ACADEMIC REGULATIONS,COURSE STRUCTURE

and

DETAILED SYLLABUS

CHOICE BASED CREDIT SYSTEM

R21

B.Tech – Computer Science & Engg.,

(Data Science)

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 markof 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 butunder 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 years 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

Admission into first year of four year B. Tech. degree programmes of study inEngineering

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.

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.

Admission into the second year of four year B. Tech. degree Program in Engineering

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.

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

Normal Duration

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.

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.

Maximum Duration

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.

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.

The period is reckoned from the academic year in which the student is admitted first time intothe 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:

The candidate shall pursue a course of study as specified in section 3.1 and 3.2.

The candidate shall register for 160 credits and secure 160 credits (Excluding Mandatory Courses).

5. PROGRAMME STRUCTURE

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.

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.

Credit Courses:

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.

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 inthe 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.

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 – ProfessionalCore 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

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.

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'.

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).

A student may be permitted to register for his/her course of CHOICE with a Total of prescribed credits per Semester (permitted deviation being±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.

Choice for 'additional Courses' must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/Counsellor.

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 aslisted in the Course Structure, only the first mentioned Course in that Category will be taken into consideration.

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

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

Courses may be offered to the Students, only if minimum of 20 students (1/3rd of the section strength) opt for it.

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).

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.

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.

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.

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.

If the credits of NPTEL/ SWAYAM/ Coursera /other MOOC platform courses do not match with the existing subject the BOS will take appropriate decision.

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).

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.).

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.

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 ofthe 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 departmentat the time of registration for Minor degree.

a. 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.
b. 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.
c. Students will not be allowed to register and pursue more than extra two subjects in any semester.
d. 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 Mandatoryor 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.

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.

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.

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.

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.

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.

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

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.

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 3**0 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 meansthere 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.

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.

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.

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.

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.

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, Headof 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 for100 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 shallbe 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.

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 ofthe 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).

For Mandatory Non-Credit Courses offered in a Semester, after securing 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.

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 **s**tandard 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 fourclasses 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 ≥ 8.00
First Class	≥ 6.50 to < 8.00 CGPA
Second Class	≥ 5.50 to < 6.50 CGPA
Pass Class	≥ 5.00 to < 5.50 CGPA
FAIL	CGPA < 5

14. LETTER GRADE AND GRADE POINT

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.

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 (□ 90% , ≤ 100%)	O (Outstanding)	10
Below 90% but not less than 80% (□ 80% , < 90%)	A^+ (Excellent)	9
Below 80% but not less than 70% (□ 70% , < 80%)	A (Very Good)	8
Below 70% but not less than 60% (□ 60% , < 70%)	B+ (Good)	7
Below 60% but not less than 50% (□ 50% , < 60%)	B (above Average)	6
Below 50% but not less than 40% (□ 40% , < 50%)	C (Average)	5
Below 40% (< 40%)	F (FAIL)	0
Absent	AB	0

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.

A Letter Grade does not imply any specific % of Marks.

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.

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.

Credit Points (CP) = Grade Point (GP) x Credits …. For a Course

The Student passes the Subject/Course only when he gets GP □ 4 (P Grade or above).

The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (□CP) secured from ALL Subjects/Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

SGPA = $\{\sum_{i=1}^{N} C_i G_i\} / \{\sum_{i=1}^{N} C_i\}$ …. 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 x10= 30
Course5	3	C	5	3 x 5 = 15
Course6	4	B	6	4 x 6 = 24

Thus, **SGPA =139/20 =6.95**

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

CGPA = { $\sum_{j=1}^{M} C_j G_j$ } / { $\sum_{j=1}^{M} C_j$ } … for all S Semesters registered(i.e., up to and inclusive of S Semesters, S □ 2),

where 'M' is the TOTAL no. of Subjects (as specifically required and listed under the Course Structure of the parent Department) the Student has 'REGISTERED' 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 allottedto the jth Subject, and G_j represents the Grade Points (GP) corresponding to the Letter Grade awarded for that jth 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 SGPA : 6.9	Credits : 20.5 SGPA : 7.8	Credits : 18.0 SGPA : 5.6	Credits : 19.0 SGPA : 6.0	Credits : 21.5 SGPA : 6.3	Credits : 21.5 SGPA : 8.0	Credits : 23 SGPA : 8.0	Credits : 17 SGPA : 8.0

Thus, CGPA = 19.5x6.9+20.5x7.8+18.0x5.6+19.0x6.0+21.5x6.3+21.5x8.0+23x8.0+17x8.0

160 = 7.10

For Merit Ranking or Comparison Purposes or any other listing, ONLY the 'ROUNDED OFF' values of the CGPAs will be used.

For Calculations listed in Item 12.6–12.10, performance in failed Subjects/Courses (securingF 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.

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 resultof 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 Transcriptcontaining 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

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.

When the student absents himself, he is treated as to have appeared and obtained zero marksin that course(s) and grading is done accordingly.

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).

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 studentswho 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 inthe 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 rightto 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 ofthe 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 thecalculation 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 ≥ 8.00
First Class	≥ 6.50 to < 8.00 CGPA
Second Class	≥ 5.50 to < 6.50 CGPA
Pass Class	≥ 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 Engineering (Data Science)

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
A1DS117ES	Social Innovation	ESC	-	-	3	1.5	30	70	100
Total			**10**	**3**	**16**	**21**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
A1DS101MC	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 and Communication Skills Lab	HSMC	-	-	3	1.5	30	70	100
A1DS218PW	Engineering Exploration	PWC	-	-	2	1	30	70	100
Total			**11**	**2**	**12**	**19**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
A1DS202MC	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
A1DS301PC	Database Management Systems	PCC	3	-	-	3	30	70	100
A1DS302PC	Python Programming	PCC	3	-	-	3	30	70	100
A1DS303PC	Data Structures	PCC	3	-	-	3	30	70	100
A1DS304HS	Economics and Accounting for Engineers	HSMC	2	-	-	2	30	70	100
A1DS305PC	Discrete Mathematics	PCC	3	-	-	3	30	70	100
A1DS306PC	Database Management Systems Lab	PCC	-	-	3	1.5	30	70	100
A1DS307PC	Python Programming Lab	PCC	-	-	3	1.5	30	70	100
A1DS308PC	Data Structures Lab	PCC	-	-	3	1.5	30	70	100
Total			**14**	**-**	**9**	**18.5**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
A1DS303MC	Environmental Studies	MC	2	-	-	-	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
A1MA401BS	Computer Oriented Statistical Methods	BSC	3	1	-	4	30	70	100
A1DS402PC	Formal Languages and Automata Theory	PCC	3	-	-	3	30	70	100
A1DS403PC	Object Oriented Programming through Java	PCC	3	-	-	3	30	70	100
A1DS404PC	Operating Systems	PCC	3	-	-	3	30	70	100
A1EC405ES	Digital Electronics and Computer Organization	ESC	3	-	-	3	30	70	100
A1DS406PC	Java Programming Lab	PCC	-	-	2	1	30	70	100
A1DS407PC	Operating Systems Lab	PCC	-	-	3	1.5	30	70	100
Total			**15**	**1**	**5**	**18.5**	**210**	**490**	**700**
Mandatory Course (Non-Credit)									
A1DS404MC	Gender Sensitization	MC	-	-	2	-	100	-	**100**
A1DS405MC	Human Values and Professional Ethics	MC	3	-	-	-	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
A1DS501PC	Design and Analysis of Algorithms	PCC	3	-	-	3	30	70	100
A1DS502PC	Computer Networks	PCC	3	-	-	3	30	70	100
A1DS503PC	Introduction to Data Science	PCC	3	-	-	3	30	70	100
A1DS504PC	Machine Learning	PCC	3	-	-	3	30	70	100
	Professional Elective-I	PEC	3	-	-	3	30	70	100
A1DS505PC	Data Science Lab	PCC	-	-	3	1.5	30	70	100
A1DS506PC	Machine Learning Lab	PCC	-	-	3	1.5	30	70	100
A1EN507HS	Advanced English Communication Skills Lab	HSMC	-	-	2	1	30	70	100
A1DS508PW	Industrial Training/Mini Project	PWC	-	-	-	2	-	100	100
	MOOC's (B.Tech Hon's Degree)								
Total			**15**	**-**	**8**	**21**	**240**	**660**	**900**
Mandatory Course (Non-Credit)									
A1DS506MC	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
A1DS601PC	Data Warehousing and Data Mining	PCC	3	-	-	3	30	70	100
A1DS602PC	Predictive Analytics and Reinforcement Learning	PCC	3	-	-	3	30	70	100
A1DS603PC	Big Data Analytics	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
A1DS604PC	Big Data Analytics Lab	PCC	-	-	3	1.5	30	70	100
A1DS605PC	Data Warehousing and Data Mining Lab	PCC	-	-	3	1.5	30	70	100
A1DS606PW	Comprehensive Viva	PWC	-	-	-	1	-	100	100
	MOOC's (B.Tech Hon's Degree)								
Total			**18**	**-**	**6**	**22**	**240**	**660**	**900**
Mandatory Course (Non-Credit)									
A1DS607MC	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
A1DS701PC	Web Programming through PHP	PCC	3	1	-	4	30	70	100
A1DS702PC	Text Analytics and Natural Language Processing	PCC	3	1	-	4	30	70	100
A1DS703PC	Web and Social Media Analytics	PCC	3	1	-	4	30	70	100
	Professional Elective-IV	PEC	3	-	-	3	30	70	100
	Open Elective-II	OEC	3	-	-	3	30	70	100
A1DS704PC	Web Programming through PHP Lab	PCC	-	-	2	1	30	70	100
A1DS705PW	Project Phase - 1	PWC	-	-	8	4	100	-	100
	MOOC's (B.Tech Hon's Degree)								
Total			**15**	**3**	**10**	**23**	**280**	**420**	**700**

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
A1DS801ES	Operations Research	ESC	3	-	-	3	30	70	100
	Professional Elective-V	PEC	3	-	-	3	30	70	100
	Open Elective-III	OEC	3	-	-	3	30	70	100
A1DS802PW	Project Phase - 2	PWC	-	-	16	8	30	70	100
	MOOC's (B.Tech Hon's Degree)								
Total			**9**	**-**	**16**	**17**	**120**	**280**	**400**

PROFESSIONAL ELECTIVES			
PE-I		**PE-II**	
A1DS501PE	Software Engineering	A1DS604PE	Quantum Computing
A1DS502PE	Data Wrangling	A1DS605PE	Deep Learning
A1DS503PE	Artificial Intelligence	A1DS606PE	Cyber Security
PE-III		**PE-IV**	
A1DS607PE	Scripting Languages	A1DS710PE	Digital Marketing Analytics
A1DS608PE	Mobile Application Development	A1DS711PE	Robotic Automation Process
A1DS609PE	Data Handling and Visualization	A1DS712PE	Business Intelligence and Analytics
PE-V			
A1DS813PE	Statistical Machine Learning		
A1DS814PE	Cryptography and Network Security		
A1DS815PE	Soft Computing		

OPEN ELECTIVES			
OE-I		**OE-II**	
A2DS601OE	Predictive Analytics	A2DS703OE	Python Programming
A2DS602OE	Video Analytics	A2DS704OE	Data Analytics
OE-III			
A2DS805OE	Computational Linguistics and Natural LanguageProcessing		
A2DS806OE	Reinforcement Learning		

MANDATORY COURSE (NON – CREDIT)			
A1DS101MC	Technical Seminar -1	A1DS405MC	Human Values and Professional Ethics
A1DS202MC	Technical Seminar -2	A1DS506MC	Constitution of India
A1DS303MC	Environmental Studies	A1DS507MC	Essence of Indian Traditional Knowledge
A1DS404MC	Gender Sensitization		

OPEN ELECTIVES				
S. No.	**Name of the Department Offering Open Electives**	**Open Elective – I (Semester – VI)**	**Open Elective – II (Semester – VII)**	**Open Elective – III (Semester – VIII)**
1	Civil Engg.	**A1CE601OE**	**A1CE703OE**	**A1CE805OE**
		Engineering Materials For Sustainability	Environmental Engineering	Green Building Technologies
		A1CE602OE	**A1CE704OE**	**A1CE806OE**
		Disaster Preparedness & Planning Management	Construction Engineering And Management	Air Pollution and Control
2	Computer Science and Engg.	**A1CS601OE**	**A1CS703OE**	**A1CS805OE**
		Java Programming	Operating Systems	Linux Programming
		A1CS602OE	**A1CS704OE**	**A1CS806OE**
		Database Management Systems	Cyber Security	R Programming
3	Electrical and Electronics Engg.	**A1EE601OE**	**A1EE703OE**	**A1EE805OE**
		Energy Storage Systems	Electrical Safety Practices for Industry	Modern Trends in Electrical Energy
		A1EE602OE	**A1EE704OE**	**A1EE806OE**
		Renewable Energy Sources	Basics of Power Plant Engineering	Energy from Waste
4	Electronics and Communication Engg.	**A1EC601OE**	**A1EC703OE**	**A1EC805OE**
		Principles of Communications	Fiber Optic Communications	Embedded Networking
		A1EC602OE	**A1EC704OE**	**A1EC806OE**
		Electronic Measuring Instruments	Mobile Communication and Networks	Satellite Communication
5	Mechanical Engg.	**A1ME601OE**	**A1ME703OE**	**A1ME805OE**
		Mechatronics	Composite Materials	Total Quality Management
		A1ME602OE	**A1ME704OE**	**A1ME806OE**
		Additive Manufacturing	Industrial Robotics	Renewable Energy Sources
6	CSE(Artificial Intelligence and Machine Learning)	**AIAM601OE**	**A1AM703OE**	**A1AM805OE**
		Computational Complexity	Introduction To Machine Learning	Cognitive Computing
		AIAM602OE	**A1AM704OE**	**A1AM806OE**
		Computer Networks	Green Computing	Software Process and Project Management
7	CSE(Data Science)	**A1DS601OE**	**A1DS703OE**	**A1DS805OE**
		Predictive Analytics	Python Programming	Computational Linguistics and Natural Language Processing
		A1DS602OE	**A1DS704OE**	**A1DS806OE**
		Video Analytics	Data Analytics	Reinforcement Learning

8	CSE(IoT)	**A1IO601OE**	**A1IO703OE**	**A1IO805OE**
		Sensor and Devices	IoT for Architects	IoT System Design
		A1IO602OE	**A1IO704OE**	**A1IO806OE**
		IoT Sensor and Technologies	Python for IoT	Internet of Medical Things
9	CSE(Software Engineering) Civil Engg.	**A1SE601OE**	**A1SE703OE**	**A1SE805OE**
		Introduction to C++	JAVA Programming	Scripting Language
		A1SE602OE	**A1SE704OE**	**A1SE806OE**
		Principles of Software Engineering	Software Testing Methodology	Software Quality Management

***Open Elective –** Students should take Open Electives from List of Open Electives Offered by OtherDepartments / Branches Only

Ex: - A Student of CSE(Data Science) can take Open Electives from all other departments/branches exceptOpen Electives offered by CSE(Data Science) Dept.

