrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education Inc,

SENSORS AND DEVICES

II-B.Tech (II-Semester)
Course Code: A1IO402PC

L T P C
3 - - 3

COURSE OBJECTIVES:

1. To introduce the terminology, technology and its applications
2. To introduce the concept of M2M (machine to machine) with necessary protocols
3. To introduce the Python Scripting Language which is used in many IoT devices
4. To introduce the Raspberry PI platform, that is widely used in IoT applications
5. To introduce the implementation of web-based services on IoT devices

COURSE OUTCOMES:

1. Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved.
2. Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules
3. Market forecast for IoT devices with a focus on sensors
4. Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi

UNIT-I

Introduction to Internet of Things- Definition and Characteristics of IoT, Sensors, Actuators, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Agriculture and Industry.

UNIT-II

IoT and M2M- Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT-III

IoT Physical Devices and Endpoints- Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), Programming – Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins.

UNIT-IV

Controlling Hardware- Connecting LED, Buzzer, Switching High Power devices with transistors, Controlling AC Power devices with Relays, Controlling servo motor, speed control of DC Motor, unipolar and bipolar Stepper motors Sensors- Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11, Motion Detection Sensors, Wireless Bluetooth Sensors, Level Sensors, USB Sensors, Embedded Sensors, Distance Measurement with ultrasound sensor.

UNIT-V

IoT Physical Servers and Cloud Offerings– Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API.

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759
3. Raspberry Pi Cookbook, Software and Hardware Problems and solutions, Simon Monk, O'Reilly (SPD), 2016, ISBN 7989352133895

REFERENCE BOOKS:

1. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015
2. Peter Friess, 'Internet of Things – From Research and Innovation to Market Deployment', River Publishers, 2014
3. N. Ida, 'Sensors, Actuators and Their Interfaces', SciTech Publishers, 2014.

OPERATING SYSTEMS

II-B.Tech (II-Semester)
Course Code: A1IO403PC

L T P C
3 - - 3

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To understand the role of OS in the overall computer system and study the operations performed by OS as a resource manager.
2. To understand the scheduling policies and different memory management techniques for different operating systems.
3. To understand process concurrency and synchronization.
4. To understand the concepts of I/O, storage and file management and introduce system call interface for file and process management.
5. To introduce the goals and principles of protection

COURSE OUTCOMES:

At the end of the course, student will be able to:

1. Acquire a High-level understanding of what are an operating system and the role it plays and the services it provides.
2. Understand process management concepts including scheduling, synchronization.
3. Describe System model for deadlock, Methods for handling deadlocks.
4. Understand memory management including virtual memory.
5. Acquire Knowledge on issues related to file system interface and implementation.

UNIT-I

Overview-Introduction-Operating system objectives, User view, System view, Operating system definition, Computer System Organization, Computer System Architecture, OS Structure, OS Operations, Process Management, Memory Management, Storage Management, Protection and Security, Computing Environments.

Operating System services, User and OS Interface, System Calls, Types of System Calls, System Programs, Operating System Design and Implementation, OS Structure.

UNIT-II

Process: Process concepts-The Process, Process State, Process State transitions, Process Control Block, Context Switch.

Threads: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads.

Process Scheduling: Scheduling Queues, Schedulers, Scheduling Criteria, Scheduling algorithms, Multiprocessor Scheduling. Case Studies: Linux, Windows.

UNIT-III

Process Synchronization: Inter-process Communication: Background, The Critical Section Problem, Race Conditions, Mutual Exclusion, Peterson's solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization- Bounded Buffer Problem, The Producer/ Consumer Problem, Reader's & Writer Problem, Dining Philosopher Problem, Event counters, Monitors, Message passing.

Deadlocks: Deadlocks - System Model, Deadlock Characterization: Necessary and sufficient conditions for Deadlock, Methods for Handling Deadlocks: Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

UNIT-IV

Memory Management: Basic Hardware, Address Binding, Logical and physical address space, Dynamic loading, linking and Shared libraries, Swapping, Contiguous Memory Allocation- Fixed and variable partition-Internal and External fragmentation and Compaction; Segmentation, Paging- Hardware support for paging, Protection, shared pages, Structure of Page Table. Case Studies: Linux, Windows.

Virtual Memory Management: Background, Demand Paging-locality of reference, Page fault; Copy-on-Write, Page replacement, Page Replacement Algorithms, Allocation of Frames, Thrashing.

UNIT–V

File Management: Concept of File - Attributes, operations, file types, internal structure, access methods, Directory structure, file protection, file system structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

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

Protection: System Protection, Goals of Protection, Principles of Protection.

TEXT BOOKS

1. Abraham Silberschatz, Peter B.Galvin, Greg Gagne, Operating System Concepts, 9th Edition, Wiley Asia Student Edition.
2. William Stallings, Operating Systems: Internals and Design Principles, 5th Edition, Prentice Hall of India.

REFERENCE BOOKS:

1. Charles Crowley, Operating System: A Design-oriented Approach, 1st Edition, Irwin Publishing.
2. Gary J. Nutt, Addison, Operating Systems: A Modern Perspective, 2nd Edition, Wesley.
3. Maurice Bach, Design of the UNIX Operating Systems, 8th Edition, Prentice Hall of India.
4. Daniel P. Bovet, Marco Cesati, Understanding the Linux Kernel, 3rd Edition, O'Reilly and Associates.

DISCRETE MATHEMATICS

II-B.Tech (II-Semester)
Course Code: A1IO404PC

L T P C
3 - - 3

COURSE OBJECTIVES:

1. To help students understand discrete and continuous mathematical structures
2. To impart basics of relations and functions
3. To facilitate students in applying principles of Recurrence Relations to calculate generating functions and solve the Recurrence relations
4. To acquire knowledge in graph theory

COURSE OUTCOMES:

1. Apply the knowledge of discrete and continuous mathematical structures.
2. Solve various problems on relations and functions.
3. Apply the principles of Recurrence Relations to generate functions and solve various problems on it.
4. Solve problems using the knowledge of graph theory.

UNIT-I: MATHEMATICAL LOGIC

Statements and notations, Connectives, Well-formed formulas, Truth Tables, Tautology, Equivalence implication, Normal forms, Logical Inference, Rules of inference, Direct Method, Direct Method using CP(Conditional Proof), Consistency, Proof of contradiction, Automatic Theorem Proving. Quantifiers, Universal quantifiers. Predicates: Predicative logic, Free & Bound variables.

UNIT-II: RELATIONS

Introduction to set theory, Relations, Properties of Binary Relations, Equivalence Relation, Transitive closure, Compatibility and Partial ordering relations, Lattices, Hasse diagram. Functions: inverse Function , Composition of functions, Recursive Functions

UNIT-III: ELEMENTARY COMBINATORICS

Basis of counting, Combinations & Permutations, Enumeration of Combinations and Permutations, Enumeration of Combinations and Permutations With repetitions, Enumerating Permutations with Constrained repetitions, Binomial Coefficients, Binomial and Multinomial theorems, The principles of Inclusion – Exclusion, Pigeon- hole principles and its applications.

UNIT-IV: RECURRENCE RELATION

Generating Functions, Function of Sequences, Calculating Coefficient of generating function, Recurrence relations, Solving recurrence relation by substitution and Generating functions, The method of Characteristics roots, Solution of Inhomogeneous Recurrence Relation.

UNIT-V: GRAPHS

Basic Concepts, Isomorphism and Sub graphs, Trees and their properties, Spanning Trees- DFS,BFS, Minimal Spanning Trees- Prims, Kruskal's Algorithm, Planar Graphs, Euler's Formula, Multi graph and Euler circuits, Hamiltonian Graphs, Chromatic number.

TEXT BOOKS:

1. T1. Discrete Mathematics for computer scientists & Mathematicians, J.L. Mott, A. Kandel, T.P. Baker PHI
2. Discrete Mathematical Structures With Applications to Computer Science, JP Tremblay, R Manohar

REFERENCE BOOK:

1. R1. Logic and Discrete Mathematics, *Grass Man & Trembley*, Pearson Education.

PYTHON PROGRAMMING

II-B.Tech (II-Semester)
Course Code: AIIO405PC

L T P C
3 - - 3

COURSE OBJECTIVES:

1. Understand the basics and function of Python Programming Language.
2. Understand the string operation and sequences used in Python Programming Languages.
3. Understand the data structures used in Python Programming Languages.
4. Know the classes and objects in Python Programming Language.
5. Use the reusability concepts in Python Programming Language.

COURSE OUTCOMES:

1. Apply control structures and functions in Program
2. Analyze various String handling functions and data structures
3. Apply the files and object orientation concepts
4. Solve the problems by using Inheritance and polymorphism
5. Illustrate programs on various python libraries such as numpy, pandas and matplotlib

UNIT - I

Introduction to Python Programming: Features of Python Language, Data Types, Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Shift Operators, Ternary operator, Membership Operators, Identity Operators, Expressions and order of evaluations. Illustrative examples on all the above operators, Expressions, Control Statements, and Standard I/O Operations: input, print, 'sep', 'end'.

Functions and Modules: Declaration and Definition Function Calling, Defining Functions, Recursive Functions, Modules, Packages in Python, Doc Strings, Built-in Functions.

UNIT – II

Strings and Regular Expressions: String Operations, Built-in String Methods and Functions, Comparing Strings, functions in Regular Expression.

Sequence: List, Tuples, Dictionaries.

UNIT - III

File Handling: Introduction, File Path, Types of Files, Opening and Closing Files, Reading and Writing Files, File Positions, Renaming and Deleting Files, Directory Methods.

Implementation of classes and objects in Python: Classes and Objects, Methods and Self Argument, The init Method, Class Variables and Object Variables, The del Method, Public and Private Data Members, Private Methods, Built-in Functions to Check, Get, Set and Delete Class Attributes, Garbage Collection (Destroying Objects).

UNIT – IV

Implementation of Inheritance in Python: Inheriting Classes in Python, Types of Inheritance, Composition/Containership, Abstract Classes and Interfaces, Meta class, Implementing Operator Overloading,

Overriding Methods Exception Handling in Python: Introduction, Exception hierarchy, Handling Exception, Multiple except Blocks and Multiple Exceptions, Finally Block.

UNIT - V

Python NumPy: Features of Numpy, NumPyndarray, Data Types, Functions of NumPy Array, Numpy Array Indexing, Mathematical Functions on Arrays in NumPy.

Python Pandas: Pandas Features, Install Pandas, Dataset in Pandas, Series, DataFrames, Panel, Manipulating the Datasets, Describing a Dataset, group by Function, Filtering, Missing Values in Pandas, Concatenating Data Frames

Matplotlib: Formatting the style of plot, plotting with keyword strings, plotting with categorical variables, controlling line properties.

TEXT BOOKS:

1. Core Python Programming, by R.NageswaraRao
2. Reema Thareja, Python Programming using Problem Solving Approach, First Edition, Oxford Higher Education.

REFERENCE BOOKS:

1. Kenneth A.Lambert, Fundamentals of Python
2. Charles Dierach, Introduction to Computer Science using Python

SENSORS AND DEVICES LAB

II-B.Tech (II-Semester)
Course Code: A1IO406PC

L T P C
- - 3 1.5

COURSE OBJECTIVES:

1. It covers various concepts of C programming language
2. It introduces searching and sorting algorithms
3. It provides an understanding of data structures such as stacks and queues

COURSE OUTCOMES:

1. Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
2. Ability to Implement searching and sorting algorithms

LIST OF EXPERIMENTS:

WEEK 1: Connect an LED to GPIO pin 25 and control it through command line

WEEK 2: Connect an LED to GPIO pin 24 and a Switch to GPIO 25 and control the LED with the switch.

WEEK 3: The state of LED should toggle with every press of the switch Use DHT11 temperature sensor and print the temperature and humidity of the room with an interval of 15 seconds

WEEK 4: Use joystick and display the direction on the screen

WEEK 5: Use Light Dependent Resistor (LDR) and control an LED that should switch-on/off depending on the light.

WEEK 6: Create a traffic light signal with three colored lights (Red, Orange and Green) with a duty cycle of 5-2-10 seconds.

WEEK 7: Switch on and switch of a DC motor based on the position of a switch.

WEEK 8: Convert an analog voltage to digital value and show it on the screen.

WEEK 9: Create a door lock application using a reed switch and magnet and give a beep when the door is opened.

WEEK 10: Control a 230V device (Bulb) with Raspberry Pi using a relay.
Control a 230V device using a threshold temperature, using temperature sensor

WEEK 11: Create an application that has three LEDs (Red, Green and white). The LEDs should follow the cycle (All Off, Red On, Green On, White On) for each clap (use sound sensor)

WEEK 12: Create a web application for the above applications wherever possible with suitable modifications to get input and to send output.