I-YEAR (I-SEMESTER)

LINEAR ALGEBRA AND CALCULUS

I-B. Tech I-Semester **L T P C**
Course Code: A1MA101BS **3 1 0 4**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Concept of a rank of the matrix and applying this concept to know the consistency and solving thesystem of linear equations.
2. Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form. Conceptof Sequence and nature of the series.
3. Evaluation of surface areas and volumes of revolutions of curves and evaluation of improper integralsusing Beta and Gamma functions.
4. Partial differentiation and finding maxima and minima of function of two and three variables.

COURSE OUTCOMES:

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

1. Write the matrix representation of a set of linear equations and to analyse the solution of thesystem of equations
2. Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations.
3. Analyse the nature of sequence and series.
4. Solve the applications on the mean value theorems and evaluate the improper integrals using Beta andGamma 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: SEQUENCES & SERIES

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.
Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D- Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

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. Curvature- Radius of Curvature (Cartesian and Parametric co-ordinates) – Center of Curvature –Evolutes – Envelopes of one parameter family of curves. Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-V: MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)

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 **L T P C**
Course Code: A1AP104BS **3 1 0 4**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To provide an experimental foundation for the theoretical concepts introduced in the lectures.
2. To teach how to make careful experimental observations and how to think about and draw conclusions from such data
3. To help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments.
4. To introduce the concepts and techniques which have a wide application in experimental science but have not been introduced in the standard courses
5. To teach how to write a technical report this communicates scientific information in a clear and concise manner.

COURSE OUTCOMES:

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

1. Students will demonstrate the concepts in the quantum physics and develop skills in scientific inquiry, problem solving techniques
2. Students will have the knowledge of fundamentals of Semiconductor physics, and apply it to day to day issues.
3. The knowledge of Optoelectronics, enable the students to apply to various systems like communications, solar cell, photo cells and so on.
4. The students can design, characterization and study the properties of Lasers and fibre optics and prepare new models for various engineering applications.
5. Students will evaluate the different parameters of magnetic materials and their applications, and analyze the Electromagnetic theory.

UNIT-I: QUANTUM MECHANICS

Introduction to quantum physics, Black body radiation, Planck's law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, quantum operators, Particle in one dimensional box. Bloch theorem.

UNIT-II: SEMICONDUCTOR PHYSICS

Band theory of solids, Intrinsic and Extrinsic semiconductors, Effective mass of electron, density of states. Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, 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 (CO_2) laser, He-Ne 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, Ferroelectrics and Piezoelectrics. Magnetisation, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials.

TEXT BOOKS:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learing.
2. Halliday and Resnick, Physics - Wiley.
3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand

REFERENCE BOOKS:

1. Richard Robinett, Quantum Mechanics
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc. (1995).
3. Online Course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Guptha on NPTEL
4. Solid state physics by A J dekker.

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

I-B.Tech I-Semester **L T P C**
Course Code: A1EE107ES **3 1 0 4**

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:

Upon graduation:

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. CIRCUITS

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. CIRCUITS

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 characterises, 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 SatyabrataJit 2ed.,
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th Edition

REFERENCE BOOKS:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition by Raymond A.De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

ENGINEERING GRAPHICS

I-B.Tech I-Semester **L T P C**
Course Code: A1ME108ES **1 0 4 3**

COURSE OBJECTIVES

To learn

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 **L T P C**
Course Code: A1AP112BS **0 0 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To provide an experimental foundation for the theoretical concepts introduced in the lectures.
2. To teach how to make careful experimental observations and how to think about and draw conclusions from such data
3. To help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments.
4. To introduce the concepts and techniques which have a wide application in experimental science but have not been introduced in the standard courses
5. To teach how to write a technical report this communicates scientific information in a clear and concise manner.

COURSE OUTCOMES:

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

1. Develop skills to impart practical knowledge in real time solution. Discuss the working and characteristics ofthe various optoelectronic devices.
2. Analyze various properties of the semi-conductor devices and built the circuits with appropriate components.
3. Recall the magnetic properties of materials and determines the related parameters of magnetic fields.
4. Understand the comparison of results with theoretical calculations.
5. Focus on the principles, concepts, working and applications of new technology.

LIST OF EXPERIMENTS

WEEK – 1 Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode
WEEK – 2 Solar Cell: To study the V-I and P-I characteristics of solar cell
WEEK – 3 Light Emitting Diode: Plot V-I characteristics of light emitting diode Plot V-I characteristics of light emitting diode
WEEK – 4 Hall Effect: To determine Hall co-efficient of a given semiconductor
WEEK – 5 PIN Photo Diode to study the V-I Characteristics of Photo Diode by calculating the photo current.
WEEK – 6 Optical fiber: To determine the numerical aperture and acceptance angle of an optical fiber **WEEK – 7** LASER: To determine the wavelength of a given laser source by using diffraction rating method
WEEK – 8 LCR Circuit: To determine the Resonance frequency and Quality factor of a LCR Circuit **WEEK – 9** Thermistor: To study the variation of resistance with respect to temperature using thermistor.
WEEK – 10 Torsional Pendulum: To determine the rigidity modulus of a given metal wire by using Torsional pendulum.
WEEK – 11 Plank's Constant: To determine value of plank's constant using by measuring Radiation in fixed spectral range.
WEEK – 12 Stewart Gee's experiment: To study the variation of magnetic field along the axisof a circular coil.

TEXT BOOKS:

1. Engineering Physics, B.K. Pandey, S. Chaturvedi – Cengage Learing
2. R. Robinett, "Quantum Mechanics", OUP Oxford, 2006.IIndEdn.
3. P.K Palanisamy, Engineering Physics, Sitech Publications, 2013, 4th Ed Nielsen M. A.,
4. L Chung, Quantum Computation & Quantum Information, Cambridge Univ. Press.

REFERENCE BOOKS:

1. "Semiconductor Physics and Devices: Basic Principles" by Donald A Neamen
2. "Optics, Principles and Applications" by K K Sharma.
3. "Principles of Optics" by M Born and E Wolf.
4. "Oscillations and Waves" by Satya Prakash and Vinay Dua

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

I-B.Tech I-Semester **L T P C**
Course Code: A1EE115ES **0 0 2 1**

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:

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-2 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 atgiven 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

REFERENCE BOOKS:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition by Raymond A.De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

WORKSHOP MANUFACTURING PRACTICE

I-B. Tech I-Semester **L T P C**
Course Code: A1ME116ES **0 0 4 2**

COURSE OBJECTIVES:

The course should enable the students to:

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:

1. Study and practice on machine tools and their operations
2. Practiceonmanufacturingofcomponentsusingworkshoptradesincludingpluming, 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

REFERENCE BOOKS:

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

SOCIAL INNOVATION

I-B. Tech I-Semester **L T P C**
Course Code: A1DS117ES **0 0 3 1.5**

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:

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

1. Illustrate the factors affecting social innovation.
2. Illustrate the impact of social innovation in various sectors.
3. Adopt the ethical values in doing innovation, which leads to betterment of society.

UNIT 1

Community Study: Types and features of communities- Rural, Suburban, Urban and regional, Service based learning, Aims of community-based projects, Community visits.

UNIT 2

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

UNIT 3

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

UNIT 4

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 5

Steps for Patent filing and Start-up's, poster presentation.

REFERENCE BOOKS:

1. Social Entrepreneurship for the 21st Century: Innovation Across the Non Profit, Private and Public Sectors; Georgia Levenson Keohane; Tata McGraw Hill
2. Social Enterprises: An Organizational Perspective edited; Benjamin Gidron, Yeheskel Hasenfeld;Palgrave Macmillan
3. Engineering Ethics: An Industrial Perspective; Gail Baura; Elsevier
4. Intellectual Property and Financing Strategies for Technology Startups; Gerald B. Halt, Jr., John C. Donch, Jr., Amber R. Stiles, Robert Fesnak; Springer
5. Fundamentals of Intellectual Property (English) 1st Edition (Paperback, Dr. Kalyan C. Kankanala) Publisher: Asia Law House ISBN: 9789381849514, 938184951X Edition: 1st Edition, 2012.
6. Indian Patent Law (English, Paperback, Kalyan C. Kankanala) Publisher: Oxford University Press- NewDelhi, ISBN: 9780198089705, 0198089700 Edition: 2012.

I-YEAR (II-SEMESTER)

ORDINARY DIFFERENTIAL EQUATIONS AND ADVANCED CALCULUS

I-B.Tech II-Semester **L T P C**
Course Code: A1MA201BS **3 1 0 4**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Methods of solving the differential equations of first order.
2. Different methods of solving the differential equations of higher order.
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:

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

1. Identify whether the given differential equation of first order is exact or not
2. Solve higher differential equation and apply the concept of differential equation to real world problems
3. Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravityfor cubes, sphere and rectangular parallelepiped
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: FIRST ORDER ORDINARY DIFFERENTIAL EQUATION:

Exact, linear and Bernoulli's equations; Applications: 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, equation solvable for x and Clairaut's type.

UNIT-II: ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER:

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

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 Irrotationalvectors.

UNIT-V: VECTOR INTEGRATION

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and theirapplications.

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, 9thEdition, Pearson, Reprint.

REFERENCE BOOKS:

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

ENGINEERING CHEMISTRY

I-B. Tech II-Semester **L T P C**
Course Code: A1CH202BS **3 1 0 4**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To impart the basic knowledge of atomic, molecular and electronic modifications which makes the studentto understand & remember the technology based on them.
2. Able to understand the concepts of hardness & analyse 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:

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

1. Able to evaluate the MOELD of N2, O2 & F2.
2. Able to analyse hardness of water.
3. Able to apply electrochemistry concepts to solve the problem of corrosion.
4. Able to evaluate the structure of Organic compounds by using spectroscopy.
5. Able to 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 of N2, O2 and F2 molecules. π molecular orbitals of butadieneand benzene. Crystal Field Theory (CFT): Salient Features of CFT – Crystal Field Splitting of transition metal ion dorbitals 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 ozonization. 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 and Lithium ion battery).Fuel cells-Hydrogen-Oxygen fuel cell, 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, symmetryand chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation alanalysis of n- butane. Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN1, SN2 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. Rearrangement reactions: Pincol pinacolone rearrangement .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, 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

PROGRAMMING FOR PROBLEM SOLVING

I-B. Tech II-Semester **L T P C**
Course Code:A1CS206ES **3 0 0 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 programing 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, functionsreturning 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, 3rdedition,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.

WEB REFERENCES:

1. https://en.wikipedia.org/wiki/Computational_thinking 2. https://nptel.ac.in/courses/106/104/106104128/
3. https://en.cppreference.com/w/c/language
4. https://www.learn-c.org/

E-TEXT BOOKS:

1. https://slidelegend.com/queue/computational-thinking-for-the-modern-problem-solver_59d6f01e1723ddb0c7a0df47.html
2. http://flowgorithm.altervista.org/#elf_l1_Lw
3. http://www.freebookcentre.net/Language/Free-C-Programming-Books-Download.htm

MOOC COURSE:

1. https://www.coursera.org/learn/computational-thinking-problem-solving
2. https://onlinecourses.nptel.ac.in/noc18_cs33/preview
3. https://www.alison.com/courses/Introduction-to-Programming-in-c
4. http://www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s096-effective- programming-in- c-and-c-january-iap-2014/index.htm

ENGLISH FOR EFFECTIVE COMMUNICATION

I-B. Tech II-Semester **L T P C**
Course Code: A1EN205HS **2 0 0 2**

COURSE OBJECTIVES:

The course should enable the students to learn:

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 natureof the subject.
5. Develop language components to communicate effectively in formal and informal situations.

COURSE OUTCOMES:

At the end of this course, students will 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 andspeaking 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 Building: 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. Basic Writing Skills: 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 Styleof 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 CAMBRIDGEUNIVERSITY 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 PressReferences:
2. Swan, M. (2016). Practical English Usage Oxford University Press
3. Exercises in Spoken English. Parts I –III CIEFL, Hyderabad. Oxford University Press

REFERENCE BOOKS:

1. Murphy, R. (2015). Essential Grammar in Use. Cambridge University Press.
2. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
3. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
4. Zisser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.

PROGRAMMING FOR PROBLEM SOLVING LAB

I-B. Tech II-Semester **L T P C**
Course Code: A1CS214ES **0 0 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 form the user(+,-,*,/,% use switch)
c) Write a program to compute grade of students using if else adder. The grades are assigned as followed:

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

WEEK – 6:

a) Write a C program to find Sum of individual digits of given integer
b) Write a C program to generate first n terms of Fibonacci series
c) Write a C program to generate prime numbers between 1 and n
d) Write a C Program to find the Sum of Series SUM=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!
e) Write a C program to generate Pascal's triangle.
f) Write a C program to generate pyramid of numbers.1

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

WEEK – 7:

a) Write a C Program to implement following searching methods
   I. Binary Search
   II. Linear Search

b) Write a C program to find largest and smallest number in a list of integers

c) Write a C program
   I. To add two matrices
   II. To multiply two matrices

d) Write a C program to find Transpose of a given matrix

WEEK – 8:

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

WEEK – 9:

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

WEEK – 10:

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

WEEK – 11:

a) Write a C program to print 2-D array using pointers
b) 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 ofn 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.

WEB REFERENCES:

1. http://www.flowgorithm.org/documentation/
2. http://www.sanfoundry.com/c-programming-examples
3. http://www.geeksforgeeks.org/c
4. http://www.cprogramming.com/tutorial/c

ENGINEERING CHEMISTRY LAB

I-B. Tech II-Semester **L T P C**
Course Code: A1CH210BS **0 0 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
2. To determine the rate constant of reactions from concentrations as an function of time.
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:

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

1. Able to analyse the hardness and chloride content in water.
2. Able to Estimate rate constant of a reaction from concentration – time relationships.
3. Able to determine physical properties like adsorption and viscosity.
4. Able to Calculate Rf values of some organic molecules by TLC technique.
5. Able to determine the acid content in the given sample by using potentiometer.

LIST OF EXPERIMENTS

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe2+ by Potentiometry using KMnO4
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol.
9. Thin layer chromatography calculation of Rf values. eg ortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. Determination of surface tension of a give liquid using stalagnometer.

TEXT BOOKS:

1. P.C. Jain and M. Jain, Engineering Chemistry, 15/e, Dhanapat Rai & Sons, Delhi, 2014.
2. B.K. Sharma, Engineering Chemistry, Krishna Prakashan, Meerut.
3. O G Palanna, Engineering Chemistry, Tata McGraw Hill, 2009.

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 LANGUAGE AND COMMUNICATION SKILLS LAB

I-B. Tech II-Semester **L T P C**
Course Code: A1EN213HS **0 0 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to learn:

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. Get trained in different interview and public speaking skills such as JAM, debate, role play, group discussion etc.
5. Instill confidence and make them competent enough to express fluently and neutralize their mother tongue influence.

COURSE OUTCOMES:

At the end of the course 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.

LIST OF ACTIVITIES

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 peopleof 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
    1. Oral practice: Just A Minute (JAM) Sessions
    2. Describing objects/situations/people
    3. Role play – Individual/Group activities

EXERCISE – ICALL 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 – IICALL 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 - IIICALL 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 – IVCALL 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 – VCALL Lab:

Understand: Listening for Specific Details.*Practice:* Listening Comprehension Tests. **ICS Lab**:
Understand: Interview Skills.*Practice:* Mock Interviews.

TEXT BOOKS:

1. Michael Swan. Practical English Usage. Oxford University Press. 2017.
2. Wren & Martin. High School English Grammar and Composition Book. S Chand Publishing. 2017.

REFERENCE BOOKS:

1. Whitby, N. Business Benchmark. Cambridge University Press (with CD) 2nd Edition.
2. Kumar, S. & Lata, P. (2011). Communication Skills. Oxford University Press.
3. Balasubramanian, T. (2008). A Text book of English Phonetics for Indian Students, Macmillan.
4. Thorpe, E. (2006). Winning at Interviews, Pearson Education.
5. Sethi, J. et al. (2005). A Practical Course in English Pronunciation (with CD), Prentice Hall of India.

WEBSITES:

1. https://www. britishcouncil.org
2. https://www. bbc.co.uk
3. https://www. grammarly.com
4. https://www. fluentu.com
5. https://www.cambridgeenglish.org/exams-and-tests/business-preliminary
6. https://www.cambridgeenglish.org/exams-and-tests/business-vantage

ENGINEERING EXPLORATION

I-B. Tech II-Semester **L T P C**
Course Code: A1DS218PW **0 0 2 1**

COURSE DESCRIPTION:

Course Overview:

This Course provides an opportunity for freshman students to learn in new ecosystem and is one of the unique outcomes of innovative education ecosystem in digital era of our nation. The focus of this course is on Engineering Design Process, Problem Solving, and Multi-disciplinary skills, Ethics and Data Acquisition and Analysis. This course is co-designed and co-taught by faculty members drawn from multiple engineering disciplines; it follows Project Based Learning (PBL) pedagogy with need statements covering broad themes of environmental, educational, smart appliances, smart agriculture, industrial needs etc. are used by students to carve out problem definitions by linking Sustainable Development Goals defined by United Nation. Students work in teams to solve identified problems and serves as a platform for peer learning and push students in Multi-disciplinary design thinking in first year itself.

COURSE OUTCOMES:

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

1. Explain the role of an Engineer as a problem solver.
2. Identify multi-disciplinary approach required in solving an engineering problem
3. Analyse a given problem using process of engineering problem analysis.
4. Build simple systems using engineering design process.
5. Analyse engineering solutions from sustainability perspectives.
6. Use basics of engineering project management skills in doing projects.
7. Demonstrate data acquisition and analysis skills using a tool.

MODULE 1

Introduction to Engineering and Engineering Study: Introduction to Engineering and Engineering Study: Difference between science and engineering, scientist and engineer needs and wants, various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer.

MODULE 2

Engineering Design: Engineering Design Process, Multidisciplinary facet of design, Importance of analysis in engineering design, general analysis procedure, Pair wise comparison chart, Introduction to mechatronics system, generation of multiple solution, decision matrix, Concepts of reverse engineering

MODULE 3

Mechanisms: Basic Components of a Mechanism, Degrees of Freedom or Mobility of a Mechanism, 4 Bar Chain, Crank Rocker Mechanism, Slider Crank Mechanism.

MODULE 4

Platform based development: Introduction to various platform-based development, programming and its essentials, Introduction to transducers and actuators and its interfacing. Concepts of reverse engineering.

Data Acquisition and Analysis: Types of Data, Descriptive Statistics techniques as applicable to different types of data, Types of graphs as applicable to different types of data, Usage of data acquisition tools for descriptive statistics, Data Acquisition, Exporting acquired data to analysis using visual representation.

MODULE 5

Project Management: Introduction, Significance of teamwork, Importance of communication in engineering profession, Project management tools: Checklist, Timeline, Gantt Chart, Significance of documentation.

Sustainability: Introduction to sustainability, Sustainability leadership, Life cycle assessment, carbon footprint.

REFERENCE BOOKS:

1. Engineering Fundamentals: An Introduction to Engineering (Mind Tap Course List) 5th Edition by Saeed Moaveni.
2. Software Project Management (SIE), (Fifth Edition); Bob Hughes, Mike Cotterell, Rajib Mall; Publishedby Tata McGraw-Hill Education Pvt. Ltd (2011) ; ISBN 10: 0071072748 ISBN 13: 9780071072748
3. A Ghosh and AK Malik: Theory of Mechanism and Machine; East West Press (Pvt) Ltd., New Delhi.
4. Arduino Cookbook, 2nd Edition by Michael Margolis: O'Reilly Media
5. Data Acquisition and Analysis - Building an Excel Budget Forecast Workbook by Andrew Greaney (Kindle Edition)ISBN: 1521903468
6. Concepts in Engineering Design – 2016; by Sumesh Krishnan (Author), Dr. Mukul Shukla (Author), Publisher: Notion Press

II-YEAR (I-SEMESTER)

DATABASE MANAGEMENT SYSTEMS

II-B.Tech I-Semester **L T P C**
Course Code: A1DS301PC **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students to:

1. **Discuss** the basic database concepts, applications, data models, schemas and instances.
2. **Design** Entity Relationship model for a database.
3. **Demonstrate** the use of constraints and relational algebra operations.
4. **Describe** the basics of SQL and construct queries using SQL
5. **Understand** the importance of normalization in databases.
6. **Demonstrate** the basic concepts of transaction processing and concurrency control.
7. **Understand** the concepts of database storage structures and identify the access techniques.

COURSE OUTCOMES:

At the end of the course the students are able to:

1. Use the basic concepts of Database Systems in Database design
2. Apply SQL queries to interact with Database
3. Apply normalization on database design to eliminate anomalies
4. Analyze database transactions and can control them by applying ACID properties
5. Analyze physical database storage system of database.

UNIT-I:

Introduction: Database system applications, Database system Vs file systems, Advantage of a DBMS, Describing and storing data in a DBMS, Structure of a DBMS, People who work with databases.

Entity Relationship Model (ER Model): Database Design and ER Diagrams, Entities Attributes and Entity sets, Features of ER Model, Conceptual design with the ER model.

UNIT-II:

Introduction to relational model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition language, Basic Structure of SQL Queries, Basic operations, Set Operations, NULL Values, Aggregate Functions, Nested Sub Queries, JOIN Expressions, Views, Transactions, Integrity Constraints, SQL Data types and Schemas, Functions and Procedures, Triggers.

UNIT-III:

Relational Algebra and Calculus: Relational Algebra, Tuple Relational Calculus, Domain Relational Calculus.

Schema Refinement and Normal Forms: Introduction to schema refinement, Functional Dependencies, Reasoning about FDs, Normal Forms: 1NF, 2NF, 3NF, Boyce Codd Normal Form, Properties of decompositions, Multi valued Dependencies, Fourth Normal Form, Join Dependencies and Fifth Normal Form.

UNIT-IV:

Transaction Management: Transaction Concept, A simple transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability.

Concurrency Control and Recovery System: Lock based protocols, Deadlock handling, multiple granularity, Time stamp based protocols, Validation based protocols. Failure Classification, Storage, Recovery and Atomicity, Failure with Non-volatile Storage, Remote backup systems.

UNIT-V:

Storage and File Structure: Overview of Physical Storage Media, Magnetic Disk and Flash Storage, RAID, Tertiary Storage, File Organization, Organization of Records in Files, Data Dictionary storage.

Indexing and Hashing: Basic Concepts, Ordered Indices, B+ Tree Index Files, Multiple Key access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, TataMcGraw Hill, 2011.
2. Raghurama Krishnan, Johannes Gehrke, "Data base Management Systems", TATA McGraw Hill, 3rd Edition, 2007.
3. R.P. Mahapatra & Govind Verma, Database Management Systems, Khanna Publishing House, 2013.

REFERENCE BOOKS:

1. Peter Rob, Carlos Coronel, Database Systems Design Implementation and Management, 7th edition, 2009.
2. Scott Urman, Michael McLaughlin, Ron Hardman, "Oracle database 10g PL/SQL programming", 6th edition, Tata McGraw Hill,2010
3. .K.Singh, "Database Systems Concepts, Design and Applications", First edition, Pearson Education, 2006.
4. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fourth Edition, Pearson / Addision wesley, 2007.

WEB REFERENCES:

1. http://www.learndb.com/databases/how-to-convert-er-diagram-to-relational-database
2. https://www.w3schools.com/sql/sql_create_table.asp
3. http://www.edugrabs.com/conversion-of-er-model-to-relational-model/?upm_export=print
4. http://ssyu.im.ncnu.edu.tw/course/CSDB/chap14.pdf
5. http://web.cs.ucdavis.edu/~green/courses/ecs165a-w11/8-query.pdf

E-TEXT BOOKS:

1. http://www.freebookcentre.net/Database/Free-Database-Systems-Books-Download.html
2. http://www.ddegjust.ac.in/studymaterial/mca-3/ms-11.pdf

MOOCS COURSE:

1. https://www.mooc-list.com/tags/dbms-extensions
2. https://onlinecourses.nptel.ac.in/noc18_cs15/preview

PYTHON PROGRAMMING

II-B.Tech I-Semester **L T P C**
Course Code: A1DS302PC **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

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:

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

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 stumpy, pandas and matplotlib.

UNIT – I INTRODUCTION TO PYTHON PROGRAMMING

Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set Types.

UNIT – II FILE, EXCEPTION HANDLING AND OOP

FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, *Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

UNIT – III INTRODUCTION TO REGULAR EXPRESSIONS

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

UNIT – IV GUI PROGRAMMING

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers.

UNIT – V DATABASE PROGRAMMING

Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs)

TEXTBOOKS:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCE BOOKS:

1. Think Python, Allen Downey, Green Tea Press
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson 4. Learning Python, Mark Lutz, O'Really.

WEB REFERENCES:

1. https://www.programiz.com/python-programming
2. https://www.javatpoint.com/python-tutorial
3. https://www.geeksforgeeks.org/python-programming-language/

DATA STRUCTURES

II B. Tech - I Semester **L T P C**
Course Code: A1DS303PC **3 0 0 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. 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 Sortingmethods.

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 SciencePress.
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

WEB REFERENCES:

1. https://hackr.io/tutorials/learn-data-structures-algorithms
2. https://www.geeksforgeeks.org/fundamentals-of-algorithms/
3. https://www.udemy.com/introduction-to-algorithms-and-data-structures-in-c/
4. https://leetcode.com

E-TEXT BOOKS:

1. http://www.freetechbooks.com/algorithm-analysis-and-design-t1030.html
2. http://www.freetechbooks.com/algorithmic-problem-solving-t373.html
3. http://www.freetechbooks.com/algorithms-and-data-structures-the-basic-toolbox-t871.html

MOOCS COURSE:

1. https://www.coursera.org/specializations/data-structures-algorithms
2. https://onlinecourses.nptel.ac.in/noc16_cs06/preview

ECONOMICS AND ACCOUNTING FOR ENGINEERS

II-B.Tech I-Semester **L T P C**
Course Code: A1DS304HS **2 0 0 2**

COURSE OBJECTIVES:

The course should enable the students to learn:

To enable the student to understand and appreciate, with a particular insight, the importance of certain basic issuesgoverning 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:

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

1. Understand the market dynamics namely, demand and supply, demand forecasting, elasticity of demand and supply, pricing methods and pricing in different market structures.
2. Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis.
3. Develop an understanding of Markets & New Economic Environment.
4. Analyze how capital budgeting decisions are carried out.
5. Understanding the framework for both manual and computerized accounting process.
6. Know how to analyses 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 (TrasingAccount, 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. Du Pont 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.

DISCRETE MATHEMATICS

II B. Tech - I Semester **L T P C**
Course Code: A1DS305PC **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students to:

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:

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

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 BOOKS:

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

DATABASE MANAGEMENT SYSTEMS LAB

II-B.Tech I-Semester **L T P C**
Course Code: A1DS306PC **0 0 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to learn:

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:

At the end of the 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.
5. Analyze and Select storage and recovery techniques of database system.
6. Develop Procedures, Cursors, and Triggers in database system.

LIST OF EXPERIMENTS

WEEK -1 DDL Commands

Creation of Tables using SQL- Overview of using SQL tool and Data types in SQL

- Altering Tables and
- Dropping Tables

WEEK -2 Create Table with Primary key and Foreign Key& DML Commands

Creating Tables (along with Primary and Foreign keys),Practicing DML commands-

- Insert,
- Update
- Delete.

WEEK -3 Selection Queries

Practicing Select command using following operations

- AND, OR
- ORDER BY
- BETWEEN
- LIKE
- Apply CHECK constraint

WEEK -4 Aggregate Functions and Views

Practice Queries using following functions

- COUNT,
- SUM,
- AVG,
- MAX,
- MIN,

Apply constraint on aggregation using

- GROUP BY,
- HAVING,

VIEWS Create, Modify and Drop

WEEK -5 Nested Queries

Practicing Nested Queries using

- UNION,
- INTERSECT,
- CONSTRAINTS
- IN

WEEK -6 Co- Related Nested Queries

Practicing Co – Related Nested Queries using

- EXISTS
- NOT EXISTS. ANY, ALL

WEEK -7 Join Queries

Practicing Join Queries using

- Inner join
- Outer join
- Equi join
- Natural join

WEEK -8 Triggers

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

WEEK -9 Procedures

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

WEEK -10 Cursors

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

WEEK -11 PL/SQL Part 1

Practice PL/SQL –

- block structure,
- variables,
- data types,

WEEK -12 PL/SQL Part 2

Practice PL/SQL –

- operators,
- control structures;
- aseca

Case study 1: College Management

Case study 2: An Enterprise/Organization Case study 3: Library Management system Case study 4: Sailors and shipment system

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", SixthEdition,Tata McGraw Hill, 2011.
2. Raghurama Krishnan, Johannes Gehrke, "Data base Management Systems", TATA McGraw Hill, 3rd Edition, 2007.
3. R.P. Mahapatra & Govind Verma, Database Management Systems, Khanna PublishingHouse,2013.
4. Michael McLaughlin, Oracle Database 11g PL/SQL Programming, Oracle press.

REFERENCE BOOKS:

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

WEB REFERENCES:

1. http://www.learndb.com/databases/how-to-convert-er-diagram-to-relational-database
2. https://www.w3schools.com/sql/sql_create_table.asp
3. http://www.edugrabs.com/conversion-of-er-model-to-relational-model/?upm_export=print
4. http://ssyu.im.ncnu.edu.tw/course/CSDB/chap14.pdf
5. http://web.cs.ucdavis.edu/~green/courses/ecs165a-w11/8-query.pdf

PYTHON PROGRAMMING LAB

II-B.Tech I-Semester **L T P C**
Course Code: A1DS307PC **0 0 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Understand the basics and function of Python Programming Language.
2. Understand the string operation and sequences used in Python Programming Language.
3. Know the Data Structures in Python Programming Language.
4. Use the reusability concepts in Python Programming Language.
5. Use Exception Handling mechanism in Python Programming Language.
6. Know the packages in Python Programming Language.

COURSE OUTCOMES:

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

1. Develop programs on data types, operators and expressions
2. Apply the data structures in real time scenarios
3. Write the programs on strings and functions
4. Implement programs on class and related issues.
5. Use of python exception handling and libraries.

LIST OF EXPERIMENTSWEEK-1:

a. Write a program to perform different Arithmetic Operations on numbers in Python
b. Write a Python program which accepts the radius of a circle from the user and compute the area
c. Write a Python program to get the Python version you are using.
d. Write a Python program that accepts an integer (n) and computes the value of n+nn+nnn.