OPERATING SYSTEMS LAB

II-B.Tech (II-Semester)
Course Code: A1IO407PC

L T P C
- - 3 1.5

COURSE OBJECTIVES:

1. To provide an understanding of the design aspects of operating system concepts through simulation
2. Introduce basic Unix commands, system call interface for process management, inter process communication and I/O in Unix

COURSE OUTCOMES:

1. Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
2. Able to implement C programs using Unix system calls

LIST OF EXPERIMENTS

1. Write C programs to simulate the following CPU Scheduling algorithms
 - a. FCFS
 - b. SJF
 - c. Round Robin
 - d. priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms
 - a. Pipes
 - b. FIFOs
 - c. Message Queues
 - d. Shared Memory
6. Write C programs to simulate the following memory management techniques
 - a. Paging
 - b. Segmentation

TEXT BOOKS:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the UNIX environment, W.R.Stevens, *Pearson* education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System - A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education

IT WORKSHOP LAB

II-B.Tech (II-Semester)
Course Code: A1IO408PC

L T P C
- - 3 1.5

COURSE OBJECTIVES:

The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

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. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.** **Internet & World Wide Web** module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks would be introduced. **Productivity tools** module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX.

Task 1: 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.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: 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. The work done should be verified by the instructor and followed up with a Viva.

Task 6: 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. The work done should be verified by the instructor and followed up with a Viva.

Internet & World Wide Web

Task1: 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, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: 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.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word: to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered: Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4 : Creating a Newsletter : Features to be covered: Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler: Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2 : Calculating GPA: Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Performance Analysis: Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

LaTeX and MS/equivalent (FOSS) tool Power Point

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes: - PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and PowerPoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Task 2: Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

REFERENCE BOOKS:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)
5. LaTeX Companion – Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press, Pearson Education.

GENDER SENSITIZATION

II-B.Tech (II-Semester)
Course Code: AIIO405MC

L T P C
- - 2 -

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To provide a critical perspective on the socialization of men and women.
2. To introduce students to information about some key biological aspects of genders. To expose the students to debates on the politics and economics of work.
3. To help students reflect critically on gender violence.
4. To expose students to more egalitarian interactions between men and women.

COURSE OUTCOMES:

At the end of the course, student will be able to:

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT – I UNDERSTANDING GENDER

Gender: Why Should We Study It? (*Towards a World of Equals*: Unit -1) **Socialization:** Making Women, Making Men (*Towards a World of Equals*: Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT – II GENDER AND BIOLOGY

Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals*: Unit -4) Declining Sex Ratio. Demographic Consequences.

Gender Spectrum: Beyond the Binary (*Towards a World of Equals*: Unit -10) Two or Many? Struggles with Discrimination.

UNIT – III GENDER AND LABOUR

Housework: the Invisible Labour (*Towards a World of Equals*: Unit -3) “My Mother doesn’t Work.” “Share the Load.”

Women’s Work: Its Politics and Economics (*Towards a World of Equals*: Unit -7)

Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT – IV ISSUES OF VIOLENCE

Sexual Harassment: Say No! (*Towards a World of Equals*: Unit -6)

Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading:“*Chupulu*”.

Domestic Violence: Speaking Out (*Towards a World of Equals*: Unit -8)

Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading:New Forums for Justice.

Thinking about Sexual Violence (*Towards a World of Equals*: Unit -11) Blaming the Victim-“I Fought for my Life....” - Additional Reading: The Caste Face of Violence.

UNIT – V GENDER: CO – EXISTENCE

Just Relationships: Being Together as Equals (*Towards a World of Equals*: Unit -12)

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

TEXT BOOK:

1. “Towards a World of Equals: A Bilingual Textbook on Gender”, A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad, Telangana State, 2015.

REFERENCE BOOKS:

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. “I Fought For My Life...and Won.” Available online at: <http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/>

III-YEAR (I-SEMESTER)

SOFTWARE ENGINEERING

III-B.Tech (I-Semester)

Course Code: AIIO501PC

L T P C

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COURSE OBJECTIVES:

1. To provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects. Topics include process Models, software requirements, software design, software testing
2. Software process/product metrics, risk management, quality management and UML diagrams

COURSE OUTCOMES:

1. Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD). Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
2. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

UNIT –I

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. **A Generic view of process:** Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models. **Process models:** The waterfall model, incremental process models, evolutionary process models, the unified process.

UNIT –II

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document. **Requirements engineering process:** Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management. **System models:** Context models, behavioral models, data models, object models, structured methods.

UNIT –III

Design Engineering: Design process and design quality, design concepts, the design model. **Creating an architectural design:** software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT –IV

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging. **Product metrics:** Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT –V

Metrics for Process and Products: Software measurement, metrics for software quality. **Risk management:** Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan. **Quality Management:** Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

REFERENCE BOOKS

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, McGraw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

MICROPROCESSORS & MICROCONTROLLERS

III-B.Tech (I-Semester)
Course Code: A1IO502ES

L T P C
3 - - 3

COURSE OBJECTIVES:

- **The course should enable the students to:**
- To develop an understanding of the operations of microprocessors and micro controllers; machine language programming and interfacing techniques
- Topics include computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors

COURSE OUTCOMES:

- Understand the basics of instructions sets and their impact on processor design
- Understands the internal architecture and organization of 8086, 8051 and ARM processors/controllers.
- Understands the interfacing techniques to 8086 and 8051 and can develop assembly language programming to design microprocessor/ micro controller based systems

UNIT - I

8086 Architecture: 8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Signal descriptions of 8086, interrupts of 8086.

Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

UNIT - II

Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

UNIT - III

I/O And Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB..

UNIT - IV

ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

UNIT - V

Advanced ARM Processors: Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture,

TEXT BOOKS:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, MHE, 2nd Edition 2006.
2. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed.
3. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012

REFERENCE BOOKS:

1. Microprocessors and Interfacing, D. V. Hall, MGH, 2nd Edition 2006.
2. Introduction to Embedded Systems, Shibu K.V, MHE, 2009
3. The 8051 Microcontrollers, Architecture and Programming and Applications -K.UmaRao, Andhe Pallavi, Pearson, 2009

COMPUTER NETWORKS

III-B.Tech (I-Semester)
Course Code: A1IO503PC

L T P C
3 - - 3

COURSE OBJECTIVES:

Student will be able

- 1 To introduce the fundamental s of various types of computer networks
- 2 To demonstrate the TCP/IP and OSI models with merits and demerits
- 3 To explore the various layers of OSI model
- 4 To introduce UDP and TCP models

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

- 1 Identify computer networks and its components.
- 2 Identify the different types of network topologies and protocols.
- 3 Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- 4 Select and use various sub netting and routing mechanisms.
- 5 Design a network diagram for a given scenario.

UNIT-I: INTRODUCTION

Introduction: Network applications, network hardware, network software, reference models: OSI, TCP/IP, Internet, Connection oriented network - X.25, frame relay.

The Physical Layer: Theoretical basis for communication, guided transmission media, wireless transmission, the public switched telephone networks, mobile telephone system.

UNIT-II: THE DATA LINK LAYER

The Data Link Layer: Design issues, error detection and correction, elementary data link protocols, sliding window protocols.

The Medium Access Sublayer: Channel allocations problem, multiple access protocols, Ethernet, Data Link Layer switching, Wireless LAN, Broadband Wireless, Bluetooth

UNIT-III: THE NETWORK LAYER

The Network Layer: Network layer design issues, routing algorithms, Congestion control algorithms, Internetworking, the network layer in the internet (IPv4 and IPv6), Quality of Service.

UNIT-IV: THE TRANSPORT LAYER

The Transport Layer: Transport service, elements of transport protocol, Simple Transport Protocol, Internet transport layer protocols: UDP and TCP.

UNIT-V: THE APPLICATION LAYER

The Application Layer: Domain name system, electronic mail, World Wide Web: architectural overview, dynamic web document and http.

Application Layer Protocols: Simple Network Management Protocol, File Transfer Protocol, Simple Mail Transfer Protocol, Telnet.

TEXT BOOKS:

1. Computer networks-Andrew S Tanenbaum, 4th edition, Pearson Education Data Communication and Networking- Behrouz. A. Forouzan , fifth edition, TMH, 2013.

REFERENCE BOOKS:

1. Behrouz A. Forouzan (2006), Data communication and Networking, 4th Edition, Mc Graw-Hill, India.
2. Kurose, Ross (2010), Computer Networking: A top down approach, Pearson Education, India.

ECONOMICS & ACCOUNTING FOR ENGINEERS

III-B.Tech (I-Semester)
Course Code: A1IO504HS

L T P C
3 - - 3

COURSE OBJECTIVES:

To enable the student to understand and appreciate, with a particular insight, the importance of certain basic issues governing the business operations namely; demand and supply, production function, cost analysis, markets, forms of business organizations, capital budgeting and financial accounting and financial analysis.

COURSE OUTCOMES:

- Understand the market dynamics namely, demand and supply, demand forecasting, elasticity of demand and supply, pricing methods and pricing in different market structures.
- Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis.
- Develop an understanding of
- Analyze how capital budgeting decisions are carried out.
- Understanding the framework for both manual and computerized accounting process
- Know how to analyze and interpret the financial statements through ratio analysis.

UNIT - I

Introduction & Demand Analysis: Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT - II

Production & Cost Analysis: Production Function - Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

UNIT - III

Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing. Methods of Pricing. Business: Features and evaluation of different forms of Business Organization: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment: Changing Business Environment in Post-liberalization scenario.

UNIT - IV

Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital - Trading Forecast, Capital Budget, Cash Budget. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of return (ARR) and Net Present Value Method (simple problems).

UNIT - V

Introduction to Financial Accounting & Financial Analysis: Accounting concepts and Conventions - Introduction IFRS - Double - Entry Book Keeping, Journal, Ledger, Trial Balance - Final Accounts (Tracing Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. DuPont Chart.

TEXT BOOKS:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.
2. S.A. Siddiqui & A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age international Publishers, Hyderabad 2013.
3. M. Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, 2012.

REFERENCE BOOKS:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2012.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
3. Lipsey & Chrystel, Economics, Oxford University Press, 2012.
4. Domnick Salvatore: Managerial Economics In a Global Economy, Thomson, 2012.
5. Narayanaswamy: Financial Accounting - A Managerial Perspective, Pearson, 2012.
6. S.N. Maheswari & S.K. Maheswari, Financial Accounting, Vikas, 2012.
7. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2012.
8. Dwivedi: Managerial Economics, Vikas, 2012.
9. Shailaja & Usha: MEFA, University Press, 2012.
10. Aryasri: Managerial Economics and Financial Analysis, TMH, 2012.
11. Vijay Kumar & Appa Rao, Managerial Economics & Financial Analysis, Cengage 2011.
12. J.V. Prabhakar Rao & P.V. Rao, Managerial Economics & Financial Analysis, Maruthi Publishers, 2011.

MACHINE LEARNING

III-B.Tech (I-Semester)
Course Code: AIIO505PC

L T P C
3 - - 3

PREREQUISITES:

1. Data Structures
2. Knowledge on statistical methods

COURSE OBJECTIVES:

- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning
- This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
- To understand computational learning theory.
- To study the pattern comparison techniques.

COURSE OUTCOMES:

- Understand the concepts of computational intelligence like machine learning
- Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
- Understand the Neural Networks and its usage in machine learning application

UNIT -I

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias.

Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT –II

Artificial Neural Networks-1

Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

Artificial Neural Networks-2

Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms

UNIT -III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance-Based Learning- Introduction, k-nearest neighbor algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning

UNIT -IV

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning – Introduction, the learning task, Q-learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming

UNIT -V

Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2- Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis

TEXT BOOK:

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOKS:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

DESIGN AND ANALYSIS OF ALGORITHMS (PROFESSIONAL ELECTIVE-I)

III B. TECH- I SEMESTER

Course Code: AIIO501PE

L T P C

3 - - 3

PREREQUISITES:

1. A course on “Computer Programming and Data Structures”
2. A course on “Advanced Data Structures”

COURSE OBJECTIVES:

1. Introduces the notations for analysis of the performance of algorithms.
2. Introduces the data structure disjoint sets.
3. Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
4. Describes how to evaluate and compare different algorithms using worst-, average-, and best-case analysis.
5. Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

COURSE OUTCOMES:

1. Ability to analyze the performance of algorithms
2. Ability to choose appropriate data structures and algorithm design methods for a specified application
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs

UNIT – I

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen’s matrix multiplication.

UNIT - II

Disjoint Sets: Disjoint set operations, union and find algorithms

Backtracking: General method, applications, n-queen’s problem, sum of subsets problem, graph coloring

UNIT - III

Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT - IV

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT - V

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution.

NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP – Hard and NP-Complete classes, Cook’s theorem

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

REFERENCE BOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R.Tamassia, John Wiley and sons.