WEEK-2:

a. Write a Python program to convert temperatures to and from Celsius, Fahrenheit.
b. [Formula: c/5= f-32/9]
c. Write a python script to print the current date in the following format “Sun May 29 02:26:23 IST 2017”
d. A library charges a fine for every book returned late. For first 6 days the fine is 50 paisa, for 10-15 days fine is one rupee and above 15 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Write a python program to accept the number of days the
e. Member is late to return the book and display the fine or the appropriate message.

WEEK-3:

a. Write a python function to find largest of three numbers
b. Write a Python function that prints prime numbers in between 50 and 100
c. Write a python program to find factorial of a number using Recursion
d. Write a function that receives marks received by a student in 6 subjects and returns the average and percentage of these marks. Call this function from main() and print the result in main

WEEK-4:

a. Write a program to demonstrate working with tuples and List in python
b. Write a program to demonstrate working with dictionaries in python

WEEK-5:

a. Write a program to demonstrate working with Strings and string operations

WEEK-6:

a. Write a script named hellow.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
b. Write a program that inputs a text file. The program should print all of the unique words in the file
c. in alphabetical order.

WEEK-7:

a. Write python programs to demonstrate class & object, static and instance method implementation.

WEEK -8:

a. Write python programs to demonstrate Inheritance and Polymorphism.

WEEK-9:

a. Write python programs to demonstrate Exception Handling in python.

WEEK-10:

a. Write python programs to demonstrate Numpy library and supporting functions.

WEEK-11:

a. Write python programs to demonstrate Pandas libraries' supported structures like series, data frame and panel.

WEEK-12:

a. Write a python program to demonstrate matplotlib library and supporting functions.

DATA STRUCTURES LAB

II-B.Tech I-Semester **L T P C**
Course Code: A1DS308PC **0 0 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, hashtables 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-RESURSION

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 ofintegers 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 ascendingorder

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.

WEB REFERENCES:

1. http://www.sanfoundry.com/data structures-examples
2. http://www.geeksforgeeks.org/c
3. http://www.cs.princeton.edu

ENVIRONMENTAL STUDIES

II-B.Tech I-Semester **L T P C**
Course Code: A1DS303MC **2 0 0 0**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations
4. Determine the Natural resources on which the structure of development is raised for sustainability of the society through equitable maintenance of natural resources.
5. Illustrate about biodiversity that raises an appreciation and deeper understanding of species, ecosystems and also the interconnectedness of the living world and thereby avoids the mismanagement, misuse and destruction of biodiversity.
6. Summarize a methodology for identification, assessment and quantification of global environmental issues in order to create awareness about the international conventions for mitigating global environmental problems.
7. Sustainable development that aims to meet raising human needs of the present and future generations through preserving the environment.
8. Outline green environmental issue provides an opportunity to overcome the current global environmental issues by implementing modern techniques like CDM, green building, green computing etc.

COURSE OUTCOMES:

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

1. Demonstrate an understanding of the Significance of environmental education.
2. Outline the context of environmentalism.
3. Comprehend the multidisciplinary nature of the course environmental Studies.
4. Illustrate the components of the environment and its interactions.
5. Outline the causes, effects and management options for various environmental problems related to Air, Water and land.

UNIT – I ECO SYSTEMS

Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem, Food chains, food web and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem value, services and carrying capacity.

UNIT – II NATURAL RESOURCES & MINERAL RESOURCES

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, Land resources: Forest 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

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Threats to biodiversity: habitat loss, poachingof 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 and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture. Noise Pollution: Sources and Healthhazards, 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. Overview of air pollution control technologies, Concepts of bioremediation. Global Environmental Problems and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). International conventions / Protocols: Earth Summit, Kyoto protocol and Montréal Protocol.

UNIT – V ENVIRONMENTAL POLICY, LEGISLATION & EIA

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act1981, 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. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Towards Sustainable Future: Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for UniversityGrants 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 LearningPrivateLtd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHILearning 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

II-YEAR (II-SEMESTER)

COMPUTER ORIENTED STATISTICAL METHODS

II B. Tech - II Semester **L T P C**
Course Code: A1MA401BS **3 1 0 4**

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 Marcov 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 forEngineers 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.

FORMAL LANGUAGES AND AUTOMATA THEORY

II-B.Tech II-Semester **L T P C**
Course Code: A1DS402PC **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To provide introduction to some of the central ideas of theoretical computer science from the Perspectiveof 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:

At the end of the course the students are able to:

1. Able to understand the concept of abstract machines and their power to recognize the Languages.
2. Able to employ finite state machines for modelling 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 €-transitions to NFA without €-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 Tress, 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 €- Productions. Chomsky Normal form Griebech 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, 3nd Edition, John E. Hopcroft,Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra andChandrashekaran, 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.

WEB REFERENCES:

1. http://www.wileyindia.com
2. https://dl.acm.org
3. http://www.sanfoundry.com
4. http://csstanford.edu
5. http://web.ics.uci.edu.pdf

E-TEXT BOOKS:

1. http://www.freebookcentre.net/Database/Free-flat-Books-Download.html
2. http://www.ddegjust.ac.in/studymaterial/mca-3/ms-11.pdf

MOOCS COURSE:

1. https://www.mooc-list.com/tags/flat-extensions
2. https://onlinecourses.nptel.ac.in/noc18_cs15/preview

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

II-B.Tech II-Semester **L T P C**
Course Code: A1DS403PC **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Understand the basic object oriented programming concepts and apply them in problem solving.
2. Illustrate inheritance and polymorphism concepts for reusing the program.
3. Demonstrate on the exception handling mechanism.
4. Demonstrate on the multi-tasking by using multiple threads.
5. Develop data-centric applications using JDBC.
6. Understand the basics of java collection framework.

COURSE OUTCOMES:

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

1. Use object oriented programming concepts to solve real world problems.
2. Demonstrate the user defined exceptions by exception handling keywords (try, catch, throw, throws and finally).
3. Use multithreading concepts to develop inter process communication.
4. Develop java application to interact with database by using relevant software component (JDBC Driver).
5. Solve real world problems using Collections.

UNIT – I JAVA BASICS

JAVA BASICS: Review of Object oriented concepts, History of Java, Java buzzwords, JVM architecture, Data types, Variables, Scope and life time of variables, arrays, operators, control statements, type conversion and casting, simple java program, constructors, methods, Static block, Static Data, Static
Method String and String Buffer Classes, Using Java API Document.

UNIT – II INHERITANCE, POLYMORPHISM, PACKAGES AND INTERFACES

INHERITANCE AND POLYMORPHISM: Basic concepts, Types of inheritance, Member access rules, Usage of this and Super key word, Method Overloading, Method overriding, Abstract classes, Dynamicmethod dispatch, Usage of final keyword.

PACKAGES AND INTERFACES: Defining package, Access protection, importing packages, defining and implementing interfaces, and Extending interfaces.

UNIT – III EXCEPTION HANDLING AND FILES

EXCEPTION HANDLING: Exception types, Usage of Try, Catch, Throw, Throws and Finally keywords,Built-in Exceptions, Creating own Exception classes.

I / O STREAMS AND FILES: Concepts of streams, Stream classes- Byte and Character stream, Reading console Input and Writing Console output, File Handling.

UNIT – IV MULTITHREADING AND JDBC

MULTI THREADING: Concepts of Thread, Thread life cycle, creating threads using Thread class andRunnable interface, Synchronization, Thread priorities, Inter Thread communication.

JDBC-Connecting to Database - JDBC Type 1 to 4 drives, connecting to a database, querying a database and processing the results, updating data with JDBC.

UNIT – V COLLECTION FRAMEWORK

COLLECTION FRAMEWORK: Introduction to Java Collections, Overview of Java Collection frame work, Generics, Commonly used Collection classes- Array List, Vector, Hash table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, calendar and Properties.

TEXT BOOKS:

1. Herbert Schildt and Dale Skrien,"Java Fundamentals – A comprehensive Introduction", McGraw Hill, 1st Edition, 2013.
2. Herbert Schildt, "Java the complete reference", McGraw Hill, Osborne, 7th Edition, 2011.
3. T.Budd, "Understanding Object- Oriented Programming with Java", Pearson Education, Updated Edition (New Java 2 Coverage), 1999.

REFERENCE BOOKS:

1. P.J.Dietel and H.M.Dietel, "Java How to program", Prentice Hall, 6th Edition, 2005.
2. P.Radha Krishna, "Object Oriented programming through Java", CRC Press, 1st Edition, 2007.
3. S.Malhotra and S. Choudhary, "Programming in Java", Oxford University Press, 2nd Edition, 2014.

OPERATING SYSTEMS

II-B.Tech II-Semester **L T P C**
Course Code: A1DS404PC **3 0 0 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 OSas 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 fileand 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.
6. Understand the issues related to disk management.

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, Dinning 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.

WEB REFERENCES:

1. Abraham-Silberschatz-Operating-System-Concepts---9th 2012.12.pdf
2. https://www.cs.uic.edu/~jbell/CourseNotes/OperatingSystems

DIGITAL ELECTRONICS AND COMPUTER ORGANIZATION

II-B.Tech II-Semester **L T P C**
Course Code: A1EC405ES **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Understand different number systems.
2. Design combinational and sequential logic circuits
3. Understand concepts of register transfer logic and arithmetic operations.
4. Learn different types of addressing modes and memory organization

COURSE OUTCOMES:

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

1. Able to solve from one number to another number.
2. Able to combinational and sequential logic circuits
3. Identify basic components and design of the CPU: the ALU and control unit.
4. Compare various types of IO mapping techniques
5. Critique the performance issues of cache memory and virtual memory

UNIT – I NUMBER THEORY and BOOLEAN ALGEBRA

Representation of numbers of different radix, conversion of numbers from one radix to another radix, r-1‘s complement and r‘s complement. 4-bit codes. Basic Theorems and Properties of Boolean algebra, Canonical and Standard Forms, Digital Logic Gates, Universal Logic Gates. K- Map Method.

UNIT – II COMBINATIONAL and SEQUENTIAL LOGIC CIRCUITS

Design of Half adder, full adder, half subtractor, full subtractor. Decoder, Encoder, Multiplexer, De- multiplexer and comparator. basic flip-flops, truth tables and excitation tables (NAND RS latch, NOR RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with preset and clear terminals). Classification of sequential circuits (synchronous and asynchronous);

UNIT – III DESIGN

Conversion of flip-flops to other flip-flops. Design of Ripple counters, design of synchronous counters, Johnson counter, ring counter, shift register, bi-directional shift register, universal shift register.
Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control Memory-Reference Instructions, Input-Output and interrupt.

UNIT – IV REGISTER TRANSFER AND MICRO-OPERATIONS:

Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC),.Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro- Operations, Logic Micro- Operations, Shift Micro-Operations, Arithmetic logic shift unit.

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. Switching and Finite Automata Theory- Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge.
2. Digital Design- Morris Mano, PHI, 3rd Edition.
3. M. Morris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.
4. John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGraw-Hill.

REFERENCE BOOKS:

1. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed,John Wiley & SonsInc.
2. William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersy.
3. Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education.

JAVA PROGRAMMING LAB

II-B.Tech II-Semester **L T P C**
Course Code: A1DS406PC **0 0 2 1**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Practice object-oriented programs and build java applications.
2. Implement java programs for establishing interfaces.
3. Implement sample programs for developing reusable software components.
4. Create database connectivity in java and implement GUI applications.

COURSE OUTCOMES:

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

1. Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.
2. Understand the use of different exception handling mechanisms and concept of multithreading for robust and efficient application development.
3. Understand and implement concepts on file streams and operations in java programming for a givenapplication programs.
4. Develop java application to interact with database by using relevant software component (JDBC
5. Driver).

LIST OF EXPERIMENTS WEEK – 1 JAVA BASICS

a. Write a java program that prints all real solutions to the quadratic equation ax2+bx+c=0. Read in a, b, c and use the quadratic formula.

b. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses both recursive and non-recursive functions.

WEEK – 2 ARRAYS

a. Write a java program to sort given list of integers in ascending order.

b. Write a java program to multiply two given matrices.

WEEK – 3 STRINGS

a. Write a java program to check whether a given string is palindrome.

b. Write a java program for sorting a given list of names in ascending order.

WEEK – 4 OVERLOADING & OVERRIDING

a. Write a java program to implement method overloading and constructors overloading.

b. Write a java program to implement method overriding.

WEEK – 5 INHERITANCES

Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

WEEK – 6 INTERFACES

a. Write a program to create interface A in this interface we have two method meth1 and meth2. Implements this interface in another class named My Class.
b. Write a program to give example for multiple inheritances in Java.

WEEK – 7 EXCEPTION HANDLING

Write a program that reads two numbers Num1 and Num2. If Num1 and Num2 were not integers, theprogram would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception.

WEEK – 8 I/O STREAMS

a. Write a java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
b. Write a java program that displays the number of characters, lines and words in a text file.

WEEK – 9 MULTI THREADING

Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number

WEEK – 10 GENERICS

a. Write a Java program to swap two different types of data using Generics.
b. Write a Java program to find maximum and minimum of two different types of data usingGenerics.

WEEK – 11 COLLECTIONS

Create a linked list of elements.
a. Delete a given element from the above list.
b. Display the contents of the list after deletion.

WEEK – 12 CONNECTING TO DATABASE

Write a java program that connects to a database using JDBC and does add, delete, modify and retrieve operations.

TEXT BOOKS:

1. P. J. Deitel, H. M. Deitel, “Java for Programmers”, Pearson Education, PHI, 4th Edition, 2007.
2. P. Radha Krishna, “Object Oriented Programming through Java”, Universities Press, 2nd Edition, 2007
3. Bruce Eckel, “Thinking in Java”, Pearson Education, 4th Edition, 2006.
4. Sachin Malhotra, Saurabh Chaudhary, “Programming in Java”, Oxford University Press, 5th Edition, 2010.

REFERENCE BOOKS:

1. P.J.Dietel and H.M.Dietel, “Java How to program”, Prentice Hall, 6th Edition, 2005.
2. P.Radha Krishna, “Object Oriented programming through Java”, CRC Press, 1st Edition, 2007.
3. S.Malhotra and S. Choudhary, “Programming in Java”, Oxford University Press, 2nd Edition, 2014.

OPERATING SYSTEMS LAB

II-B.Tech II-Semester **L T P C**

Course Code: A1DS407PC **0 0 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To write programs in Linux environment.
2. To implement the scheduling algorithms.
3. To develop solutions for synchronization problems using semaphores.
4. To implement page replacement algorithms and other memory management techniques.
5. To implement file allocation methods

COURSE OUTCOMES:

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

1. Design and solve synchronization problems.
2. Simulate and implement scheduling concepts.
3. Model a deadlock situation and implementing methods for handling deadlocks.
4. Simulate and implement memory management techniques.
5. Simulate and implement various file management concepts.
6. Use different system calls for writing application programs.

LIST OF EXPERIMENTSWEEK 1

Programs using system calls

a. Write a C program to simulate ls | sort command.

b. Write a C program to implement the Process system calls. Create a new process, create a child process to itand then make it wait and abort.

c. Write a C program to simulate copy the contents of one file to another using system calls.