IoT SYSTEM ARCHITECTURE (PROFESSIONAL ELECTIVE-I)

III-B.Tech (I-Semester)
Course Code: AIIO502PE

L T P C
3 - - 3

COURSE OBJECTIVE:

Learn to create the next generation of IoT-enabling technologies, by designing an IoT system to connect embedded sensors using commodity smart phones via low power Bluetooth Low Energy. Skills such as app development and embedded system design are practiced using various applications including a sensor station.

COURSE OUTCOMES:

- 1 Describe the architecture IoT and the IoT technical fundamentals
- 2 Identify various types of sensing devices and endpoints.
- 3 Analyze the functions of WPAN standards and use it for suitable IoT applications
- 4 Implement simple IoT applications using WLAN and WAN protocols.
- 5 Develop the working of protocols for machine-to-machine communication

UNIT-I: IOT ARCHITECTURE

History of IoT, IoT potential, IoT ecosystem: IoT Vs machine to machine, The value of a network and Metcalfe's and Beckstrom's Law, Role of an architect, An Architectural Overview- Building an architecture- Main design principles and needed capabilities-An IoT architecture outline-Standards considerations. M2M and IoT Technology Fundamentals: Devices and gateways-Local and wide area networking-Data management-Knowledge management

UNIT-II: SENSING POWER AND DATA COMMUNICATION

Sensing devices, Smart IoT Endpoints: Vision system, Sensor fusion, I/O devices, Energy Sources and power management: Energy Harvesting, Energy Storage, Communication theory: RF energy, RF interference, Information theory, The radio spectrum.

UNIT-III WPAN STANDARDS

802.15 standards: Bluetooth, IEEE 802.15.4, Zigbee, Z-wave, Internet Protocol and Transmission Control Protocol, 6LoWPAN, Thread .

UNIT-IV: WLAN AND WAN PROTOCOLS

IEEE 802.11, Long-range Communication Systems and Protocols: Cellular Connectivity-LTE, LoRa and LoRaWAN, Sigfox

UNIT-V: IOT EDGE TO CLOUD PROTOCOLS

MQTT, MQTT-SN, Constrained Application Protocol, STOMP, AMQP, Comparison of Protocols.

TEXT BOOKS:

1. Perry Lea, "Internet of Things for Architects: Architecting IoT solutions by implementing Sensors, communication infrastructure, edge computing, analytics, and security", Packt Publishing Ltd., 2018.
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014

REFERENCE BOOKS:

1. Peter Waher, “Learning Internet of Things”, PACKT publishing, 2015.
2. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, Springer, 2011.
3. Vijay Madisetti and ArshdeepBahga, “Internet of Things (A Hands-onApproach)”, 1st Edition, VPT, 2014.
4. Arshdeep Bahga and Vijai Madisetti : A Hands-on Approach “Internet of Things”, Universities Press, 2015.

PYTHON FOR IOT (PROFESSIONAL ELECTIVE-I)

III-B.Tech (I-Semester)
Course Code: A11O503PE

L T P C
3 - - 3

COURSE OBJECTIVE:

The course should enable the students to:

1. Understand the architecture of Internet of Things and connected world.
2. Explore on use of various hardware and sensing technologies to build IoT applications.
3. Illustrate the real time IoT applications to make smart world.
4. Understand the available cloud services and communication API's for developing smart cit

COURSE OUTCOMES:

1. Understand the concept of Internet of Things and connected world.
2. Explore on use of various hardware and sensing technologies to build IoT applications
3. Illustrate the architecture of Internet of Things and python.
4. Understand the working with python on intel galileo gen.
5. Explore on Interacting with digital outputs with python.5 Develop the working of protocols for machine-To-machine communication

UNIT-I: INTRODUCAION TO IOT

Definition and characteristics of IoT, physical design of IoT, logical design of IoT, IoT enabling technologies, IoT levels and deployment, domain specific IoTs

UNIT-II: IOT AND M2M

Introduction, M2M, difference between IoT and M2M, software defined networking (SDN) and network function virtualization (NFV) for IoT, basics of IoT system management with NETCONF-YANG.

UNIT-III IOT ARCHITECTURE AND PYTHON

IoT Architecture: State of the art introduction, state of the art; Architecture reference model: Introduction, reference model and architecture, IoT reference model. Logical design using Python: Installing Python, Python data types and data structures, control flow, functions, modules, packages, file handling.

UNIT-IV: WORKING WITH PYTHON AND INTEL GALILEO GEN

Setting up the board to work with Python as the programming language, Retrieving the board's assigned IP address, Connecting to the board's operating system, Installing and upgrading the necessary libraries to interact with the board, Installing pip and additional libraries, Invoking the Python interpreter

UNIT-V: INTERACTING WITH DIGITAL OUTPUTS WITH PYTHON

Turning on and off an onboard component, Prototyping with breadboards, Working with schematics to wire digital outputs, Counting from 1 to 9 with LEDs, Python code and the mraa library, Taking advantage of object-oriented code to control digital outputs, Improving our object-oriented code to provide new features, Isolating the pin numbers to improve wirings, Controlling digital outputs with the wiring-x86 library.

TEXT BOOKS:

1. Arshdeep Bahga, Vijay Madisetti, -Internet of Things: A Hands-on-Approachl, VPT, 1st Edition, 2014.
2. Matt Richardson, Shawn Wallace, -Getting Started with Raspberry Pi, O'Reilly (SPD), 3rd Edition, 2014.

REFERENCE BOOKS:

1. Adrian McEwen, Hakim Cassimally, –Designing the Internet of Things, John Wiley and Sons, 1st Edition, 2014.

MICROPROCESSORS & MICROCONTROLLERS LAB

III-B.Tech (I-Semester)
Course Code: A1IO506ES

L T P C
- - 3 1.5

COURSE OBJECTIVES:

To familiarize the architecture of microprocessors and micro controllers.

COURSE OUTCOMES:

1. Understands the internal architecture, organization and assembly language programming of 8086 processors.
2. Understands the internal architecture, organization and assembly language programming of 8051/controllers
3. Understands the interfacing techniques to 8086 and 8051 based systems.
4. Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors.

LIST OF EXPERIMENTS**Using 8086 Processor Kits and/or Assembler**

- Write Assembly Language Programs to 8086 to Perform
 1. Arithmetic, Logical, String Operations on 16 Bit and 32-Bit Data.
 2. Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.

Using 8051 Microcontroller Kit

- **Introduction to IDE**
 1. Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16 Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate, Shift, Swap and Branch Instructions.
 2. Time delay Generation Using Timers of 8051.
 3. Serial Communication from / to 8051 to / from I/O devices.
 4. Program Using Interrupts to Generate Square Wave 10 KHZ Frequency on P2.1 Using Timer 0 8051 in 8 bit Auto reload Mode and Connect a 1 HZ Pulse to INT1 pin and Display on Port 0. Assume Crystal Frequency as 11.0592 MHZ.

Interfacing I/O Devices to 8051

1. 7 Segment Display to 8051.
2. Matrix Keypad to 8051.
3. Sequence Generator Using Serial Interface in 8051.
4. 8 bit ADC Interface to 8051.
5. Triangular Wave Generator through DAC interfaces to 8051.

TEXT BOOKS:

1. Advanced Microprocessors and Peripherals by A K Ray, Tata McGraw-Hill Education, 2006.
2. The 8051 Microcontrollers: Architecture, Programming & Applications by Dr. K. Uma Rao, AndhePallavi, Pearson, 2009.

REFERENCE BOOKS:

1. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed, 2004.
2. Microprocessors and Interfacing, D. V. Hall, TMGH, 2nd Edition 2006.

MACHINE LEARNING LAB

III-B.Tech (I-Semester)
Course Code: AIIO507PC

L T P C
- - 3 1.5

COURSE OBJECTIVES:

- 1 To understand a range of machine learning algorithms along with their strengths and weaknesses.
- 2 To understand the basic theory underlying machine learning.

COURSE OUTCOMES:

- 1 Understand complexity of Machine Learning algorithms and their limitations;
- 2 Understand modern notions in data analysis-oriented computing;
- 3 Be capable of confidently applying common Machine Learning algorithms in practice and Implementing their own;
- 4 Be capable of performing experiments in Machine Learning using real-world data.

WEEK-1

- The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye’s rule in python to get the result. (Ans: 15%)

WEEK-2

- Extract the data from database using python

WEEK-3

- Implement k-nearest neighbors classification using python

WEEK-4

- Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of kmeans clustering with 3 means (i.e., 3 centroids)

	VAR1	VAR2	CLASS
1.713	1.586	0	
0.180	1.786	1	
0.353	1.240	1	
0.940	1.566	0	
1.486	0.759	1	
1.266	1.106	0	
1.540	0.419	1	
0.459	1.799	1	
0.773	0.186	1	

WEEK-5

- The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.

Medium skiing design single twenties no -> High Risk
 High golf trading married forties yes -> Low Risk
 Low speedway transport married thirties yes -> Med Risk
 Medium football banking single thirties yes -> Low Risk
 High flying media married fifties yes -> High Risk
 Low football security single twenties no -> Med Risk
 Medium golf media single thirties yes -> Med Risk
 Medium golf transport married forties yes -> Low Risk
 High skiing banking single thirties yes -> High Risk
 Low golf unemployed married forties yes -> High Risk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf` and the conditional probability of `single` given `Med Risk` in the dataset?

WEEK-6

- Implement linear regression using python

WEEK-7

- Implement Naïve Bayes theorem to classify the English text

WEEK-8

- Implement an algorithm to demonstrate the significance of genetic algorithm

WEEK-9

- Implement the finite words classification system using Back-propagation algorithm

CONSTITUTION OF INDIA

III-B.Tech (I-Semester)

Course Code: AI1506MC

L T P C

2 - - -

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries include United Kingdom and The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India’s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be “static” and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it “as one of the strongest court in the world

UNIT - I

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India

UNIT - II

1. Scheme of the fundamental rights
2. The scheme of the Fundamental Duties and its legal status
3. The Directive Principles of State Policy – Its importance and implementation

UNIT - III

1. Federal structure and distribution of legislative and financial powers between the Union and the States
2. Parliamentary Form of Government in India – The constitution powers and status of the President of India
3. Amendment of the Constitutional Powers and Procedure

UNIT - IV

1. The historical perspectives of the constitutional amendments in India
2. Emergency Provisions: National Emergency, President Rule, Financial Emergency
3. Local Self Government – Constitutional Scheme in India

UNIT - V

1. Scheme of the Fundamental Right to Equality
2. Scheme of the Fundamental Right to certain Freedom under Article 19
3. Scope of the Right to Life and Personal Liberty under Article 21

TEXT BOOKS:

1. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd. New Delhi
2. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012
3. The constitution of India, P.M.Bakshi, Universal Law Publishing Co.,
4. The Constitution of India, 1950 (Bare Act), Government Publication.
5. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.

REFERENCE BOOKS:

1. M. P. Jain, Indian Constitution Law, 7th Edn. Lexis Nexis, 2014.
2. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.
3. Indian constitution at work, NCERT
4. SubashKashyap, Indian Constitution, National Book Trust
5. J.A. Siwach, Dynamics of Indian Government & Politics
6. D.C. Gupta, Indian Government and Politics
7. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
8. J.C. Johari, Indian Government and Politics Hans
J. Raj Indian Government and Politics.

III-YEAR (II-SEMESTER)

IoT COMMUNICATION PROTOCOLS

III-B.Tech (II-Semester)
Course Code: A1IO601PC

L T P C
3 - - 3

COURSE OBJECTIVES:

In this course, learners will be going to learn about various protocols designed for the implementation of the Internet of Things (IoT) applications.

COURSE OUTCOMES:

Analyse the sensors available in IoT based on application requirement and the Sensing methods.

1. Understand fundamentals of IoT architecture outline and standards.
2. Understand and analyze different architectural views.
3. Understand the importance of IoT Data Link Layer & Network Layer Protocols.
4. Understand the importance of Iot Transport & Session Layer Protocols.

UNIT-I

Introductions: IoT architecture outline, standards - IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics.

UNIT-II:

IoT Reference Architecture: Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant Architectural views. Real-World Design Constraints- Introduction, Technical Design constraints.

UNIT-III:

IoT Data Link Layer: PHY/MAC Layer (3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, ZWave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7

UNIT-IV:

Network Layer Protocols: Network Layer-IPv4,IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP.

UNIT-V:

IoT Transport & Session Layer Protocols: Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)- (TLS, DTLS) – Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT.

TEXT BOOKS:

1. Daniel Minoli, “Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications”, ISBN: 978-1-118-47347-4, Wiley Publications ,2016
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2015.

REFERENCE BOOKS:

1. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3-642- 19156-5 e-ISBN 978-3-642-19157-2, Springer, 2016.
2. N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014.

COMPUTER VISION AND ROBOTICS

III-B.Tech (II-Semester)
Course Code: A1IO602PC

L T P C
3 - - 3

PRE-REQUISITES: UG level Course in Linear Algebra and Probability.

COURSE OBJECTIVES:

1. To understand the Fundamental Concepts Related To sources, shadows and shading.
2. To understand the Geometry of Multiple Views

COURSE OUTCOMES:

1. Implement fundamental image processing techniques required for computer vision.
2. Implement boundary tracking techniques.
3. Apply chain codes and other region descriptors, Hough Transform for line, circle, and ellipse detections.
4. Apply 3D vision techniques and Implement motion related techniques.
5. Develop applications using computer vision techniques..

UNIT-I

CAMERAS: Pinhole Cameras. Radiometry – Measuring Light: Light in Space, Light Surfaces, Important Special Cases. Sources, Shadows, And Shading: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Interreflections: Global Shading Models. Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.

UNIT-II:

Linear Filters: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates. Edge Detection: Noise, Estimating Derivatives, Detecting Edges. Texture: Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture.

UNIT-III:

The Geometry of Multiple Views: Two Views. Stereopsis: Reconstruction, Human Stereopsis, Binocular Fusion, Using More Cameras. Segmentation by Clustering: What Is Segmentation? Human Vision: Grouping and Gestalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering.

UNIT-IV:

Segmentation by Fitting a Model: The Hough Transform, Fitting Lines, Fitting Curves, Fitting as a Probabilistic Inference Problem, Robustness. Segmentation and Fitting Using Probabilistic Methods: Missing Data Problems, Fitting, and Segmentation, The EM Algorithm in Practice. Tracking With Linear Dynamic Models: Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples.

UNIT-V:

Geometric Camera Models: Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations. Geometric Camera Calibration: Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into

Account, Analytical Photogrammetry, An Application: Mobile Robot Localization. Model-Based Vision: Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering, Obtaining Hypotheses Using Invariants, Verification, Application: Registration In Medical Imaging Systems, Curved Surfaces and Alignment.

TEXT BOOKS:

1. David A. Forsyth and Jean Ponce: Computer Vision – A Modern Approach, PHI Learning (Indian Edition), 2009.

REFERENCE BOOKS:

1. E. R. Davies: Computer and Machine Vision – Theory, Algorithms and Practicalities, Elsevier (Academic Press), 4th edition, 2013.
2. R. C. Gonzalez and R. E. Woods “Digital Image Processing” Addison Wesley 2008.
3. Richard Szeliski “Computer Vision: Algorithms and Applications” Springer-Verlag London Limited 2011.

AUTOMATA THEORY OF COMPILER DESIGN (PROFESSIONAL ELECTIVES -II)

III-B.Tech (II-Semester)
Course Code: A1IO604PE

L T P C
3 - - 3

COURSE OBJECTIVES:

- 1 To provide introduction to some of the central ideas of theoretical computer science from the Perspective of formal languages.
- 2 To introduce the fundamental concepts of formal languages, grammars and automata theory.
- 3 Classify machines by their power to recognize languages.
- 4 Employ finite state machines to solve problems in computing.
- 5 To understand deterministic and non-deterministic machines.
- 6 To understand the differences between decidability and undesirability.

COURSE OUTCOMES:

- 1 Able to understand the concept of abstract machines and their power to recognize the Languages.
- 2 Able to employ finite state machines for modeling and solving computing problems.
- 3 Able to design context free grammars for formal languages.
- 4 Able to distinguish between decidability and undesirability.
5. Able to gain proficiency with mathematical tools and formal methods

UNIT - I

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.

Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.

Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with ϵ -transitions to NFA without ϵ -transitions. Conversion of NFA to DFA, Moore and Melay machines

UNIT - II

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions. Pumping Lemma for Regular Languages, Statement of the pumping lemma, and Applications of the Pumping Lemma.

Closure Properties of Regular Languages: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata

UNIT - III

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms, Parse Trees, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages.

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata. From CFG to PDA, From PDA to CFG.

UNIT - IV

Normal Forms for Context- Free Grammars: Eliminating useless symbols, Eliminating ϵ - Productions. Chomsky Normal form Griebach Normal form.

Pumping Lemma for Context-Free Languages: Statement of pumping lemma, Applications

Closure Properties of Context-Free Languages: Closure properties of CFL's, Decision Properties of CFL's
Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine

UNIT - V

Types of Turing machine: Turing machines and halting

Undesirability: Undesirability, A Language that is Not Recursively Enumerable, An Undecidable Problem that is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machines

TEXT BOOKS:

1. Introduction to Automata Theory, Languages, and Computation, 3rd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekar, 2nd edition, PHI

REFERENCE BOOKS:

1. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.
4. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning.
5. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson.

SMART SENSOR TECHNOLOGIES (PROFESSIONAL ELECTIVES -II)

III-B.Tech (II-Semester)
Course Code: A1IO605PE

L T P C
3 - - 3

PREREQUISITES: Electronic Devices and Circuits

COURSE OBJECTIVES:

- 1 Select the right sensor for a given application.
- 2 Design basic circuit building blocks.
- 3 Simulate, synthesize, and layout a complete sensor or sensor system, MEMS device or micro system ready for fabrication tools.

COURSE OUTCOMES:

- 1 Analyse the sensors available in IoT based on application requirement and the Sensing methods
- 2 Create a Real-time application by choosing appropriate sensors for temperature monitoring.
- 3 Interfacing different types of Sensors with MCU
- 4 Infer Wireless Sensing, RF Sensing and RF MEMS
- 5 Design a real-time application for landslide monitoring and hazard mitigation

UNIT-I BASICS OF SENSORS

Introduction- Sensor Vs Transducer, Nature of Sensors, Sensor Output Characteristics, Sensing Technologies, Digital Output Sensors.

UNIT-II APPLICATION SPECIFIC SENSORS

Occupancy and motion detectors: ultrasonic – microwave – capacitive detectors- optical presence sensor, Light Detectors: Photo diodes – photo transistor – photo resistor- CCD and CMOS image sensors, Temperature Sensors: thermos-resistive sensors – thermoelectric contact sensor

UNIT-III SENSOR WITH MICROCONTROLLER

Introduction, Amplification and Signal Conditioning, Integrated Signal Conditioning, Digital Conversion, MCU Control, MCUs for Sensor Interface, Techniques and Systems Considerations, Sensor Integration

UNIT-IV WIRELESS SENSING

Wireless Data and Communications, Wireless Sensing Networks, Industrial Wireless Sensing Networks, RF Sensing, Telemetry, RF MEMS, Complete System Consideration

UNIT-V SMART APPLICATIONS AND SYSTEM REQUIREMENTS

Automotive Applications, Industrial (Robotic) Applications, Consumer Applications, Future Sensor Plus Semiconductor Capabilities, Future System Requirements.

TEXT BOOKS:

1. Frank, Randy, “Understanding smart sensors”, Artech House integrated microsystems series, 3rd Edition, 2013.
2. Jacob Fraden, “Handbook of Modern Sensors: Physics, Designs, and Applications”, 5th Edition, Springer, 2016

REFERENCE BOOKS:

1. Vlasios Tsiatsis, Stamatis Karnouskos, Jan Holler, David Boyle, Catherine Mulligan, "Internet of Things: Technologies and Applications for a New Age of Intelligence", Academic Press, 16-Nov2018.

EMBEDDED SYSTEMS (PROFESSIONAL ELECTIVES -II)

III-B.Tech (II-Semester)
Course Code: A1IO606PE

L T P C
3 - - 3

COURSE OBJECTIVES:

- 1 To provide an overview of Design Principles of Embedded System.
- 2 To provide clear understanding about the role of firmware, operating systems in correlation with hardware

COURSE OUTCOMES:

- 1 Expected to understand the selection procedure of Processors in the embedded Domain.
- 2 Design Procedure for Embedded Firmware.
- 3 Expected to visualize the role of Real time Operating Systems in Embedded Systems
- 4 Expected to evaluate the Correlation between task synchronization and latency issues

UNIT –I INTRODUCTION TO EMBEDDED

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT –II

Typical Embedded System: Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS). Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT-III

Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT-IV

RTOS Based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling

UNIT-V

Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS

TEXT BOOK:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill

REFERENCE BOOKS:

1. Embedded Systems - Raj Kamal, MC GRAW HILL EDUCATION.
2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems – Lyla, Pearson, 2013
4. An Embedded Software Primer - David E. Simon, Pearson Education

SOFTWARE TESTING METHODOLOGY (PROFESSIONAL ELECTIVES -III)

III-B.Tech (II-Semester)
Course Code: A1IO607PE

L T P C
3 - - 3

COURSE OBJECTIVES:

- 1 The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- 2 Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams Course
- 3 To understand the software testing methodologies such as flow graphs and path testing, transaction flows testing, data flow testing, domain testing and logic base testing

COURSE OUTCOMES:

Ability to translate end-user requirements into system and software requirements using e.g. UML and structure the requirements in a Software Requirements Document (SRD)

- 1 Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
- 2 Will have experience and/or awareness of testing problems and will be able to develop a simple testing report
- 3 Ability to apply the process of testing and various methodologies in testing for developed software.
- 4 Ability to write test cases for given software to test it before delivery to the customer

UNIT I:

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs
Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT II:

Transaction Flow Testing: transaction flows, transaction flow testing techniques. Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing. Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT III:

Paths, Path products and Regular expressions: path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications.

UNIT IV:

State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips.

UNIT V:

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Win-runner)

TEXT BOOKS:

1. Software Testing techniques - Baris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

REFERENCE BOOKS:

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

**ARTIFICIAL INTELLIGENCE
(PROFESSIONAL ELECTIVES-III)**

III-B.Tech (II-Semester)
Course Code: A1IO608PE

L T P C
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COURSE OBJECTIVES:

- To learn the difference between optimal reasoning vs human like reasoning.
- To understand the notions of state space representation, exhaustive search, heuristic search.
- To learn different knowledge representation techniques.
- To understand the applications of AI like Game Playing and Expert Systems.
- To Introduce the concept of Machine Learning

COURSE OUTCOMES:

- Understand the basics of AI and to formulate efficient problem space and select a search algorithm for problem.
- Apply AI techniques to solve problems related to Game playing, Expert systems.
- Develop Logic programming skills.
- Represent knowledge using appropriate techniques.
- Interpret probabilistic and logical reasoning for knowledge.
- Understand the concept of machine learning

UNIT-I

Introduction: History, Intelligent Systems, Foundations of AI, Sub areas of AI & Applications. Problem Solving - State-Space Search and Control Strategies, General Problem Solving Techniques Characteristics of Problem, Exhaustive Searches, Heuristic Search Techniques, Iterative-Deepening A*, Constraint Satisfaction. Game Playing, Bounded Look-ahead Strategy and use of Evaluation Functions, Alpha-Beta Pruning.

UNIT-II

Logic Concepts and Logic Programming : Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, Resolution Algorithm, Predicate Logic, Logic Programming.

UNIT-III

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: Case Grammars, Semantic Web

UNIT-IV

Uncertainty Measure: Probability Theory: Introduction, Probability Theory, Bayesian Belief Networks, Certainty Factor Theory, Dempster-Shafer Theory. Introduction to Machine Learning: Machine Learning Systems, Supervised and unsupervised learning, Inductive and Deductive learning.

UNIT-V

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert Systems Vs Traditional Systems, and Rule based Expert Systems, Truth Maintenance Systems, Applications of Expert Systems, List of Shells and Tools.

TEXT BOOKS:

1. Saroj Kaushik, Artificial Intelligence, Cengage Learning, 2011.
2. Russel & Norvig, Artificial Intelligence: A Modern Approach, Pearson Education

REFERENCE BOOKS:

1. Rich, Knight, Nair: Artificial intelligence, Tata McGraw Hill, Third Edition, 2009.
2. Eugene Charniak, Introduction to Artificial Intelligence, Pearson, 2007.
3. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI, 1990.
4. George Fluger, Artificial Intelligence, 5th Edition, Pearson.

WEB REFERENCES:

1. https://www.vssut.ac.in/lecture_notes/lecture1428643004.pdf
2. https://www.edx.org./course/atificial_intelligence-ai-columbiacx-csmn-101x-4
3. https://onlinecourses.nptel.ac.in/noc18_cs18/preview

E -TEXT BOOKS:

1. <https://www.e-booksdirectory.com/details.php?ebook>

MOOCS COURSE:

1. <https://swayam.gov.in/>
2. <https://onlinecourses.nptel.ac.in/106105077>

MOBILE APPLICATION DEVELOPMENT FOR IoT (PROFESSIONAL ELECTIVES -III)

III-B.Tech (II-Semester)
Course Code: A1IO609PE

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COURSE OBJECTIVES:

- 1 Automate data analysis
- 2 Working collaboratively and openly on code
- 3 Knowing how to generate dynamic documents
- 4 Being able to use a continuous test-driven development approach

COURSE OUTCOMES:

1. Understand significance of IoT programming fundamentals.
2. Understand and analyze IoT programming applications.
3. Develops IoT applications using standardized hardware.
4. Discuss concepts of IoT Advance Wireless Interfaces and IoT Production System

UNIT –I

Introduction: IoT Product Conceptualization: IoT Product Development Lifecycle, IoT Product Conceptualizations IoT Programming Fundamentals: Getting Started, IoT Programming setup for LED flashing, Program to display message on screen, Program to read LDR level and display on screen, Android APK to perform read write operation, Particle android APK to control LED intensity, LED switching with HTML interface, Cloud based motion detection, Displaying temperature sensor data on terminal, Publishing sensor values on the cloud, Performing computation on sensor values.