WEEK 2

Write C programs to simulate the following CPU scheduling algorithms:

a. FCFS b. SJF

WEEK 3

Write C programs to simulate the following CPU scheduling algorithms

a. Priority b. Round Robin

WEEK 4

Write a C program to solve the Producer- Consumer problem using semaphores

WEEK 5

Write a C program to solve the Dining- Philosopher problem using monitors

WEEK 6

Write a C program to simulate Bankers Algorithm for Dead Lock Avoidance**.**

WEEK 7

Write a C program to simulate Bankers Algorithm for Dead Lock Prevention.

WEEK 8

Write C program to simulate the paging technique of memory management

WEEK 9

Write C program to simulate the segmentation technique of memory management

WEEK 10

Write C programs to simulate the following page replacement algorithms:

a. FIFO b. LRU

WEEK 11

Write C programs to simulate the following Directory organization techniques:

a. Single level directory b. Two level directory

WEEK 12

Write C programs to simulate the following File allocation methods:

a. Contiguous b. Linked

TEXT BOOKS:

1. Abraham Silberschatz, Peter Galvin and 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. C.P Bhatt, An Introduction to Operating Systems, 2nd Edition, PHI.
2. Terrence Chan, Unix System Programming Using C++, PHI/ Pearson.
3. Andrew S Tanenbaum, Modern Operating Systems, 3rd Edition, PHI

.

WEB REFERENCES:

1. http://codex.cs.yale.edu/avi/os-book/os9
2. www.cs.uic.edu/~jbell/course notes/operating systems

GENDER SENSITIZATION

II-B.Tech II-Semester **L T P C**
Course Code: A1DS404MC **0 0 2 0**

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 SexRatio. 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 ofWork.

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 BOOKS:

1. ***"Towards a World of Equals: A Bilingual Textbook onGender"***, 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/

WEB REFERENCES:

1. http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/

HUMAN VALUES & PROFESSIONAL ETHICS

II-B.Tech II-Semester **L T P C**
Course Code: A1DS405MC **3 0 0 0**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in theirlife and profession
3. To help students understand the meaning of happiness and prosperity for a human being.
4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
5. To facilitate the students in applying the understanding of harmony in existence in their profession and leadan ethical life

COURSE OUTCOMES:

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

1. Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society
2. Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.
3. Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society
4. Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.
5. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

UNIT – I 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 fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill 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 ofSelf ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer andenjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', 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 fulfillment 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-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in societyUndivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)- 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 fulfillment among the four orders of nature-recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) 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, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) 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. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

REFERENCE BOOKS:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
5. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
6. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
7. A N Tripathy, 2003, Human Values, New Age International Publishers.
8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.

WEB REFERENCES:

1. https://www.uhv.ac.in
2. Story of Stuff, http://www.storyofstuff.com

III-YEAR (I-SEMESTER)

DESIGN AND ANALYSIS OF ALGORITHMS

III-B.Tech I-Semester **L T P C**
Course Code: A1DS501PC **3 0 0 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 specifiedapplication
3. Ability to understand how the choice of data structures and the algorithm design methods impact theperformance of programs

UNIT - I
Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, AsymptoticNotations- 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, graphcoloring

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

UNIT - IV
Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum costspanning 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 andNP-Complete classes, Cook's theorem.

TEXT BOOK:
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 Wileyand sons.

COMPUTER NETWORKS

III-B.Tech I-Semester | **L T P C**
Course Code: A1DS502PC | **3 0 0 3**

PREREQUISITES:

1. A course on "Programming for problem solving"
2. A course on "Data Structures"

COURSE OBJECTIVES:

1. The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.
2. Familiarize the students with the standard models for the layered approach to communicationbetween machines in a network and the protocols of the various layers.

COURSE OUTCOMES:

1. Gain the knowledge of the basic computer network technology.
2. Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
3. Obtain the skills of subnetting and routing mechanisms.
4. Familiarity with the essential protocols of computer networks, and how they can be applied innetworkdesign and implementation.

UNIT - I

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET,Internet.
Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wirelesstransmission.

UNIT - II

Data link layer: Design issues, framing, Error detection and correction.
Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-freechannel, A simplex stop and wait protocol for noisy channel.
Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.
Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT - III

Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

UNIT - IV

Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.

UNIT - V

Application Layer –Domain name system, SNMP, Electronic Mail; the World WEB, HTTP, Streaming audio and video.

TEXT BOOK:

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. PearsonEducation/PHI

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

E-TEXT BOOKS:

1. http://www.freebookcentre.net/Database/Free-flat-Books-Download.html
2. http://www.ddegjust.ac.in/studymaterial/mca-3/ms-11.pdf

MOOC COURSE:

1. https://www.mooc-list.com/tags/flat-extensions
2. https://onlinecourses.nptel.ac.in/noc18_cs15/preview

INTRODUCTION TO DATA SCIENCE

III-B.Tech I-Semester **L T P C**
Course Code: A1DS503PC **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Learn concepts, techniques and tools they need to deal with various facets of data sciencepractice, including data collection and integration
2. Understand the basic types of data and basic statistics
3. Identify the importance of data reduction and data visualization techniques

COURSE OUTCOMES:

After completion of the course, the student should be able to

1. Understand basic terms what Statistical Inference means.
2. Identify probability distributions commonly used as foundations for statistical modeling. Fit amodel to data
3. describe the data using various statistical measures
4. utilize R elements for data handling perform data reduction and apply visualization techniques

UNIT – I

Introduction: Definition of Data Science- Big Data and Data Science hype – and getting past the hype - Datafication - Current landscape of perspectives - Statistical Inference - Populations and samples - Statistical modeling, probability distributions, fitting a model – Over fitting. **Basics of R:** Introduction, R- Environment Setup, Programming with R, Basic Data Types.

UNIT – II

Data Types & Statistical Description

Types of Data: Attributes and Measurement, What is an Attribute? The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes, Binary Attribute, Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes. Basic Statistical Descriptions of Data: Measuring the Central Tendency: Mean, Median, and Mode, Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Inter- quartile Range, Graphic Displays of Basic Statistical Descriptions of Data.

UNIT – III

Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector sub setting, **Matrices:** Creating and Naming Matrices, Matrix Sub setting, Arrays, Class. **Factors and Data Frames:** Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, subsetting of Data Frames, Extending Data Frames, Sorting Data Frames.

Lists: Introduction, creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors

UNIT – IV

Conditionals and Control Flow: Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements. **Iterative Programming in R:** Introduction, While Loop, For Loop, Looping Over List. **Functions in R:** Introduction, writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Functionsin R.

UNIT – V

Data Reduction: Overview of Data Reduction Strategies, Wavelet Transforms, Principal Components Analysis, Attribute Subset Selection, Regression and Log-Linear Models: Parametric Data Reduction, Histograms, Clustering, Sampling, Data Cube Aggregation.

Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

TEXTBOOKS

1. Doing Data Science, Straight Talk from The Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly,2014
2. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd ed.The Morgan Kaufmann Series in Data Management Systems
3 . K G Srinivas, G M Siddesh, "Statistical programming in R", Oxford Publications.

REFERENCE BOOKS

1. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, PearsonEducation.
2 Brain S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014
3 Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008
4 Paul Teetor, "R Cookbook", O'Reilly, 2011.

MACHINE LEARNING

III-B.Tech I-Semester | **L T P C**
Course Code: A1DS504PC | **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. This course explains machine learning techniques such as decision tree learning, Bayesianlearning etc.
2. To understand computational learning theory
3. To study the pattern comparison techniques.

COURSE OUTCOMES:

At the end of the course the students are able to:

1. Understand the concepts of computational intelligence like machine learning.
2. Ability to get the skill to apply machine learning techniques to address the real time problemsin different areas
3. Conceptualize the system through design with emphases on architectural modeling and user interface
4. 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 decisiontree 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, Gibs 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 neighbour 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, remarkson explanation-based learning, explanation-based learning of search control knowledge.

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

SOFTWARE ENGINEERING
(PROFESSINAL ELECTIVE – I)

III-B.Tech I-Semester | **L T P C**
Course Code: A1DS501PE | **3 0 0 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 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).
2. 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.
3. 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 models**: The waterfall model, Spiral model and Agile methodology

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.

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. Metrics for Process and Products: Software measurement, metrics for software quality.

UNIT - V

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM. **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, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.

DATA WRANGLING
(PROFESSIONAL EELECTIVE-I)

III-B.Tech I-Semester **L T P C**
Course Code: A1DS502PE **3 0 0 3**

COURSE OBJECTIVES:
The course should enable the students to learn:
1. Introduce fundamental concepts in representing data, accessing it and analysing it
2. Explore applications in data science and big data projects

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COURSE OUTCOMES:
After completion of the course, students will be able to:
1. Identify and execute the basic data format.
2. Perform the computations with Excel and pdf files
3. Understand the concepts of data cleanup
4. Explore and analyze the Image and video data
5. Understand the concepts web scraping

UNIT – I INTRODUCTION TO DATA WRANGLING
What Is Data Wrangling?- Importance of Data Wrangling -How is Data Wrangling performed?- Tasks of Data Wrangling-Data Wrangling Tools-Introduction to Python-Python Basics-Data Meant to Be Read by Machines-CSV Data-JSON Data-XML Data.

UNIT – II WORKING WITH EXCEL FILES AND PDFS
Installing Python Packages-Parsing Excel Files-Parsing Excel Files -Getting Started with Parsing-PDFs and Problem Solving in Python-Programmatic Approaches to PDF Parsing-Converting PDF to Text-Parsing PDFs Using pdf miner-Acquiring and Storing Data-Databases: A Brief Introduction-Relational Databases: MySQL and PostgreSQL- Non-Relational Databases: NoSQL-When to Use a Simple File-Alternative Data Storage.

UNIT – III DATA CLEANUP
Why Clean Data?- Data Cleanup Basics-Identifying Values for Data Cleanup-Formatting Data-Finding Outliers and Bad Data-Finding Duplicates-Fuzzy Matching-RegEx Matching-Normalizing and Standardizing the Data-Saving the Data-Determining suitable Data Cleanup-Scripting the CleanupTesting with New Data

UNIT – IV DATA EXPLORATION AND ANALYSIS
Exploring Data-Importing Data-Exploring Table Functions-Joining Numerous Datasets-Identifying Correlations-Identifying Outliers-Creating Groupings-Analyzing Data-Separating and Focusing the DataPresenting Data- Visualizing the Data-Charts-Time-Related Data-Maps-Interactives-Words-Images, Video, and Illustrations- Presentation Tools-Publishing the Data-Open Source Platforms.

UNIT – V WEB SCRAPING
What to Scrape and How-Analyzing a Web Page-Network/Timeline-Interacting with JavaScript-In-Depth Analysis of a Page-Getting Pages-Reading a Web Page-Reading a Web Page with LXML-XPath-Advanced Web Scraping- Browser-Based Parsing-Screen Reading with Selenium-Screen Reading with Ghost.PySpidering the Web-Building a Spider with Scrapy-Crawling Whole Websites with Scrapy.

TEXT BOOKS
1. Jacqueline Kazil & Katharine Jarmul," Data Wrangling with Python", O'Reilly Media, Inc,2016.

REFERENCE BOOKS:

1. Dr. Tirthajyoti Sarkar, Shubhadeep," Data Wrangling with Python: Creating actionable data from raw sources", Packt Publishing Ltd,2019.
2. Dr. Tirthajyoti Sarkar, Shubhadeep," Data Wrangling with Python: Creating actionable data from rawsources", Packt Publishing Ltd,2019.
3. Stefanie Molin," Hands-On Data Analysis with Pandas", Packt Publishing Ltd,2019
4. Allan," Practical Data Wrangling", Packt Publishing Ltd,2017
5. Tye Rattenbury, Joseph M. Hellerstein, Jeffrey Heer, Sean Kandel, Connor Carreras," Principles of Data Wrangling: Practical Techniques for Data Preparation", O'Reilly Media, Inc,2017

ARTIFICIAL INTELLIGENCE
(PROFESSIONAL ELECTIVE-I)

III-B.Tech I-Semester **L T P C**
Course Code: A1DS503PE **3 0 0 3**

COURSE OBJECTIVES:
The course should enable the students to learn:
1. To learn the difference between optimal reasoning vs human like reasoning.
2. To understand the notions of state space representation, exhaustive search, heuristic search.
3. To learn different knowledge representation techniques.
4. To understand the applications of AI like Game Playing and Expert Systems.
5. To introduce the concept of Machine Learning.

COURSE OUTCOMES:
At the end of the course, student will be able to:
1. Understand the basics of AI and to formulate efficient problem space and select a search algorithm for aproblem.
2. Apply AI techniques to solve problems related to Game playing, Expert systems.
3. Develop Logic programming skills.
4. Represent knowledge using appropriate techniques.
5. Interpret probabilistic and logical reasoning for knowledge.
6. 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-columbiax-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

DATA SCIENCE LAB

III-B.Tech I-Semester | **L T P C**
Course Code: A1DS505PC | **0 0 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Understand the R Programming Language.
2. Exposure on Solving of data science problems
3. Understand the classification and Regression Model.

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LIST OF EXPERIMENTS

WEEK -1 R AS CALCULATOR APPLICATION

a. Using with and without R objects on console
b. Using mathematical functions on console
c. Write an R script, to create R objects for calculator application and save in a specified location in disk

WEEK -2 DESCRIPTIVE STATISTICS IN R

a. Write an R script to find basic descriptive statistics using summary
b. Write an R script to find subset of dataset by using subset ().

WEEK -3 READING AND WRITING DIFFERENT TYPES OF DATASETS

a. Reading different types of data sets (.txt, .csv) from web and disk and writing in file in specific disklocation.
b. Reading Excel data sheet in R.
c. Reading XML dataset in R.

WEEK -4 VISUALIZATIONS

a. Find the data distributions using box and scatter plot.
b. Find the outliers using plot.
c. Plot the histogram, bar chart and pie chart on sample data.

WEEK -5 CORRELATION AND COVARIANCE

a. Find the correlation matrix.
b. Plot the correlation plot on dataset and visualize giving an overview of relationships among data oniris data
c. Analysis of covariance: variance (ANOVA), if data have categorical variables on iris data

WEEK -6 REGRESSION MODEL

Import a data from web storage. Name the dataset and now do Logistic Regression to find out relation between variables that are affecting the admission of a student in a institute based on his or her GRE score, GPA obtained and rank of the student. Also check the model is fit or not. require (foreign), require(MASS)..

WEEK -7 MULTIPLE REGRESSION MODEL

Apply multiple regressions, if data have a continuous independent variable. Apply on above dataset

WEEK -8 REGRESSION MODEL FOR PREDICTION

Apply regression Model techniques to predict the data on above dataset

WEEK -9 CLASSIFICATION MODEL

a. Install relevant package for classification.
b. Choose classifier for classification problem.
c. Evaluate the performance of classifier.