UNIT –II

IoT Programming Applications: Gas level detection using MQ2 sensor, Blink Android Application for controlling LED from mobile, Integration of Temperature and Gas Sensor with Blynk Mobile Application, Printing real-time Date and Time values on serial terminal, Display temperature value on serial terminal, Display temperature values on 16*2 LCD display Interfacing: Interfacing of Nokia 5110 display, display image on Nokia 5110, Particle Electron displaying battery charging level status, GPS tracking device interface to get coordinates

UNIT –III

IoT Product Hardware Development: Product realization, Connection diagram of IoT product, Engineering board development, Product board customization and optimization, Flowchart of IoT warehouse monitoring system, Wireless communication between the multiple kits, Particle cloud IDE.

UNIT –IV

IoT Advance Wireless Interfaces: Bluetooth communication between master and slave module, Data visualization on ThingSpeak cloud using webhook services, Storing data into google excel sheet and sending the sheets to emails.

UNIT –V

IoT Production System: IoT Warehouse Monitoring System, IoT Product Packaging, Future of IoT Product Development.

TEXT BOOKS:

1. IoT Product Development with Programming: Stepwise programming approach with Particle Development board Kindle Edition by Mahesh Jadhav and Tejas Sarang Patil.

REFERENCE BOOKS:

1. Kale, Vivek. Parallel Computing Architectures and APIs: IoT Big Data Stream Processing 1st edition, CRC Press, 2019.
2. IoT Product Development with Programming: Stepwise programming approach with Particle Development board Kindle Edition by Mahesh Jadhav and Tejas Sarang Patil

SENSORS AND DEVICES (OPEN ELECTIVE-I)

III-B.Tech (II-Semester)
Course Code: A1IO601OE

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COURSE OBJECTIVES:

- 1 To introduce the terminology, technology and its applications
- 2 To introduce the concept of M2M (machine to machine) with necessary protocols
- 3 To introduce the Python Scripting Language which is used in many IoT devices
- 4 To introduce the Raspberry PI platform, that is widely used in IoT applications
- 5 To introduce the implementation of web-based services on IoT devices

COURSE OUTCOMES:

- 1 Understanding of IoT value chain structure (device, data cloud), application areas and technologies Involved.
- 2 Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules
- 3 Market forecast for IoT devices with a focus on sensors
- 4 Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi

UNIT-I

Introduction to Internet of Things- Definition and Characteristics of IoT, Sensors, Actuators, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Agriculture and Industry.

UNIT-II

IoT and M2M- Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT-III

IoT Physical Devices and Endpoints- Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), Programming – Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins.

UNIT-IV

Controlling Hardware- Connecting LED, Buzzer, Switching High Power devices with transistors, Controlling AC Power devices with Relays, Controlling servo motor, speed control of DC Motor, unipolar and bipolar Stepper motors Sensors- Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11, Motion Detection Sensors, Wireless Bluetooth Sensors, Level Sensors, USB Sensors, Embedded Sensors, Distance Measurement with ultrasound sensor

UNIT-V

IoT Physical Servers and Cloud Offerings– Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759
3. Raspberry Pi Cookbook, Software and Hardware Problems and solutions, Simon Monk, O'Reilly (SPD), 2016, ISBN 7989352133895

REFERENCE BOOKS:

- 1 Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015
- 2 Peter Friess, 'Internet of Things – From Research and Innovation to Market Deployment', River Publishers, 2014
- 3 N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014.

IOT SENSOR TECHNOLOGIES (OPEN ELECTIVE-I)

III-B.Tech (II-Semester)
Course Code: A1IO602PE

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COURSE OBJECTIVES:

1. To discuss on IoT reference layer and various protocols and software.
2. To Train the students to build IoT systems using sensors, single board computers and open source IoT platforms

COURSE OUTCOMES:

- 1 Analyze the sensors available in IoT based on application requirement and the Sensing methods.
- 2 Create the sensor interface electronic forgiven application
- 3 Develop the application with the support of motion-related sensors.
- 4 Infer light and radiation detectors
- 5 Design a Real time application by choosing appropriate sensors for temperature

UNIT-I PRINCIPLES OF SENSING

Introduction to IoT- Need for sensors in IoT, Data Acquisition – sensor characteristics – electric charges, fields, potentials – capacitance – magnetism – inductance – resistance – piezoelectric – pyroelectric – Hall effect thermoelectric effects – sound waves – heat transfer – light – dynamic models of sensors

UNIT-II: INTERFACE ELECTRONICS

Radiometry – Photometry – mirrors – lenses – fibre optics – concentrators – Interface circuits – amplifiers – light-to-voltage – excitation circuits – ADC – Digitization – Capacitance-to-voltage – bridge circuits – data transmission – noise in sensors and circuits – calibration – low power sensors

UNIT-III: MOTION RELATED SENSORS

Occupancy and motion detectors: ultrasonic – microwave – capacitive detectors – triboelectric – Optoelectronic motion sensors – optical presence sensor – Pressure Gradient sensors Velocity And acceleration sensors: Accelerometer characteristics – capacitive accelerometers – Piezoelectric accelerometers – piezoresistive accelerometers – thermal accelerometers – Gyroscopes – piezoelectric cables – gravitational sensors

UNIT-IV: LIGHT AND RADIATION DETECTORS

Light Detectors: Photo diodes – photo transistor – photo resistor – cooled detectors – CCD and CMOS image sensors – thermal detectors – optical design – gas flame detectors Radiation Detectors: scintillating detectors – ionization detectors – cloud and bubble chambers.

UNIT-V: TEMPERATURE AND CHEMICAL SENSORS

Temperature Sensors: coupling with objects – temperature reference points – thermo resistive sensors – thermo electric contact sensors – semiconductor sensors – acoustic sensors – piezoelectric sensors Chemical sensors: characteristics – classes of chemical sensors – biochemical sensors – multisensory arrays – electronic noses and tongues.

REFERENCE BOOKS:

1. Jacob Fraden, “Handbook of Modern Sensors: Physics, Designs, and Applications”, Fourth Edition, Springer, 2010.
2. Sensors and Transducers by Patranabis Second Edition, 2013, PHI

IoT COMMUNICATION PROTOCOLS LAB

III-B.Tech (II-Semester)
Course Code: AIIO603PC

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- - 3 1.5

COURSE OBJECTIVES:

1. To introduce the raspberry PI platform, that is widely used in IoT applications.
2. To introduce the implementation of distance sensor on IoT devices

COURSE OUTCOMES::

This Lab focuses on using multi-media instruction for language development to meet the following targets:

1. Ability to introduce the concept of M2M (machine to machine) with necessary protocols and get awareness in implementation of distance sensor.
2. Get the skill to program using python scripting language which is used in many IoT devices.

LIST OF EXPERIMENTS:

1. Using raspberry pi

- a. Calculate the distance using a distance sensor.
- b. Basic LED functionality.

2. Using Arduino

- a. Calculate the distance using a distance sensor.
- b. Basic LED functionality. c. Calculate temperature using a temperature sensor.

3. Using Node MCU a. Calculate the distance using

- a distance sensor.
- b. Basic LED functionality.
- c. Calculate temperature using a temperature sensor.

TEXT BOOKS

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madiseti, Universities Press, 2015, ISBN: 9788173719547.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759.

REFERENCE BOOKS:

3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer, 2016.
4. N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014..

COMPUTER VISION AND ROBTICS LAB

III-B.Tech (II-Semester)
Course Code: A1IO604PC

L T P C
- - 3 1.5

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To Make students acquainted with practical aspects of computing with images.
2. To Improve quality of image by applying enhancement techniques.
3. To understand Feature Extraction algorithms..

COURSE OUTCOMES:

At the end of the course, student will be able to:

1. Understand the basic image processing techniques and enhance images by adjusting contrast.
2. Detects edges using various kernels using transformation.
3. Apply histogram processing, convert between various color spaces.
4. Partition dataset by classification and clustering.
5. Comprehend computer vision systems for real world problems.

LIST OF EXPERIMENTS

Description: Use any tool like OpenCV/ Scilab/ python/R Programming etc.,
List of Programs

WEEK-1:

- . Familiarization of the tool used for computer vision.

WEEK-2:

- Implement basic image operations
 - a. Loading and displaying an image.
 - b. Color formats
 - c. Image enhancement

WEEK-3:

- Implement smoothing filters on an image using
 - a. Gaussian filter
 - b. Median filter
 - c. Mean Filter

WEEK-4:

- . Demonstrate fourier Transformations.

WEEK-5:

- Implement histogram calculation and equalization for the given image.

WEEK-6:

- Implement morphological operations like dilation, erosion, opening and closing on the given image

WEEK-7:

- Implement edge detection on images using any two edge detection masks. 8. Detection of motion from structure.

WEEK -8:

- Detection of motion from structure.

WEEK-9:

- Implement texture extraction of a given image.

WEEK-10:

- Implement object detection like recognizing pedestrians.

WEEK-11:

- Implement face recognition of an image using K-Means clustering..

WEEK-12:

- Implement dimensionality reduction using PCA for the given images
- Demonstrate model based reconstruction using tensor flow.

TEXT BOOKS:

1. Gary Bradski and Adrian Kaehler, "Learning OpenCV", O'Reilly Media, Inc., 1st Edition, 2008.
2. Talita Perciano and Alejandro C Frery, "Introduction to Image Processing Using Learning by Examples, Springer, 1st Edition, 2013.
3. "Computer Vision: Algorithms and Applications" by Richard Szeliski; Springer-Verla London Limited 2011.

REFERENCE BOOKS:

1. R C Gonzalez and R E woods, "Digital Image Processing", Addison Pearson, 3rd Edition, 2013.
2. David A. Forsyth and Jean Ponce, Computer Vision-A Modern Approach, PHI, 1st Edition, 2003.

ADVANCE ENGLISH COMMUNICATION SKILLS LAB**III-B.Tech (II-Semester)**
Course Code: A1EN605HS**L T P C**
- - 2 1**INTRODUCTION:**

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context. The proposed course should be a laboratory course to enable students to use ‘good’ English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students’ fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing
- To prepare all the students for their placements.

WEEK-I

Activities on Fundamentals of Inter-personal Communication and Building Vocabulary - Starting a conversation

Responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

WEEK-II

Activities on Reading Comprehension

General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.

WEEK-III

Activities on Writing Skills

Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one’s writing.

WEEK-IV

Activities on Presentation Skills

Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ emails/assignments etc

WEEK-V

Activities on Group Discussion and Interview Skills

Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews

MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics
- Round Tables with movable chairs
- Audio-visual aids • LCD Projector • Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

SUGGESTED SOFTWARE

The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner’s Compass, 7th Edition
- DELTA’s key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd. 2nd Edition
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition

REFERENCE BOOKS:

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
5. English Vocabulary in Use series, Cambridge University Press 2008.
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.

ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

III-B.Tech II-Semester

Course Code: AIIO607MC

L T P C

2 - - -

COURSE OBJECTIVES:

The course should enable the students to learn:

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

COURSE OUTCOMES:

At the end of the course, the student will be able to:

1. Upon completion of the course, the students are expected to:
2. Understand the concept of Traditional knowledge and its importance
3. Know the need and importance of protecting traditional knowledge.
4. Know the various enactments related to the protection of traditional knowledge.
5. Understand the concepts of Intellectual property to protect the traditional knowledge.

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

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.

UNIT-III

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

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 FORA for increasing protection of Indian Traditional Knowledge.

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. 139

TEXT 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.

REFERENCE BOOKS:

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
2. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino2

E-RESOURCES:

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

IV-YEAR (I-SEMESTER)

IOT CLOUD PROCESSING AND ANALYTICS

IV-B.Tech (I-Semester)

Course Code: AIIO701PC

L T P C

3 - - 3

COURSE OBJECTIVES:

Knowledge on IoT networking connectivity protocols and IoT Analytics for the cloud processing

- 1 Understand the basics and function of Python Programming Language.
- 2 Know the classes and objects in Python Programming Language.
- 3 Use the reusability concepts in Python Programming Language.

COURSE OUTCOMES:

1. Implement the architectural components and protocols for application development.
2. Identify data analytics and data visualization tools as per the problem characteristics.
3. Collect, store and analyze IoT data.

UNIT –I

IoT devices, Networking basics, IoT networking connectivity protocols, IoT networking data messaging protocols, Analyzing data to infer protocol and device characteristics.

UNIT –II

IoT Analytics for the Cloud: Introduction to elastic analytics, Decouple key components, Cloud security and analytics, Designing data processing for analytics, Applying big data technology to storage

UNIT-III

Exploring IoT Data: Exploring and visualizing data, Techniques to understand data quality, Basic time series analysis, Statistical analysis.

UNIT-IV

Data Science for IoT Analytics: Introduction to Machine Learning, Feature engineering with IoT data, Validation methods, Understanding the bias–variance tradeoff, Use cases for deep learning with IoT data.

UNIT-V

Strategies to Organize Data for Analytics: Linked Analytical Datasets, Managing data lakes, data retention strategy.

TEXT BOOK:

1. Arshdeep Bahga and Vijay Madisetti, “Internet of Things – A Hands on Approach”, Universities Press, 2015.
2. Kevin, Townsend, Carles, Cufi, Akiba and Robert Davidson, "Getting Started with Bluetooth Low Energy" O'Reilly

REFERENCE BOOKS:

1. Madhur Bhargava “IoT Projects with Bluetooth Low Energy, Packt Publishing, August 2017.
2. Robin Heydon,” Bluetooth Low Energy: The Developer's Handbook”, Pearson, October 2012
3. Kumar Saurabh,” Cloud Computing”, Wiley India, 1st Edition, 2016.

IOT SECURITY

IV-B.Tech (I-Semester)
Course Code: AIIO702PC

L T P C
2 - - 2

COURSEOBJECTIVES:

The course should enable the students to learn:

1. Understand the fundamentals, various attacks and importance of Security aspects in IoT.
2. Understand the techniques, protocols and some idea on security towards Gaming models.
3. Understand the operations of Bitcoin blockchain, crypto-currency as application of blockchain technology.
4. Understand the essential components of IoT.
5. Understand security and privacy challenges of IoT.

COURSEOUTCOMES:

At the end of the course, the student will be able to: Understand

1. Incorporate the best practices learnt to identify the attacks and mitigate the same.
2. Adopt the right security techniques and protocols during the design of IoT products.
3. Assimilate and apply the skills learnt on ciphers and block chains when appropriate.
4. Describe the essential components of IoT.
5. Find appropriate security/privacy solutions for IoT.

UNIT-I

Fundamentals of IoT and Security and its need, Prevent Unauthorized Access to Sensor Data, Block ciphers, Introduction to Blockchain, Introduction of IoT devices, IoT Security Requirements, M2M Security, Message integrity, Modeling faults and adversaries, Difference among IoT devices, computers, and embedded devices.

UNIT-II

IoT and cyber-physical systems RFID Security, Authenticated encryption Byzantine Generals problem sensors and actuators in IoT. IoT security (vulnerabilities, attacks, and countermeasures), Cyber Physical Object Security, Hash functions, Consensus algorithms and their scalability problems, Accelerometer, photoresistor, buttons.

UNIT-III

Security engineering for IoT development Hardware Security, Merkle trees and Elliptic curves digital signatures, verifiable random functions, Zero-knowledge systems motor, LED, vibrator. IoT security lifecycle, Front-end System Privacy Protection, Management, Secure IoT Databases, Public-key crypto (PKI), blockchain, the challenges, and solutions, analog signal vs. digital signal.

UNIT-IV

Data Privacy Networking Function Security Trees signature algorithms proof of work, Proof of stake, Networking in IoT, Device/User Authentication in IoT IoT Networking Protocols, Crypto-currencies, alternatives to Bitcoin consensus, Bitcoin scripting language and their use Real-time communication

UNIT-V

Introduction to Authentication Techniques Secure IoT Lower Layers, Bitcoin P2P network, Ethereum and Smart Contracts, Bandwidth efficiency, Data Trustworthiness in IoT Secure IoT Higher Layers, Distributed consensus, Smart Contract Languages and verification challenges data analytics in IoT - simple data analyzing methods.

TEXT BOOKS:

1. B. Russell and D. Van Duren, “Practical Internet of Things Security,” Packt Publishing, 2016.
2. FeiHU, “Security and Privacy in Internet of Things (IoTs): Models, Algorithms, and Implementations”, CRC Press, 2016.
2. Narayanan et al., “Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction,” Princeton University Press, 2016.

REFERENCE BOOKS:

1. A. Antonopoulos, “Mastering Bitcoin: Unlocking Digital Cryptocurrencies,” O’Reilly, 2014.
2. T. Alpcan and T. Basar, “Network Security: A Decision and Game-theoretic Approach,” Cambridge University Press, 2011.
3. Security and the IoT ecosystem, KPMG International, 2015.
4. Internet of Things: IoT Governance, Privacy and Security Issues” by European Research Cluster.
5. Ollie Whitehouse, “Security of Things: An Implementers' Guide to Cyber-Security for Internet of Things Devices and Beyond”, NCC Group, 2014
6. Josh Thompson, ‘Blockchain: The Blockchain for Beginnings, Guide to Blockchain Technology and Blockchain Programming’, Create Space Independent Publishing Platform, 2017.

DISTRIBUTED SYSTEMS

IV-B.Tech I-Semester

Course code: AIIO703PC

L T P C

3 1 - 4

COURSE OBJECTIVES:

The course should enable the students to learn:

This course provides an insight into Distributed systems.

1. To be able to understand Topics include- Peer to Peer Systems
2. To be able to describe and understand the Transactions and Concurrency control
3. To recognize Security and Distributed shared memory

COURSE OUTCOMES:

At the end of the course the students are able to:

1. Ability to understand Transactions and Concurrency control
2. Ability to understand Security issues
3. Understanding Distributed shared memory
4. Ability to design distributed systems for basic level applications.

UNIT-I

Characterization of Distributed Systems-Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models -Introduction, Architectural and Fundamental models, Networking and Internetworking, Interprocess Communication, Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.

UNIT-II

Operating System Support- Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture, Distributed File Systems-Introduction, File Service architecture.

UNIT-III

Peer to Peer Systems– Introduction, Napster and its legacy, Peer to Peer middleware, Routing overlays, Overlay case studies-Pastry, Tapestry, Application case studies-Squirrel, Ocean Store. Time and Global States-Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging. Coordination and Agreement- Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT-IV

Transactions and Concurrency Control-Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering. Distributed Transactions-Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.

UNIT-V

Replication-Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data. Distributed shared memory, Design and Implementation issues, Consistency models.

TEXT BOOKS:

1. T. Cormen, C. Leiserson, R. Rivest and C. Stein, Introduction to Algorithms, Third Edition, McGraw-Hill,2009.
2. R. Motwani and P. Raghavan, Randomized Algorithms, Cambridge University Press, 1995.
3. J. J. McConnell, Analysis of Algorithms: An Active Learning Approach, Jones & Bartlett Publishers,2001.
4. D. E. Knuth, Art of Computer Programming, Volume 3, Sorting and Searching, Second Edition, Addison-WesleyProfessional,1998.
5. S. Dasgupta, C. H. Papadimitriou and U. V. Vazirani, Algorithms, McGraw-Hill, 2008

REFERENCE BOOKS:

1. “Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
2. Distributed Computing, Principles, Algorithms and Systems, Ajay D. Kshemakalyani and Mukesh Singhal, Cambridge, rp 2010.

AD-HOC AND SENSOR NETWORKS (PROFESSIONAL ELECTIVES -IV)

IV-B.Tech (I-Semester)
Course Code: AIIO710PE

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3 - - 3

COURSE OBJECTIVES:

- 1 Understand the design issues in ad hoc and sensor networks.
- 2 Learn the different types of MAC protocols.
- 3 Be familiar with different types of adhoc routing protocols.
- 4 Be expose to the TCP issues in adhoc networks.
- 5 Learn the architecture and protocols of wireless sensor networks.

COURSE OUTCOMES:

- 1 Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks
- 2 Analyze the protocol design issues of ad hoc and sensor networks
- 3 Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
- 4 Evaluate the QoS related performance measurements of ad hoc and sensor networks

UNIT-I

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs): concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

UNIT-II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

UNIT-III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks

UNIT-IV WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS

Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4

UNIT-V WSN ROUTING, LOCALIZATION & QOS

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues

TEXT BOOKS:

1. C. Siva Ram Murthy, and B. S. Manoj, “Ad Hoc Wireless Networks: Architectures and Protocols “Prentice Hall Professional Technical Reference, 2008

REFERENCE BOOKS:

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, “Wireless Sensor Networks”, Elsevier Publication – 2002.
3. Holger Karl and Andreas Willig “Protocols and Architectures for Wireless Sensor Networks”, Wiley, 2005
4. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks-Technology, Protocols, and Applications”, John Wiley, 2007.
5. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

CLOUD COMPUTING (PROFESSIONAL ELECTIVES -IV)

IV-B.Tech (I-Semester)

Course Code: AIIO711PE

L T P C

3 - - 3

PREREQUISITES: A course on “Computer Networks”.

1. A course on “Operating Systems”
2. A course on “Distributed Systems”.

COURSE OBJECTIVES:

3. Topics covered include- distributed system models, different cloud service models
4. Service-oriented architectures, cloud programming and software environments, resource management.

COURSE OUTCOMES:

1. Ability to understand various service delivery models of a cloud computing
2. Architecture, Ability to understand the ways in which the cloud can be programmed and deployed.
3. Understanding cloud service providers.

UNIT-I

Cloud Computing Overview Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling ,Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing

UNIT-II

Cloud Insights Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies

UNIT-III

Cloud Architecture- Layers and Models Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing

UNIT-IV

Cloud Simulators- Cloud Sim and Green Cloud Introduction to Simulator, understanding Cloud Sim simulator, Cloud Sim Architecture (User code, Cloud Sim, Grid Sim, Sim Java) Understanding Working platform for Cloud Sim, Introduction to Green Cloud

UNIT-V

Introduction to VMWare Simulator Basics of VMWare, advantages of VMware virtualization, using VMware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine

TEXT BOOKS:

1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

REFERENCE BOOKS:

1. Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
2. Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011

IoT AUTOMATION (PROFESSIONAL ELECTIVES -IV)

IV-B.Tech (I-Semester)**Course Code: AIIO712PE****L T P C****3 - - 3****COURSE OBJECTIVES:**

1. While the promise of the Industrial Internet of Things (IIoT) brings many new business prospects, it also presents significant challenges ranging from technology architectural choices to security concerns.
2. Students acquire the upcoming Industrial IoT: Roadmap to the Connected World Course offers important insights on overcoming the challenges and thrive in this exciting space.

COURSE OUTCOMES:

2. Discover key IIoT concepts including identification, sensors, localization, wireless protocols, data storage and security
3. Explore IoT technologies, architectures, standards, and regulation
4. Realize the value created by collecting, communicating, coordinating, and leveraging the data from connected devices
5. Examine technological developments that will likely shape the industrial landscape in the future
6. Understand how to develop and implement own IoT technologies, solutions, and applications
7. At the end of the program, students will be able to understand how to develop and implement their own IoT technologies, solutions, and applications.

UNIT - I

Introduction & Architecture: What is IIoT and the connected world? the difference between IoT and IIoT, Architecture of IIoT, IOT node, Challenges of IIOT. Fundamentals of Control System, introductions, components, closed loop & open loop system.

UNIT - II

IIOT Components: Introduction to Sensors (Description and Working principle): What is sensor? Types of sensors, working principle of basic Sensors -Ultrasonic Sensor, IR sensor, MQ2, Temperature and Humidity Sensors (DHT-11). Digital switch, Electro Mechanical switches.

UNIT - III

Communication Technologies of IIoT: Communication Protocols: IEEE 802.15.4, ZigBee, Z Wave, Bluetooth, BLE, NFC, RFID Industry standards communication technology (LoRAWAN, OPC UA, MQTT), connecting into existing Modbus and Profibus technology, wireless network communication.

UNIT - IV

Visualization and Data Types of IIoT: Front-end EDGE devices, Enterprise data for IIoT, Emerging descriptive data standards for IIoT, Cloud database, Cloud computing, Fog or Edge computing. Connecting an Arduino/Raspberry pi to the Web: Introduction, setting up the Arduino/Raspberry pi development environment, Options for Internet connectivity with Arduino, Configuring your Arduino/Raspberry pi board for the IoT.

UNIT -V

Retrieving Data: Extraction from Web: Grabbing the content from a web page, Sending data on the web, Troubleshooting basic Arduino issues, Types of IoT interaction, Machine to Machine interaction (M2M). Control & Supervisory Level of Automation: Programmable logic controller (PLC), Real-time control system, Supervisory Control & Data Acquisition (SCADA). HMI in an automation process, ERP & MES.