WEEK -10 CLUSTERING MODEL

a. Clustering algorithms for unsupervised classification.
b. Plot the cluster data using R visualizations

TEXT BOOKS:

1. Yanchang Zhao, "R and Data Mining: Examples and Case Studies", Elsevier, 1st Edition, 2012

REFERENCE BOOKS:

1. http://www.r-bloggers.com/how-to-perform-a-logistic-regression-in-r/
2. http://www.ats.ucla.edu/stat/r/dae/rreg.htm 3.http://www.coastal.edu/kingw/statistics/R-tutorials/logistic.html
3. http://www.ats.ucla.edu/stat/r/data/binary.csv

MACHINE LEARNING LAB

III-B.Tech II-Semester **L T P C**
Course Code: A1DS506PC **0 0 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Understand all principal elements of Computational Learning Theory.
2. Gain the knowledge of decision tree and decision tree learning algorithms.
3. Study the concept of neural networks and its algorithms to solve problems on neural networks.
4. Obtain the knowledge of Bayesian reasoning and also target based learning techniques in order toeasily master different Machine Learning models.
5. Identify the different search methods.

COURSE OUTCOMES:

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

1. Observe the concepts of computational intelligence like machine learning and Design anexemplarily learning system.
2. Apply the algorithms (Decision Tree techniques) to a real-world problem, optimize the models learnedand report on the expected accuracy.
3. Analyze the Neural Networks and its usage in machine learning application.
4. Apply Bayesian reasoning and also target based learning techniques to develop a machine learning application.
5. Analyze the different search methods.

LIST OF EXPERIMENTS

WEEK 1

Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

WEEK 2

For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the trainingexamples.

WEEK 3

Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

WEEK 4

Build an Artificial Neural Network by implementing the Back-propagation algorithm and test the same using appropriate data sets.

WEEK 5

Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

WEEK 6

Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

WEEK 7

Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

WEEK 8

Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

WEEK 9

Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs

WEEK 10

Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library lasses/API.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis
2. Introduction to Machine Learning with Python A guide for data scientists, Andreas, C. Muller &Sarah Guido, O'Reilly.
3. Introduction to Machine learning, Nils J.Nilsson
4. Machine learning for dummies, IBM Limited ed, by Judith Hurwitz and Daniel Kirsch

ADVANCED ENGLISH COMMUNICATION SKILLS LAB

III-B.Tech I-Semester	L	T	P	C
Course Code: A1EN507HS	0	0	2	1

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Improve students' fluency in spoken English.
2. Enable them to acquire behavioural skills required for their personal and professional life.
3. Help students develop their vocabulary.
4. Read and comprehend texts and respond appropriately in different socio-cultural contexts.
5. Communicate their ideas.

COURSE OUTCOMES:

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

1. Acquire vocabulary and use it contextually
2. Demonstrate effective Listening and Speaking Skills
3. Develop proficiency in academic reading and writing
4. Establish employability skills thereby increasing Job prospects
5. Communicate confidently in formal and informal contexts.

LIST OF EXPERIMENTS

WEEK -1

Activities on Fundamentals of Inter-personal Communication

Starting a conversation - responding appropriately and relevantly - using the right body language - Role Play in different situations & Discourse Skills- using visuals.

WEEK -2

Activities on Building Vocabulary

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 -3

Activities on Reading Comprehension

General Vs Local Comprehension, Reading for facts, guessing meanings from context, Scanning and Skimming.

WEEK -4

Activities on Reading for Specific Purposes

Inferring meaning, Critical reading & Effective goggling.

WEEK -5

Activities on Writing Skills- Technical Reports

Structure and presentation of different types of writing - letter writing/ Resume writing/ e- correspondence

WEEK -6

Activities on Writing Skills Technical report writing/ Portfolio writing - planning for writing - improving one's writing.

WEEK -7

Activities on Presentation Skills

Oral presentations (individual and group) through JAM sessions and Seminars.

WEEK -8

Activities on Presentation Skills Using ICT

PPTs and written presentations through posters/ projects/ reports/ e-mails/ assignments etc.

WEEK -9

Activities on Group Discussion

Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluencyand organization of ideas and rubrics for evaluation- Concept and process.

WEEK -10

Interview Skills

Pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conferencing and Mock Interviews.

TEXT BOOKS:

1. Raman, M & Sharma, S. (2009). Technical Communication. Oxford University Press.
2. Rani. S. (2011). Advanced Communication Skills Laboratory Manual. Pearson Education.
3. Anderson, V. (2007). Technical Communication. Cengage Learning pvt. Ltd.

REFERENCE BOOKS:

1. Mc Murrey. D & Buckley. J. (2012). Handbook for Technical Communication Cengage Learning.
2. Sen. L. (2009). Communication Skills. PHI Learning Pvt Ltd.
3. Vishvamohan A (2009) English for Technical Communication for Engineering Students. Tata McGraw Hill.
4. Books on TOFEL/ GRE/ GMAT/ CAT/ IELTS by Barron's/ DELTA/ Cambridge University Press.
5. Tomalin, B & Thomas, B. (2009). International English for Call Centers. Macmillan Publishers

CONSTITUTION OF INDIA

III-B.Tech I-Semester **L T P C**
Course Code: A1DS506MC **2 0 0 0**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Understand the need for constitution
2. Appreciate the fundamental duties and rights of the citizens of India.
3. Explain the role and amendments of constitution in a democratic society.
4. Describe the directive principles of state policy and their significance.
5. List the key features of the constitution, union government and state government.

COURSE OUTCOMES:

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

1. Create awareness about the constitutional values and objectives written in the Indian constitution.
2. List fundamental rights and fundamental duties of Indian citizens.
3. Identify the division of legislative, executive and financial powers between the union and state governments.
4. Understand the working of Indian democracy ,its institutions and processes at the local,state and union levels.
5. Explain the functions and responsibilities of election commission of india and union public service commission.

UNIT – I

History of Making of the Indian Constitution: Introduction to the constitution of India, the making of the constitution and salient features of the constitution.

UNIT – II

Philosophy of the Indian Constitution: Preamble Salient Features, Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties, Amendment of the constitutional powers and procedures.

UNIT – III

Union Government: Union Government, Union Legislature (Parliament), Lok Sabha and Rajya Sabha (with powers and functions), president of India (with powers and functions), Prime minister of India (With powers and functions), Union judiciary (Supreme Court), Jurisdiction of the Supreme Court.

UNIT – IV

State Government: State Government, State legislature (Legislative Assembly/ Vidhan Sabha, Legislative council/ Vidhan parishad), powers and functions of the state legislature, State executive, Governor of the state (with powers and functions), the chief Minister of the state (with powers and functions), State Judiciary (High courts)

UNIT – V

Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

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
9. J. Raj Indian Government and Politics.

E- RESOURCES:

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

III-YEAR (II-SEMESTER)

DATA WAREHOUSING AND DATA MINING

III-B.Tech II-Semester **L T P C**
Course Code: A1DS601PC **3 0 0 3**

COURSE OBJECTIVES

1. To understand the principles of data warehousing and Data Mining.
2. To be familiar with the Data warehouse architecture and its Implementation.
3. To know the Architecture of a Data Mining system.
4. To understand the various Data preprocessing Methods.
5. To perform classification and prediction of data.

COURSE OUTCOMES

1. Technical knowhow of the Data Mining principles and techniques for real time applications.

UNIT I

Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse –Data Warehouse Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

UNIT II

Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation- ArchitectureOf A Typical Data Mining Systems- Classification Of Data Mining Systems.
Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

UNIT III

Classification and Prediction: - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

UNIT IV

Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model- Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

UNIT V

Mining Object, Spatial, Multimedia, Text and Web Data:
Multidimensional Analysis and Descriptive Mining of Complex Data Objects – Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web.

TEXT BOOK

1. Jiawei Han, Micheline Kamber and Jian Pei“Data Mining Concepts and Techniques”, Third Edition,Elsevier, 2011.

REFERENCE BOOKS:

1. Alex Berson and Stephen J. Smith “Data Warehousing, Data Mining & OLAP”, Tata McGraw –Hill Edition, Tenth Reprint 2007.
2. K.P. Soman, Shyam Diwakar and V. Ajay “Insight into Data mining Theory and Practice”, EasterEconomy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta “Introduction to Data Mining with Case Studies”, Easter Economy Edition, PrenticeHall of India, 2006.
4. Pang-Ning Tan, Michael Steinbach and Vipin Kumar “Introduction to Data Mining”, PearsonEducation, 2007.

PREDICTIVE ANALYTICS AND REINFORCEMENT LEARNING

III-B.Tech II-Semester	L	T	P	C
Course Code: A1DS602PC	3	0	0	3

COURSE OBJECTIVESRE

The course should enable the students to learn:

1. course should enable the students to learn:
2. Learn how to define RL tasks and the core principals behind the RL, including policies, valuefunctions, deriving Bellman equations (as assets by the assignments, an exam and quizzes)
3. Implement in code common algorithms following code standards and libraries used in RL (as assessedby the assignments and final project)
4. Understand and work with tabular methods to solve classical control problems (as assessed by the assignments, quizzes and final exam)
5. Understand and work with approximate solutions (deep Q network based algorithms) (as assessed bythe assignments and final exam)
6. Learn the policy gradient methods from vanilla to more complex cases (as assessed by theassignments, quizzes and final exam)
7. Explore imitation learning tasks and solutions (as assessed by the quizzes and final exam) • Recognize current advanced techniques and applications in RL (as assessed by the final project, quizzes and final exam)

COURSE OUTCOMES:

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

1. Understand the need for machine learning for various problem solving
2. Familiarize the basics of Reinforcement Learning
3. Explain various tabular solution methods
4. Familiarize in approximate solution methods
5. Explain about classic conditioning and explore few applications

UNIT-I

INTRODUCTION TO PREDICTIVE ANALYTICS & LINEAR REGRESSION (NOS 2101): What and Why Analytics, Introduction to Tools and Environment, Application of Modelling in Business, Databases & Types of data and variables, Data Modelling Techniques, Missing imputations etc. Need for Business Modelling, Regression— Concepts, Blue property- assumptions- Least Square Estimation, Variable Rationalization, and Model Building etc.

UNIT-II

LOGISTIC REGRESSION (NOS 2101): Model Theory, Model fit Statistics, Model Conclusion, Analytics applications to various Business Domains etc.

Regression Vs Segmentation --- Supervised and Unsupervised Learning, Tree Building ---Regression, Classification,Over fitting, pruning and complexity, Multiple Decision Trees etc.

UNIT – III

Basic Tabular Solution Methods: Finite Markov Decision Processes- Goals, Rewards, Returns, Episodes- Optimal policies and optimal valued functions. Dynamic Programming: Policy Evaluation (Prediction) - Policy Improvement - Policy Iteration - Value Iteration- Asynchronous Dynamic Programming - Generalized Policy Iteration. Monte Carlo Methods: Monte Carlo Prediction - Monte Carlo Estimation of Action Values - Monte Carlo Control - Monte Carlo Control without Exploring Starts - Off-policy Prediction via Importance Sampling. Temporal-Difference Learning: TD Prediction - Advantages of TD - Incremental Implementation -Off-policy Monte Carlo Control.

UNIT – IV

Approximate Solution Methods : On-policy Prediction with Approximation : Value-function Approximation -The Prediction Objective (VE) - Stochastic-gradient and Semi-gradient Methods - Linear Methods –Feature Construction for Linear Methods- Nonlinear Function Approximation: Artificial Neural Networks - Least- Squares TD - Memory-based Function Approximation - Kernel-based Function Approximation.

UNIT – V

Classical Conditioning & Case studies Classical Conditioning : Blocking and Higher-order Conditioning - The Rescorla -Wagner Model - TD Model -Simulations - Instrumental Conditioning - Delayed Reinforcement- Cognitive Maps. Case Studies: Samuel's Checkers Player, Optimizing Memory Control, Human-level Video Game Play- Autonomous UAV Navigation and path planning -Drones for Field Coverage.

TEXT BOOKS:

1. Richard S.Sutton and Andrew G. Barto, , Introduction to Reinforcement Learning‘,2nd Edition, MITPress, 2017.
2. Tom M.Mitchell,―Machine Learning,McGraw-Hill Education (India) Private Limited, 2013
3. Student’s Handbook for Associate Analytics-III.

REFERENCE BOOKS:

1. Sigaud O.&Buffet O. ,Markov Decision Processes in Artificial Intelligence‘, editors, ISTE Ld., Wileyand Sons Inc, 2010.
2. Dragun Vrabie,Kyriakos G.Vamvoudakis,Frank L.Lewis.,Optimal Adaptive Control and DifferentialGames by Reinforcement learning principles,2012.

BIG DATA ANALYTICS

III-B.Tech II-Semester
Course Code: A1DS603PC

L	T	P	C
3	0	0	0

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Outline the importance of Big Data Analytics
2. Apply statistical techniques for Big data Analytics.
3. Analyze problems appropriate to mining data streams.
4. Apply the knowledge of clustering techniques in data mining.
5. Use Graph Analytics for Big Data and provide solutions
6. Apply Hadoop map Reduce programming for handing Big Data

COURSE OUTCOMES:

At the end of the course the students are able to:

1. Identify Big Data and its Business Implications.
2. List the components of Hadoop and Hadoop Eco-System
3. Access and Process Data on Distributed File System
4. Manage Job Execution in Hadoop Environment
5. Develop Big Data Solutions using Hadoop Eco System
6. Analyze Infosphere BigInsights Big Data Recommendations.
7. Apply Machine Learning Techniques using R.

PRE- REQUISITES: Should have knowledge of one Programming Language (Java preferably), Practiceof SQL (queriesand sub queries), exposure to Linux Environment.

UNIT-I INTRODUCTION TO BIG DATA

Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics - Validating - The Promotion of the Value of Big Data - Big Data Use Cases- Characteristics of Big Data Applications - Perception and Quantification of Value -Understanding Big Data Storage - Evolution Of Analytic Scalability - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

UNIT-II DATA ANALYSIS, CLUSTERING AND CLASSIFICATION

Regression Modeling - Multivariate Analysis - Bayesian Modeling - Support Vector and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics - Rule Induction. Overview of Clustering - K-means - Use Cases - Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions .- Classification: Decision Trees - Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree - Decision Trees in R - Naïve Bayes - Bayes‘ Theorem - Naïve Bayes Classifier.

UNIT-III STREAM MEMORY

Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions

UNIT-IV ASSOCIATION AND GRAPH MEMORY

Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Finding Association& finding similarity - Graph Analytics for Big Data: Graph Analytics - The Graph Model - Representation as Triples - Graphs and Network Organization - Choosing Graph Analytics - Graph Analytics Use Cases - Graph Analytics Algorithms and Solution Approaches - Technical Complexity of Analyzing Graphs- Features of a Graph Analytics Platform.

UNIT-V FRAMEWORKS AND VISUALIZATION

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed File Systems – Visualizations - Visual Data Analysis Techniques - Interaction Techniques; Systems and Analytics Applications - Analytics using Statistical packages-Approaches to modeling in Analytics – correlation, regression, decision trees, classification, association-Intelligence from unstructured information-Text analytics- Understanding of emerging trends and Technologies-Industry challenges and application of Analytics- Analyzing big data with twitter - Big data for E-Commerce Big data for blogs - Review of Basic Data Analytic Methods using R.

TEXT BOOKS:

1. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 2013.
2. AnandRajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge UniversityPress, 2012
3. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007

REFERENCE BOOKS:

1. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizingand Presenting Data", Wiley publishers, 2015.
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and itsApplications", Wiley Publishers, 2015.
3. Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRCPress, 2015
4. Jimmy Lin and Chris Dyer, "Data-Intensive Text Processing with MapReduce", Synthesis Lectures on Human Language Technologies, Vol. 3, No. 1, Pages 1-177, Morgan Claypool publishers, 2010.
5. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012.

QUANTUM COMPUTING
(PROFESSIONAL ELECTIVE-II)

III-B.Tech II-Semester	L	T	P	C
Course Code: A1DS604PE	3	0	0	3

COURSE OBJECTIVES
A basic introduction to quantum mechanics, linear algebra and familiarity with the Dirac notation is provided first to get one's quantum moorings right. This is then followed byan introductory treatment of quantum computation and quantum information covering aspects of quantum entanglement, quantum algorithms, quantum channels. Rudimentary quantum computing is introduced using the IBM quantum computer and associated simulators

UNIT - I
Introduction: Elementary quantum mechanics:, linear algebra for quantum mechanics, Quantum states in Hilbert space, The Bloch sphere, Density operators, generalized measurements, no-cloning theorem.

UNIT - II
Quantum correlations: Bell inequalities and entanglement, Schmidt decomposition, superdense coding, teleportation.

UNIT - III
Quantum cryptography: quantum key distribution

UNIT - IV
Quantum gates and algorithms: Universal set of gates, quantum circuits, Solovay-Kitaev theorem, Deutsch-Jozsa algorithm, factoring

UNIT - V
Programming a quantum computer:The IBMQ, coding a quantum computer using a simulator to carry out basic quantum measurement and state analysis.

TEXT BOOKS:
1. Phillip Kaye, Raymond Laflamme et. al., An introduction to Quantum Computing, Oxford University press, 2007.
2. Chris Bernhardt, Quantum Computing for Everyone, The MIT Press,Cambridge, 2020 (2)David McMahon-Quantum Computing Explained-Wiley-Interscience , IEEE Computer Society (2008)

REFERENCE BOOKS:
1. Quantum Computation and Quantum Information, M. A. Nielsen &I.Chuang, Cambridge University Press (2013).
2. Quantum Computing, A Gentle Introduction , Eleanor G. Rieffel and Wolfgang H. Polak

DEEP LEARNING
(PROFESSIONAL ELECTIVE-II)

III-B.Tech II-Semester **L T P C**
Course Code: A1DS605PE **3 0 0 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
3. To introduce dimensionality reduction techniques
4. To enable the students to know deep learning techniques to support real-time applications
5. 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 NetworksConvolutional 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.

CYBER SECURITY
(PROFESSIONAL ELECTIVE-II)

III-B.Tech II-Semester **L T P C**
Course Code: A1DS606PE **3 0 0 3**

COURSE OBJECTIVES:
The course 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.

COURSE OUTCOMES:
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 howto 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 Forensicsand 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

SCRIPTING LANGUAGES
(PROFESSIONAL ELECTIVE-III)

III-B.Tech II-Semester	L	T	P	C
Course Code: A1DS607PE	3	0	0	3

PREREQUISITES:
1. A course on “Computer Programming and Data Structures”
2. A course on “Object Oriented Programming Concepts”

COURSE OBJECTIVES:
1. This course introduces the script programming paradigm
2. Introduces scripting languages such as Perl, Ruby and TCL.
3. Learning TCL

COURSE OUTCOMES:
1. Comprehend the differences between typical scripting languages and typical system and application programming languages.
2. Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
3. Acquire programming skills in scripting language

UNIT - I
Introduction: Ruby, Rails, The structure and Excution of Ruby Programs, Package Management with RUBYGEMS, **Ruby and web:** Writing CGI scripts, cookies, Choice of Webservers, SOAP and webservices RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT - II
Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interperter

UNIT - III
Introduction to PERL and Scripting : Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Namesand Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern andregular expressions, subroutines.

UNIT - IV
Advanced perl Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Isses.

UNIT - V
TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

TEXT BOOKS:
1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Ruby Progamming language by David Flanagan and Yukihiro Matsumoto O’Reilly
3. “Programming Ruby” The Pramatic Progammers guide by Dabve Thomas Second edition

REFERENCE BOOKS:

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Leeand B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.

MOBILE APPLICATION DEVELOPMENT
(PROFESSIONAL ELECTIVE-III)

III-B.Tech II-Semester **L T P C**
Course Code: A1DS608PE **3 0 0 3**

PREREQUISITES:
1. Acquaintance with JAVA programming
2. A Course on DBMS

COURSE OBJECTIVES:
1. To demonstrate their understanding of the fundamentals of Android operating systems
2. To improves their skills of using Android software development tools
3. To demonstrate their ability to develop software with reasonable complexity on mobile platform
4. To demonstrate their ability to deploy software to mobile devices
5. To demonstrate their ability to debug programs running on mobile devices

COURSE OUTCOMES:
1. Student understands the working of Android OS Practically.
2. Student will be able to develop Android user interfaces
3. Student will be able to develop, deploy and maintain the Android Applications.

UNIT - I
Introduction to Android Operating System: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools

Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT - II
Android User Interface: Measurements – Device and pixel density independent measuring UNIT - s Layouts – Linear, Relative, Grid and Table Layouts

User Interface (UI) Components – Editable and non-editable TextViews, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers

Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT - III
Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS

Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding andusingIntents received within an Activity

Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT - IV
Persistent Storage: Files – Using application specific folders and files, creating files, reading data fromfiles, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference.

UNIT - V

Database – Introduction to SQLite database, creating and opening a database, creating tables, insertingretrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

TEXT BOOKS:

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning,2013

REFERENCE BOOK:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox),2013

DATA HANDLING AND VISUALIZATION
(PROFESSIONAL ELECTIVE-III)

III-B.Tech II-Semester **L T P C**
Course Code: A1DS609PE **3 0 0 3**

OBJECTIVES:
The course should enable the students to learn:

1. To introduce and provide some core and necessary data visualization techniques so that students understand how to work with large data sets and apply the appropriate data visualization technique to answer business questions

COURSE OUTCOMES:
After completion of the course, students will be able to:
1. Understand basics of Data Visualization
2. Implement visualization of distributions
3. Write programs on visualization of time series, proportions & associations
4. Apply visualization on Trends and uncertainty
5. Explain principles of proportions

UNIT – I INTRODUCTION TO VISUALIZATION
Visualizing Data-Mapping Data onto Aesthetics, Aesthetics and Types of Data, Scales Map Data Values onto Aesthetics, Coordinate Systems and Axes- Cartesian Coordinates, Nonlinear Axes, Coordinate Systems with Curved Axes, Color Scales-Color as a Tool to Distinguish, Color to Represent Data Values ,Color as a Tool to Highlight, Directory of Visualizations- Amounts, Distributions, Proportions, x–y relationships, Geospatial Data

UNIT – II VISUALIZING DISTRIBUTIONS
Visualizing Amounts-Bar Plots, Grouped and Stacked Bars, Dot Plots and Heatmaps, VisualizingDistributions: Histograms and Density Plots- Visualizing a Single Distribution, Visualizing Multple Distributions at the Same Time, Visualizing Distributions: Empirical Cumulative Distribution Functions andQ-Q Plots-Empirical Cumulative Distribution Functions, Highly Skewed Distributions, QuantileQuantile Plots,Visualizing Many Distributions at Once-Visualizing Distributions Along the Vertical Axis, VisualizingDistributions Along the Horizontal Axis

UNIT – III VISUALIZING ASSOCIATIONS & TIME SERIES
Visualizing Proportions-A Case for Pie Charts, A Case for Side-by-Side Bars, A Case for Stacked Bars and Stacked Densities, Visualizing Proportions Separately as Parts of the Total ,Visualizing Nested Proportions- Nested Proportions Gone Wrong, Mosaic Plots and Treemaps, Nested Pies ,Parallel Sets. Visualizing Associations Among Two or More Quantitative Variables-Scatterplots, Correlograms, Dimension Reduction, Paired Data. Visualizing Time Series and Other Functions of an Independent Variable-Individual Time Series , Multiple Time Series and Dose–Response Curves, Time Series of Two or More Response Variables

UNIT – IV VISUALIZING UNCERTIANITY
Visualizing Trends-Smoothing, Showing Trends with a Defined Functional Form, Detrending and Time-Series Decomposition, Visualizing Geospatial Data-Projections, Layers, Choropleth Mapping, Cartograms, Visualizing Uncertainty-Framing Probabilities as Frequencies, Visualizing the Uncertainty of Point Estimates, Visualizing the Uncertainty of Curve Fits, Hypothetical Outcome Plots

UNIT – V PRINCIPLE OF PROPORTIONAL INK

The Principle of Proportional Ink-Visualizations Along Linear Axes, Visualizations Along Logarithmic Axes, Direct Area Visualizations, Handling Overlapping Points-Partial Transparency and Jittering, 2D Histograms, Contour Lines, Common Pitfalls of Color Use-Encoding Too Much or Irrelevant Information ,Using Nonmonotonic Color Scales to Encode Data Values, Not Designing for Color-Vision Deficiency

TEXT BOOKS

1. Claus Wilke, "Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures", 1st edition, O'Reilly Media Inc, 2019.

REFERENCE BOOKS:

1. Tony Fischetti, Brett Lantz, R: Data Analysis and Visualization,O'Reilly ,2016
2. Ossama Embarak, Data Analysis and Visualization Using Python: Analyze Data to Create Visualizations for BI Systems,Apress, 2018

PREDICTIVE ANALYTICS
(OPEN ELECTIVE-I)

III-B.Tech II-Semester | **L T P C**
Course Code: A1DS601OE | **3 0 0 3**

COURSE OBJECTIVES:
The course should enable the students to learn:
1. To introduce the terminology, technology and its applications
2. To introduce the concept of predictive analysis
3. To introduce linear regression, time series concepts
4. To introduce the tools, technologies, programming languages which are used in day to day analytics cycle.

COURSE OUTCOMES:
At the end of the course, student will be able to:
1. Identify basic terminology of Data Analytics
2. Compare learning with classification
3. Develop the knowledge skill and competences using tools and training
4. Analyze the importance of Analytics in business perspective.

UNIT-I
INTRODUCTION TO PREDICTIVE ANALYTICS & LINEAR REGRESSION (NOS 2101): What and Why Analytics, Introduction to Tools and Environment, Application of Modelling in Business, Databases & Types of data and variables, Data Modelling Techniques, Missing imputations etc. Need for Business Modelling, Regression— Concepts, Blue property- assumptions- Least Square Estimation, Variable Rationalization, and Model Building etc.

UNIT-II
LOGISTIC REGRESSION (NOS 2101): Model Theory, Model fit Statistics, Model Conclusion, Analytics applications to various Business Domains etc.
Regression Vs Segmentation --- Supervised and Unsupervised Learning, Tree Building ---Regression, Classification,Over fitting, pruning and complexity, Multiple Decision Trees etc.

UNIT-III
DEVELOP KNOWLEDGE, SKILL AND COMPETENCES (NOS 9005): Introduction to Knowledge skills & competences, Training & Development, Learning & Development, Policies and Record keeping, etc.

UNIT-IV
TIME SERIES METHODS / FORECASTING, FEATURE EXTRACTION (NOS 2101): ARIMA, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average, Energy etc and Analyze for prediction.

UNIT-V
WORKING WITH DOCUMENTS (NOS 0703): Standard Operating Procedures for documentation and Knowledgesharing, Defining purpose and scope documents, Understanding structure of documents – case studies, articles, white papers, technical reports, minutes of meeting etc., Style and format, Intellectual Property and Copyright, Document preparation tools – Visio, PowerPoint, Word, Excel etc., Version Control, Accessing and updating corporate knowledge base, Peer review and feedback.

TEXT BOOKS:
1. Student's Handbook for Associate Analytics-III.

REFERENCE BOOKS:
1. Gareth James Daniela Witten Trevor Hastie Robert Tibshirani. An Introduction to Statistical Learning with Applications in R Programming

VIDEO ANALYTICS
(OPEN ELECTIVE-I)

III-B.Tech II-Semester **L T P C**
Course Code: A1DS602OE **3 0 0 3**

COURSE OBJECTIVES:
To acquire the knowledge of extracting information from surveillance videos, understand the models used for recognition of objects, humans in videos and perform gait analysis.

COURSE OUTCOMES:
At the end of the course, student will be able to:
1. Understand the basics of video- signals and systems.
2. Able to estimate motion in a video.
3. Able to detect the objects and track them.
4. Recognize activity and analyze behaviour.
5. Evaluate face recognition technologies

UNIT-I
INTRODUCTION Multidimensional signals and systems: signals, transforms, systems, sampling theorem. Digital Images and Video: human visual system and color, digital video, 3D video, digital-video applications, image and video quality.

UNIT-II
MOTION ESTIMATION Image formation, motion models, 2D apparent motion estimation, differential methods, matching methods, non-linear optimization methods, transform domain methods, 3D motion and structure estimation.

UNIT-III
VIDEO ANALYTICS Introduction- Video Basics - Fundamentals for Video Surveillance- Scene Artifacts- Object Detection and Tracking: Adaptive Background Modelling and Subtraction- Pedestrian Detection and Tracking Vehicle Detection and Tracking- Articulated Human Motion Tracking in LowDimensional Latent Spaces

UNIT-IV
BEHAVIORAL ANALYSIS & ACTIVITY RECOGNITION Event Modelling- Behavioral Analysis- Human Activity Recognition-Complex Activity Recognition Activity modelling using 3D shape, Video summarization, shape-based activity models- Suspicious Activity Detection..

UNIT-V
HUMAN FACE RECOGNITION & GAIT ANALYSIS Introduction: Overview of Recognition algorithms – Human Recognition using Face: Face Recognition from still images, Face Recognition from video, Evaluation of Face Recognition Technologies- Human Recognition using gait: HMM Framework for Gait Recognition, View Invariant Gait Recognition, Role of Shape and Dynamics in Gait Recognition.

TEXT BOOKS:
1. Murat Tekalp, “Digital Video Processing”, second edition, Pearson, 2015
2. Rama Chellappa, Amit K. Roy-Chowdhury, Kevin Zhou. S, “Recognition of Humans and their Activities using Video”, Morgan & Claypool Publishers, 2005.
3. Yunqian Ma, Gang Qian, “Intelligent Video Surveillance: Systems and Technology”, CRC Press (Taylor and Francis Group), 2009.

REFERENCE BOOKS:
1. Richard Szeliski, “Computer Vision: Algorithms and Applications”, Springer, 2011.
2. Yao Wang, JornOstermann and Ya-Qin Zhang, “Video Processing and Communications”, Prentice Hall, 2001.
3. Thierry Bouwmans, FatihPorikli, Benjamin Höferlin and Antoine Vacavant, “Background Modeling and Foreground Detection for Video Surveillance: Traditional and Recent Approaches, Implementations, Benchmarking and Evaluation”, CRC Press, Taylor and Francis Group, 2014.
4. Md. Atiqur Rahman Ahad, “Computer Vision and Action Recognition-A Guide for Image Processing and Computer Vision Community for Action Understanding”, Atlantis Press, 2011

BIG DATA ANALYTICS LAB

III-B.Tech II-Semester | **L T P C**
Course Code: A1DS604PC | **0 0 3 1.5**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Outline the importance of Big Data Analytics
2. Apply statistical techniques for Big data Analytics.
3. Analyze problems appropriate to mining data streams.
4. Apply the knowledge of clustering techniques in data mining.
5. Use Graph Analytics for Big Data and provide solutions
6. Apply Hadoop map Reduce programming for handing Big Data

COURSE OUTCOMES:

At the end of the course the students are able to:

1. Identify Big Data and its Business Implications.
2. List the components of Hadoop and Hadoop Eco-System
3. Access and Process Data on Distributed File System
4. Manage Job Execution in Hadoop Environment
5. Develop Big Data Solutions using Hadoop Eco System
6. Analyze Infosphere BigInsights Big Data Recommendations.
7. Apply Machine Learning Techniques using R.