TEXT BOOKS:

1. The Internet of Things in the Industrial Sector, Mahmood, Zaigham (Ed.) (Springer Publication)
2. Industrial Internet of Things: Cyber manufacturing System, Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat (Springer Publication)
3. Industrial IoT Challenges, Design Principles, Applications, and Security by Ismail Butun (editor)

REFERENCE BOOKS:

1. Jerker Delsing, IoT Automation: Arrowhead Framework, CRC Press

INDUSTRIAL IOT 4.0 (PROFESSIONAL ELECTIVES -V)

IV-B.Tech (I-Semester)
Course Code: A11O713PE

L T P C
3 - - 3

COURSE OBJECTIVES:

The course will guide the participants through the process of analysis, planning, and implementation of innovative digital business and operation strategies from a practical business point of view, developing during the course a deep vision about the Future Enterprise, the business, and social implications

COURSE OUTCOMES:

After completion of the course, students will be able to upon completion of this course; the students will be able to identify the Key opportunities and benefits in Industrial IoT Apply virtual network to demonstrate the use of Cloud in Industrial IoT Analyze industrial IoT Three tier topology and data management system Summarize Legacy Industrial and Modern Communication Protocols .Describe Middleware Architecture, LoRaWAN- and Augmented reality

UNIT-I INTRODUCTION TO INDUSTRIAL INTERNET AND USE-CASES

Industrial Internet- Key IoT Technologies- Innovation and the IoT -Key Opportunities and Benefits - The Digital and Human Workforce - Logistics and the Industrial Internet- IOT Innovations in Retail

UNIT-II THE TECHNICAL AND BUSINESS INNOVATORS OF THE INDUSTRIAL INTERNET

Cyber Physical Systems (CPS) – IP Mobility – Network Virtualization - SDN (Software Defined Networks)- The Cloud and Fog – Role of Big Data in IIOT - Role of Machine learning and AI in IIOT

UNIT-III IOT REFERENCE ARCHITECTURE

Industrial Internet Architecture Framework (IIAF) -Industrial Internet Viewpoints -. Architectural Topology: The Three-Tier Topology- Key System Characteristics- Data Management- Advanced data analytics.

UNIT-IV DESIGNING INDUSTRIAL INTERNET SYSTEMS

Legacy Industrial Protocols - Modern Communication Protocols-Proximity Network Communication Protocols- Wireless Communication Technologies- Gateways: industrial gateways - CoAP (Constrained Application Protocol) - NFC.

UNIT-V MIDDLEWARE SOFTWARE PATTERNS AND IOT PLATFORMS

Publish/Subscribe Pattern: MQTT, XMPP, AMQP, DDS- Middleware Architecture- SigFox- LoRaWAN Augmented reality- Real-World Smart Factories.

TEXT BOOKS:

1. Gilchrist, Alasdair, “Industry 4.0 The Industrial Internet of Things”, Apress, 2017.

REFERENCE BOOKS:

1. Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat “Industrial Internet of Things: Cyber manufacturing Systems” (Springer), 2017.
2. Zaigham Mahmood, “The Internet of Things in the Industrial Sector: Security and Device connectivity, smart environments and Industry 4.0 (Springer), 2019.

AGILE SOFTWARE DEVELOPMENT (PROFESSIONAL ELECTIVES -V)

IV-B.Tech (I-Semester)

Course Code: AIIO714PE

L T P C

3 - - 3

COURSE OBJECTIVES:

- Basics of Software Engineering Concepts and Waterfall Methodology and OOPs
- Achieve Your Goals. Gain Job-Ready Skills. Get Ready for a Career. Flexible Online Learning.

COURSE OUTCOMES:

- Explain the background and driving forces for taking an Agile approach to software development
- Recognize the business value of adopting Agile approaches
- Drive development with unit tests using Test Driven Development
- Apply design principles and refactoring to achieve Agility
- Deploy automated build tools, version control and continuous integration
- Perform testing activities within an Agile project

UNIT - I FUNDAMENTALS OF AGILE

The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools

UNIT - II AGILE SCRUM FRAMEWORK

Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management.

UNIT - III AGILE TESTING

The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), Unit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester

UNIT - IV CORBA

Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control

UNIT - V INDUSTRY TRENDS

Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies.

TEXT BOOKS

1. Ken Schwaber, Mike Beedle, “Agile Software Development with Scrum”, Pearson Publications, 2008.
2. Robert C. Martin, “Agile Software Development, Principles, Patterns and Practices”, Prentice Hall Publications, 2002

REFERENCE BOOKS:

1. Lisa Crispin, Janet Gregory, “Agile Testing: A Practical Guide for Testers and Agile Teams”, Addison Wesley Publications, 2008.
2. Alistair Cockburn, “Agile Software Development: The Cooperative Game”, Addison Wesley Publications, 2006.
3. Mike Cohn, “User Stories Applied: For Agile Software”, Addison Wesley Publications, 2004

CYBER SECURITY (PROFESSIONAL ELECTIVES -V)

IV B. Tech I- Semester
Course Code: A11O715PE

L T P C
3 - - 3

COURSE OBJECTIVES:

The courses should enable the students to learn:

1. To familiarize various types of cyber-attacks and cyber-crimes
2. To give an overview of the cyber laws
3. To study the defensive techniques against these attacks.

COURSEOUTCOMES:

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

1. The students will be able to understand cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.

UNIT-I

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT-II

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

UNIT-III

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT-IV

Cyber Security: Organizational Implications: Introduction cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations. Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

UNIT-V

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains-medical, financial, etc. Cybercrime: Examples and Mini-Cases Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCE BOOKS:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu, J. David Irwin, CRC Press T&F Group

IOT FOR ARCHITECTS (OPEN ELECTIVE-II)

IV-B.Tech (I-Semester)
Course Code: A11O703OE

L T P C
3 - - 3

COURSE OBJECTIVE:

Learn to create the next generation of IoT-enabling technologies, by designing an IoT system to connect embedded sensors using commodity smart phones via low power Bluetooth Low Energy. Skills such as app development and embedded system design are practiced using various applications including a sensor station.

COURSE OUTCOMES:

1. Describe the architecture IoT and the IoT technical fundamentals
2. Identify various types of sensing devices and endpoints.
3. Analyze the functions of WPAN standards and use it for suitable IoT applications
4. Implement simple IoT applications using WLAN and WAN protocols.
5. Develop the working of protocols for machine-to-machine communication

UNIT-I: IOT ARCHITECTURE

History of IoT, IoT potential, IoT ecosystem: IoT Vs machine to machine, The value of a network and Metcalfe's and Beckstrom's Law, Role of an architect, An Architectural Overview- Building an architecture- Main design principles and needed capabilities-An IoT architecture outline-Standards considerations. M2M and IoT Technology Fundamentals: Devices and gateways-Local and wide area networking-Data management- Knowledge management

UNIT-II: SENSING POWER AND DATA COMMUNICATION

Sensing devices, Smart IoT Endpoints: Vision system, Sensor fusion, I/O devices, Energy Sources and power management: Energy Harvesting, Energy Storage, Communication theory: RF energy, RF interference, Information theory, The radio spectrum.

UNIT-III WPAN STANDARDS

802.15 standards: Bluetooth, IEEE 802.15.4, Zigbee, Z-wave, Internet Protocol and Transmission Control Protocol, 6LoWPAN, Thread.

UNIT-IV: WLAN AND WAN PROTOCOLS

IEEE 802.11, Long-range Communication Systems and Protocols: Cellular Connectivity-LTE, LoRa and LoRaWAN, Sigfox

UNIT-V: IOT EDGE TO CLOUD PROTOCOLS

MQTT, MQTT-SN, Constrained Application Protocol, STOMP, AMQP, Comparison of Protocols.

TEXT BOOKS:

1. Perry Lea, "Internet of Things for Architects: Architecting IoT solutions by implementing Sensors, communication infrastructure, edge computing, analytics, and security", Packt Publishing Ltd., 2018.
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014

REFERENCE BOOKS:

1. Peter Waher, “Learning Internet of Things”, PACKT publishing, 2015.
2. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, Springer,2011.
3. Vijay Madiseti and ArshdeepBahga, “Internet of Things (A Hands-onApproach)”, 1st Edition, VPT,2014.
4. Arshdeep Bahga and Vijai Madiseti : A Hands-on Approach “Internet of Things”, Universities Press, 2015.

PYTHON FOR IOT (OPEN ELECTIVE-II)

IV-B.Tech (I-Semester)
Course Code: AIIO704OE

L T P C
3 - - 3

COURSE OBJECTIVE:

The course should enable the students to:

1. Understand the architecture of Internet of Things and connected world.
2. Explore on use of various hardware and sensing technologies to build IoT applications.
3. Illustrate the real time IoT applications to make smart world.
4. Understand the available cloud services and communication API's for developing smart cit

COURSE OUTCOMES:

1. Understand the concept of Internet of Things and connected world.
2. Explore on use of various hardware and sensing technologies to build IoT applications
3. Illustrate the architecture of Internet of Things and python.
4. Understand the working with python on intel galileo gen.
5. Explore on Interacting with digital outputs with python.5 Develop the working of protocols for machine-To-machine communication

UNIT-I: INTRODUCAION TO IOT

Definition and characteristics of IoT, physical design of IoT, logical design of IoT, IoT enabling technologies, IoT levels and deployment, domain specific IoTs

UNIT-II: IOT AND M2M

Introduction, M2M, difference between IoT and M2M, software defined networking (SDN) and network function virtualization (NFV) for IoT, basics of IoT system management with NETCONF-YANG.

UNIT-III IOT ARCHITECTURE AND PYTHON

IoT Architecture: State of the art introduction, state of the art; Architecture reference model: Introduction, reference model and architecture, IoT reference model. Logical design using Python: Installing Python, Python data types and data structures, control flow, functions, modules, packages, file handling.

UNIT-IV: WORKING WITH PYTHON AND INTEL GALILEO GEN

Setting up the board to work with Python as the programming language, Retrieving the board's assigned IP address, Connecting to the board's operating system, Installing and upgrading the necessary libraries to interact with the board, Installing pip and additional libraries, Invoking the Python interpreter

UNIT-V: INTERACTING WITH DIGITAL OUTPUTS WITH PYTHON

Turning on and off an onboard component, Prototyping with breadboards, Working with schematics to wire digital outputs, Counting from 1 to 9 with LEDs, Python code and the mraa library, Taking advantage of object-oriented code to control digital outputs, Improving our object-oriented code to provide new features, Isolating the pin numbers to improve wirings, Controlling digital outputs with the wiring-x86 library.

TEXT BOOKS:

1. Arshdeep Bahga, Vijay Madisetti, –Internet of Things: A Hands-on-Approachl, VPT, 1st Edition, 2014.
2. Matt Richardson, Shawn Wallace, –Getting Started with Raspberry Pil, O'Reilly (SPD), 3rd Edition, 2014.

REFERENCE BOOKS:

1. Adrian McEwen, Hakim Cassimally, -Designing the Internet of Thingsl, John Wiley and Sons, 1st Edition, 2014.

IOT SECURITY AND CLOUD COMPUTING LAB

IV-B.Tech (I-Semester)

Course Code: AIIO704PC

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PREREQUISITE OF COURSE: Fundamentals of computer network, wireless sensor network, communication & internet technology, web technology, information security.

COURSE OBJECTIVES:

1. To learn about how to integrate the security aspect into their IoT design taking into consideration all the threats that can possibly happen.
2. To develop web applications in cloud.
3. To learn the design and development process involved in creating a cloud-based application.

COURSE OUTCOMES:

1. Understand the vision of IoT from a global context for secure and smart city.
2. Use of Devices, Gateways and Data Management in IoT. Its security building state of the art architecture in IoT, with Security deployment.
3. Configure various virtualization tools such as Virtual Box, VMware workstation.
4. Design and deploy a web application in a PaaS environment.

LIST OF EXPERIMENTS: (IOT SECURITY LAB)

1. Introduction to Open Source Hardware & its Application
 - a. Arduino
 - b. Raspberry Pi
2. Exploring various types of Sensors
3. Develop Applications using Arduino and Raspberry Pi
4. Exploring Open Source tools for Security and Privacy issues in IoT.
5. Implement Eclipse IoT Project with Emphasis on Security related issues.
6. Explore the working of AWS IoT Device Defender.

LIST OF EXPERIMENTS: (CLOUD COMPUTING LAB)

1. Install Virtualbox/Vmware Workstation with different flavors of linux or windows OS on top of windows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Install Google App Engine. Create a hello world app and other simple web applications using python/java.
4. Find a procedure to transfer the files from one virtual machine to another virtual machine.
5. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
6. Install Hadoop single node cluster and run simple applications like word count.

REFERENCE BOOKS:

1. Vijay Madiseti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1st Edition, VPT, 2014.
2. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013.
3. Cuno Pfister, Getting Started with the Internet of Things, O’Reilly Media, 2011, ISBN: 978-1- 4493-9357-1.

SUPPLEMENTARY RESOURCES:

1. <https://github.com/connectIOT/iottoolkit>
2. <https://www.arduino.cc/>
3. <http://www.zettajs.org/>
4. Contiki (Open source IoT operating system)
5. Arduino (open source IoT project)
6. IoT Toolkit (smart object API gateway service reference implementation)

E-RESOURCES:

1. <https://www.iitk.ac.in/nt/faq/vbox.htm>
2. <https://www.cloudsimtutorials.online/cloudsim/>
3. <https://edwardsamuel.wordpress.com/2014/10/25/tutorial-creating-openstack-instance-intrystack/>
4. <https://www.edureka.co/blog/install-hadoop-single-node-hadoop-cluster>

IV-YEAR (II-SEMESTER)

DEEP LEARNING

IV-B.Tech II-Semester
Course Code: AIIO801PC

L T P C
3 - - 3

COURSE OBJECTIVES:

The course should enable the students to learn:

This course covers the basics of machine learning, neural networks and deep learning. Model for deep learning technique and the various optimization and generalization mechanisms are included. Major topics in deep learning and dimensionality reduction techniques are covered. The objective of this course is:

1. To present the mathematical, statistical and computational challenges of building neural networks
2. To study the concepts of deep learning
1. To introduce dimensionality reduction techniques
2. To enable the students to know deep learning techniques to support real-time applications
3. To examine the case studies of deep learning techniques

COURSE OUTCOMES:

At the end of the course the students are able to:

1. Understand basics of deep learning
2. Implement various deep learning models
3. Realign high dimensional data using reduction techniques
4. Analyze optimization and generalization in deep learning
5. Explore the deep learning applications

UNIT – I INTRODUCTION

Introduction to machine learning- Linear models (SVMs and Perceptrons, logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximates.

UNIT – II DEEP NETWORKS

History of Deep Learning- A Probabilistic Theory of Deep Learning- Backpropagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks Convolutional Networks- Generative Adversarial Networks (GAN), Semi-supervised Learning.

UNIT – III DIMENSIONALITY REDUCTION

Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyperparameter optimization.

UNIT – IV OPTIMIZATION AND GENERALIZATION

Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience.

UNIT – V CASE STUDY AND APPLICATIONS

Imagenet- Detection-Audio WaveNet-Natural Language Processing Word2Vec - Joint DetectionBioInformatics- Face Recognition- Scene Understanding- Gathering Image Captions.

TEXT BOOKS:

1. Deep Learning (Adaptive Computation and Machine Learning Series) by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press, 2016.

REFERENCE BOOKS:

1. Cosma Rohilla Shalizi, Advanced Data Analysis from an Elementary Point of View, 2015.
2. Deng & Yu, Deep Learning: Methods and Applications, Now Publishers, 2013.
3. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press, 2016.
4. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.

ORGANIZATIONAL BEHAVIOUR

IV-B.Tech II-Semester
Course Code: A1IO802HS

L T P C
3 - - 3

COURSEOBJECTIVES:

The course should enable the students to learn:

The objective of the course is to provide the students with the conceptual framework and the theories underlying Organizational Behavior

COURSEOUTCOMES:

At the end of the course, the student will be able to:

1. Demonstrate different types of robots, specifications of robots and different end effectors used in robots.
2. Explain various types of end effectors
3. Evaluate rotation matrices, forward kinematics of RR, RP and 3R Manipulators.
4. Explain inverse kinematics of RR manipulator, RP manipulator and trajectory planning techniques.
5. Explain feedback components used in robots and industrial applications.

UNIT-I INTRODUCTION

Introduction to OB - Definition, Nature and Scope – Environmental and organizational context – Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organizational Behaviour. Cognitive Processes-I: Perception and Attribution: Nature and importance of Perception – Perceptual selectivity and organization – Social perception – Attribution Theories – Locus of control – Attribution Errors –Impression Management

UNIT-II END EFFECTORS & ACTUATORS

Cognitive Processes-II: Personality and Attitudes – Personality as a continuum – Meaning of personality - Johari Window and Transactional Analysis - Nature and Dimension of Attitudes – Job satisfaction and organizational commitment-Motivational needs and processes- Work-Motivation Approaches Theories of Motivation- Motivation across cultures - Positive organizational behaviour: Optimism – Emotional intelligence – Self-Efficacy

UNIT-III

Dynamics of OB-I: Communication – types – interactive communication in organizations – barriers to communication and strategies to improve the follow of communication - Decision Making: Participative decision-making techniques – creativity and group decision making. Dynamics of OB –II Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intraindividual conflict - strategies to cope with stress and conflict.

UNIT-IV

Dynamics of OB –III Power and Politics: Meaning and types of power – empowerment - Groups Vs. Teams – Nature of groups – dynamics of informal groups – dysfunctions of groups and teams – teams in modern work place.

UNIT-V

Leading High performance: Job design and Goal setting for High performance- Quality of Work LifeSocio technical Design and High-performance work practices - Behavioural performance management: reinforcement and punishment as principles of Learning –Process of Behavioural modification - Leadership theories - Styles, Activities and skills of Great leaders.

TEXT BOOKS:

1. Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
2. McShane: Organizational Behaviour, 3e, TMH, 2008
3. Nelson: Organizational Behaviour, 3/e, Thomson, 2008.).

REFERENCE BOOKS:

1. Newstrom W. John & Davis Keith, Organisational Behaviour-- Human Behaviour at Work, 12/e, TMH, New Delhi, 2009.
2. Pierce and Gardner: Management and Organisational Behaviour: An Integrated perspective, Thomson, 2009.
3. Robbins, P. Stephen, Timothy A. Judge: Organisational Behaviour, 12/e, PHI/Pearson, New Delhi, 2009.
4. Pareek Udai: Behavioural Process at Work: Oxford & IBH, New Delhi, 2009.
5. Schermerhorn: Organizational Behaviour 9/e, Wiley, 2008.
6. Hitt: Organizational Behaviour, Wiley, 2008
7. Aswathappa: Organisational Behaviour, 7/e, Himalaya, 2009
8. Mullins: Management and Organisational Behaviour, Pearson, 2008.
9. McShane, Glinow: Organisational Behaviour--Essentials, TMH, 2009.
10. Ivancevich: Organisational Behaviour and Management, 7/e, TMH, 2008.

IOT SYSTEM DESIGN (OPEN ELECTIVE-III)

IV-B.Tech (II-Semester)
Course Code: A1IO805OE

L T P C
3 - - 3

COURSE OBJECTIVE:

Learn to create the next generation of IoT-enabling technologies, by designing an IoT system to connect embedded sensors using commodity smart phones via low power Bluetooth Low Energy. Skills such as app development and embedded system design are practiced using various applications including a sensor station.

COURSE OUTCOMES:

- 1 Prepare the list of Technologies required to enable a specific System design and the functioning of different platforms.
- 2 Compose the difference between Analog and Digital input and output and describes the role of PWM
- 3 Setup a digital interfacing method which is used to connect system with real world devices for selected application.
- 4 Infer the usage of communication protocols and ether net sockets
- 5 Choose and use appropriate components to develop a design for real time problem

UNIT-I: IOT ENABLING TECHNOLOGIES

Sensors and Actuators, Communications, RFID and NFC (Near-Field Communication), Bluetooth Low Energy (BLE), LiFi , 6LowPAN, ZigBee, Z-Wave, LoRa, Protocols, HTTP, Web Socket, , Node-RED, Platforms.

UNIT-II: INPUT AND OUTPUT METHODS

Digital Inputs and Outputs, Analog Inputs and Outputs, Pulse Width Modulation (PWM), Accelerometer and Magnetometer, SD Card, Local File System

UNIT-III DIGITAL INTERFACES

Serial interface, Serial Peripheral Interface (SPI), I2C (Inter-Integrated Circuit), Controller Area Network (CAN), Middleware Technologies, Communication Protocols and Models

UNIT-IV: NETWORKING AND COMMUNICATIONS

IoT Network Model, IoT Event Analysis, Ethernet socket, Ethernet Web Client and Web Server, TCP Socket and UDP Socket, Web Socket, WiFi module

UNIT-V: APPLICATION DESIGN

Wi-Fi Signal Strength Reader and Haptic Feedback, Arduino Security Camera with Motion Detection, Tweet-a-Light – Twitter-Enabled Electric Light, Controlling Infrared Devices Using IR Remote.

TEXT BOOKS:

1. Perry Xiao, “Designing Embedded Systems and the Internet of Things (IoT) with the ARM Mbed”, First Edition, John Wiley & Sons Ltd, 2018.
2. Pradeeka Seneviratne, “Internet of Things with Arduino Blueprints”, First Edition, Packt Publishing, 2015.

REFERENCE BOOKS:

- 1 Qusay F. Hassan, “Internet of Things A to Z: Technologies and Applications”, John Wiley & Sons, 2018.
- 2 Alessandro Bassi, Martin Bauer, “Enabling Things to Talk: Designing IoT solutions with the IoT Architectural Reference Model”, Springer, 2013

INTERNET OF MEDICAL THINGS (OPEN ELECTIVE-III)

IV-B.Tech (II-Semester)
Course Code: A1IO806OE

L T P C
3 - - 3

COURSE OBJECTIVE:

- a. Introduce evolution of internet technology and need for IoT.
- b. Discuss on IoT reference layer and various protocols and software.
- c. Train the students to build IoT systems using sensors, single board computers and open source IoT platform

COURSE OUTCOMES:

- a. Identify the Implantable Electronics in the healthcare monitoring system and elaborate the wearable sensors and bio sensors.
- b. Analyze the Challenges in software architecture design and their database. Apply and Understand Where the IoT concept fits in the health monitoring system.
- c. Develop an application and hardware model for healthcare robotics.
- d. Explain different sensors used for medical processing and develop a IoMT system for real-time application.
- e. Differentiate classical Cryptography with Quantum Cryptography and develop a protocol with Quantum Cryptography.

UNIT-I: INTEGRATION OF BIO-INTERFACES, DEVICES AND SENSORS

Classification of Wearable Sensors for Health Monitoring, Types of Wearable Sensors with Activity Monitored, Fast Evolving Wearable Sensors in Healthcare, Placement of Wearable Sensor, Biosensors in Healthcare, Wireless Technology for Data Transmission, Interfacing of Sensor in BAN (Body Area Network), Power Consumption of Wearable Nodes, Implantable Devices, Common Characteristics of Medical Sensors, Sensor Evaluation Metrics, Design and Implementation of an Example System

UNIT-II: CHALLENGES IN DESIGNING SOFTWARE ARCHITECTURES

Overview of Web-based Systems for Biomedical Time Series Analysis, Architectural Challenges in WebBased Biomedical Signal Analysis Software - Data Privacy, Security and User Roles- Frontend Workflow Organization- Frontend and Backend Interactions- Changes in Implementation Languages and Libraries- Database Design- Integration of Existing Data Analysis and Reporting Libraries, Requirements for Constructing a Biomedical Signal Analysis Web Platform

UNIT-III: IOT AND ROBOTICS IN HEALTHCARE

Application of Robotics in Healthcare, Systems and Application- BIOTEX- RFID Technology, Internet of Things- Requirements-Use of IoT and Robotics in Healthcare- Open Source IoT Platforms- Internet of Nano Technology (IoNT)

UNIT-IV: INTERNET OF MEDICAL THINGS

Overview of Internet of Medical Things (IoMT)- Requirements- Remote Patient Healthcare and Health Monitoring System, Network Architecture of Internet of Medical Things, Real-Time Analysis Remote Patient Health Monitoring, Methodology and Analysis- Data Sensing and Acquisition- Sensor Interface Circuits, Physical Sensors- Pulse Rate Sensor- Heart Rate Sensor- Respiratory Sensor- ECG Sensor, Experimental Evaluation - Experimental Analysis - Security and Privacy Concerns of IoMT, Advantage and Applications of Remote Patient Monitoring, Limitations and Challenges.

UNIT-V: WEB OF MEDICAL THINGS (WOMT) AND QUANTUM CRYPTOGRAPHY

WoMT and Security, Mathematical Foundations, overview of Classical Cryptography, Quantum Cryptography - Secret-Key Distillation, Overview of Basic Protocol- Phases – Design and Analysis Communication and Computation Complexity Analysis - Attack Resistance Capability - Security Property Analysis, Overview of Improved Protocol- System Architecture- Quantum Key Generation and Distribution- Security Analysis- Experimental Analysis- Attack Resistance Capability- Security Property Analysis

TEXT BOOKS:

1. Aboul Ella Hassanien, Nilanjan Dey, Surekha Borra, “Medical Big Data and Internet of Medical Things: Advances, Challenges and Applications”, CRC Press, 2019.

REFERENCE BOOKS:

1. Toshiyo Tamura, Wenxi Chen “Seamless Health Care Monitoring – Advancements in Wearable Attachable and Invisible Devices”, Springer, 2018.
2. Dac-Nhuong Le, Chung Van Le “Emerging Technologies for Health and Medicine”, John Wiley & Sons, 2018.