LIST OF EXPERIMENTS:

1. Study of R Programming.
2. Hypothesis Test using R
3. K-means Clustering using R
4. Naïve Bayesian Classifier
5. Implementation of Linear Regression
7. Implement Logistic Regression
8. Time-series Analysis
9. Association Rules using R.
10. Data Analysis-Visualization using R.
11. Map Reduce using Hadoop
12. In-database Analytics
13. Implementation of Queries using Mongo DB

DATA WAREHOUSING AND DATA MINING LAB

III-B.Tech II-Semester **L T P C**
Course Code: A1DS605PC **0 0 3 1.5**

COURSE OBJECTIVES:

1. To obtain practical experience using data mining techniques on real world data sets
2. Emphasize hands-on experience working with all real data sets.

COURSE OUTCOMES:

1. Ability to add mining algorithms as a component to the exiting tools
2. Ability to apply mining techniques for realistic data.

LIST OF SAMPLE PROBLEMS:

Task 1: Credit Risk AssessmentDescription:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient. To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to representher knowledge in the form of production rules.
2. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
3. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used tojudge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctly judged when, andwhen not to, approve a loan application.

The German Credit Data:

Actual historical credit data is not always easy to come by because of confidentiality rules.
Here is one such dataset, consisting of 1000 actual cases collected in Germany. Credit dataset (original) Excel spreadsheet version of the German credit data.
In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unlessyou really can consult a real loan officer!)

A few notes on the German dataset:

1. DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks andacts like a quarter).
2. Owns telephone. German phone rates are much higher than in Canada so fewer people owntelephones.
3. Foreign worker. There are millions of these in Germany (many from Turkey). It is very hard to get German citizenship if you were not born of German parents.
4. There are 20 attributes used in judging a loan applicant. The goal is to classify the applicant into oneof two categories, good or bad.

Subtasks: (Turn in your answers to the following tasks)

1. List all the categorical (or nominal) attributes and the real-valued attributes seperately. (5 marks)
2. What attributes do you think might be crucial in making the credit assessment? Come up with some simple rules in plain English using your selected attributes. (5 marks)
3. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training. (10 marks)
4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy? (10 marks)
5. Is testing on the training set as you did above a good idea? Why or Why not ? (10 marks)
6. One approach for solving the problem encountered in the previous question is using cross-validation? Describe what is cross-validation briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why? (10 marks)
7. Check to see if the data shows a bias against "foreign workers" (attribute 20), or "personal-status" (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done.

To remove an attribute, you can use the preprocess tab in Weka's GUI Explorer. Did removing these attributes have any significant effect? Discuss. (10 marks)

8. Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.) (10 marks)
9. Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifcations equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross validation results. Are they significantly different from results obtained in problem 6 (using equal cost)? (10 marks)
10. Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model? (10 marks)
11. You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you obtain? Also, report your accuracy using the pruned model. Does your accuracy increase? (10 marks)
12. (Extra Credit): How can you convert a Decision Trees into "if-then-else rules". Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules. PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one ! Can you predict what attribute that might be in this dataset ? OneR classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and oneR. (10 marks)

Task Resources:

2. Mentor lecture on Decision Trees
3. Andrew Moore's Data Mining Tutorials (See tutorials on Decision Trees and Cross Validation)
4. Decision Trees (Source: Tan, MSU)

5. Tom Mitchell's book slides (See slides on Concept Learning and Decision Trees)
6. Weka resources:
   - Introduction to Weka (html version) (download ppt version)
   - Download Weka
   - Weka Tutorial
   - ARFF format
   - Using Weka from command line

Task 2: Hospital Management System

Data Warehouse consists Dimension Table and Fact Table.REMEMBER The following

Dimension

The dimension objects (Dimension):

- Name
- Attributes (Levels) , with one primary key
- Hierarchies

One time dimension is must. About Levels and Hierarchies

Dimension objects (dimension) consist of a set of levels and a set of hierarchies defined over those levels. Thelevels represent levels of aggregation. Hierarchies describe parent-child relationships among a set of levels.

For example, a typical calendar dimension could contain five levels. Two hierarchies can bedefined on these levels:

H1: YearL > QuarterL > MonthL > WeekL > DayLH2: YearL > WeekL > DayL

The hierarchies are described from parent to child, so that Year is the parent of Quarter,Quarter the parent of Month, and so forth.

About Unique Key Constraints

When you create a definition for a hierarchy, Warehouse Builder creates an identifier key for each level of the hierarchy and a unique key constraint on the lowest level (Base Level)

Design a Hospital Management system data warehouse (TARGET) consists of DimensionsPatient, Medicine, Supplier, Time. Where measures are 'NO UNITS', UNIT PRICE. Assume the Relational database (SOURCE) table schemas as follows

TIME (day, month, year),
PATIENT (patient_name, Age, Address, etc.,)
MEDICINE (Medicine_Brand_name, Drug_name, Supplier, no_units, Uinit_Price, etc.,)SUPPLIER :(Supplier_name, Medicine_Brand_name, Address, etc.,)

If each Dimension has 6 levels, decide the levels and hierarchies, Assume the level namessuitably.

Design the Hospital Management system data warehouse using all schemas. Give theexample 4-D cube with assumption names.

ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

III-B.Tech II-Semester **L T P C**
Course Code: A1DS607MC **2 0 0 0**

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 medicinesystem, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food andhealthcare 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)

WEB PROGRAMMING THROUGH PHP

IV-B.Tech I-Semester | **L T P C**
Course Code: A1DS701PC | **3 1 0 4**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. Teach students the basics of server side scripting using PHP
2. Explain web application development procedures
3. Impart servlet technology for writing business logic
4. Facilitate students to connect to databases using JDBC
5. Familiarize various concepts of application development using JSP

COURSE OUTCOMES:

At the end of the course the students are able to:

1. Create web pages using PHP
2. Identify the difference between the HTML PHP and XML documents.
3. Identify the engineering structural design of XML and parse tree
4. Understand the concept of JAVA SCRIPT.
5. Identify the difference and choose between the JSP and Servlet.

UNIT-I

XHTML: Basic Syntax, Standard structure, Basic Text markup, Images, Hypertext links, Lists, Tables,Frames.

XML: Introduction to XML, Defining XML tags, their attributes and values, Document type definition, XML Schemas, Document Object model.

UNIT-II

Introduction to PHP: Declaring variables, data types, arrays, strings, operations, expressions, control structures, functions, Reading data from web form controls like Text Boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (My SQL as reference), executing simple queries, handling results, Handling sessions and cookies.

UNIT-III

Client side Scripting: Introduction to JavaScript: JavaScript language – declaring variables, scope of variables functions, event handlers (on click, on submit etc.), Document Object Model, Form validations.

UNIT-IV

Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, Reading initialization parameters, Handling Http Request & Responses, Using Cookies and sessions, connecting to a database using JDBC.

UNIT-V

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session tracking, connecting to database in JSP.

TEXT BOOKS:

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill

REFERENCE BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech
2. Java Server Pages – Hans Bergsten, SPD O'Reilly
3. Java Script, D.Flanagan, O'Reilly, SPD.
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming World Wide Web, R.W. Sebesta. Fourth Edition, Pearson.
6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

TEXT ANALYTICS AND NATURAL LANGUAGE PROCESSING

IV-B.Tech I-Semester | **L T P C**
Course Code: A1DS702PC | **3 1 0 4**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To learn the fundamentals of natural language processing
2. To understand the use of Text analytics
3. To understand the role of semantics of sentences and pragmatics
4. To apply the NLP techniques to Text applications

COURSE OUTCOMES:

At the end of the course the students are able to:

1. Understand the basics of Natural language processing
2. Analyze the text syntactically
3. Analyze the text content Semantically
4. Implement recurrent network for language models
5. Implement a sentiment classification and chatbot systems

UNIT-I INTRODUCTION

Introduction to NLP, Regular Expressions, Words, Corpora, Text Normalization, Minimum Edit distance, N gram Language Models, Evaluating Language Models

UNIT-II SYNTACTIC ANALYSIS

English Word Classes, The Penn Treebank Part-of-Speech Tagset, Part-of-Speech Tagging, HMM Partof- Speech Tagging, Maximum Entropy Markov Models, Grammar Rules for English, Treebanks, Grammar Equivalence and Normal form, Lexicalized Grammar.

UNIT-III SEMANTIC ANALYSIS

Representation of Sentence Meaning: Computational Desiderata for Representations, Model Theoretic Semantics, First-Order Logic, Event and State Representations, Description Logics, Semantic roles, Semantic role labeling.

UNIT-IV SEQUENCE PARSING WITH RECURRENT NETWORKS

Simple Recurrent Networks, Applications of RNNs, Deep Networks: Stacked and Bidirectional RNNs,Managing Context in RNNs: LSTMs and GRUs, Words, Characters and Byte-Pairs

UNIT-V CASE STUDY

Sentiment Classification, Dialog Systems and Chatbots

TEXT BOOKS:

1. Dan Jurafsky and James H. Martin. Speech and Language Processing (3rd ed. draft), 2019.

REFERENCE BOOKS:

2. Steven Bird, Ewan Klein, and Edward Loper, Natural Language Processing with Python, FirstEdition, O'reilly, 2009
3. Yoav Goldberg, University of Toronto, Neural Network Methods for Natural language Processing,Morgan & Claypool, 2017
4. Christopher D. Manning, and Hinrich Schütze. Foundations of statistical natural language processing.First Edition, MIT press, 1999

WEB AND SOCIAL MEDIA ANALYTICS

IV-B.Tech I-Semester **L T P C**
Course Code: A1DS703PC **3 1 0 4**

COURSE OBJECTIVES: **Exposure to various web and social media analytic techniques**

COURSE OUTCOMES:

At the end of the course the students are able to:

1. Knowledge on decision support systems.
2. Apply natural language processing concepts on text analytics.
3. Understand sentiment analysis.
4. Knowledge on search engine optimization and web analytics.

PRE- REQUISITES: Should have knowledge of one Programming Language (Java preferably), Practice of SQL (queriesand sub queries), exposure to Linux Environment.

UNIT-I

An Overview of Business Intelligence, Analytics, and Decision Support: Analytics to Manage a Vaccine Supply Chain Effectively and Safely, Changing Business Environments and Computerized Decision Support, Information Systems Support for Decision Making, The Concept of Decision SupportSystems (DSS), Business Analytics Overview, Brief Introduction to Big Data Analytics

UNIT-II

Text Analytics and Text Mining: Machine Versus Men on Jeopardy!: The Story of Watson, Text Analytics and Text Mining Concepts and Definitions, Natural Language Processing, Text Mining Applications, Text Mining Process, Text Mining Tools.

UNIT-III

Sentiment Analysis: Sentiment Analysis Overview, Sentiment Analysis Applications, Sentiment Analysis Process, Sentiment Analysis and Speech Analytics.

UNIT-IV

Web Analytics, Web Mining: Security First Insurance Deepens Connection with Policyholders, Web Mining Overview, Web Content and Web Structure Mining, Search Engines, Search Engine Optimization, Web Usage Mining (Web Analytics), Web Analytics Maturity Model and Web Analytics Tools.

UNIT-V

Social Analytics and Social Network Analysis: Social Analytics and Social Network Analysis, Social Media Definitions and Concepts, Social Media Analytics.

Prescriptive Analytics - Optimization and Multi-Criteria Systems: Multiple Goals, Sensitivity Analysis, What-If Analysis, and Goal Seeking.

TEXT BOOKS:

1 Ramesh Sharda, Dursun Delen, Efraim Turban, BUSINESS INTELLIGENCE AND ANALYTICS: SYSTEMS FOR DECISION SUPPORT, Pearson Education

REFERENCE BOOKS:

1. Rajiv Sabherwal, Irma Becerra-Fernandez," Business Intelligence – Practice, Technologies and Management", John Wiley 2011.
2. Lariss T. Moss, ShakuAtre, "Business Intelligence Roadmap", Addison-Wesley It Service.
3. Yuli Vasiliev, "Oracle Business Intelligence: The Condensed Guide to Analysis and Reporting",SPD Shroff, 2012

DIGITAL MARKETING ANALYTICS
(PROFESSIONAL ELECTIVE-IV)

IV-B.Tech I-Semester **L T P C**
Course Code: A1DS710PE **3 0 0 3**

COURSE OBJECTIVES:
The course should enable the students to learn:

4. Digital Marketing Courses familiarize users with how to advertise and promote products and services to the targeted audience by the use of digital marketing tools and techniques such as SEO, Content Marketing, Email Marketing, Social Media Marketing.

COURSE OUTCOMES:
At the end of the course the students are able to:

1. Relate to digital media marketing and the need for analytics on the data captured.
2. Choose the appropriate tools for performing different digital analytics on the digital marketing Data.
3. Analyze and appraise the outcomes of digital influence and listening. 3,9,10
4. Formulate a research plan and perform search analysis on the digital marketing data.
5. Summarize the strategies for Mobile analytics and Business Intelligence

UNIT-I DIGITAL MEDIA AND ANALYTICS
Digital media types – Owned and earned social metrics – Paid searches and Organic Searches - AligningDigital and Traditional Analytics – Identifying social media listening tools – Understanding social media engagement software – Social media engagement tools.

UNIT-II TOOLS FOR DIGITAL ANALYTICS
Social Media Listening Tools - Evolution, Social analytics life cycle, Social media monitoring software: Sysomos, Radian6, Visible Technologies, Zoho social and others. Search Analytics Tools – Basics of search, Search analytics use cases, Search data, Google trends, YouTube trends, Google Adwords keyword, Yahoo clues, Collecting insights through search data. Audience Analysis Tools – Audience Analysis Use Cases, Audience analysis tool types – Audience analysis Techniques, Event Triggers. Content Analysis Tools - Content Audits-Optimizing Content Distribution, Analysing Content Consumption. Engagement Analysis Tools – Social Media Engagement Software (SMES), using SMES, study of different SMES in the market.

UNIT-III DIGITAL INFLUENCE AND LISTENING
Reality of Digital Influence - Media List - Klout, PeerIndex - Online Versus Offline Influence - Using the Influencer List - Developing Social Media Listening Program - Using Listening Data for Program Planning - Implementing Listening Program - Conversation Audit - Online Influencers - Conducting Social brand benchmarking - Use of Online data for crisis anticipation - Identifying known issues - Crisis day monitoring and ongoing reporting - Corrections after crisis - Improving customer service - Social customer service conflict - Social customer service models.

UNIT-IV RESEARCH PLAN AND SEARCH ANALYSIS
Queuing Launching new product – Product life cycle – Introduction Phase – Growth Phase – Maturity Phase. Formulating research plan – Developing source list – Research methods – Constructing reports – Delivering reports – Report use cases – Building central repository of information – Search analytics for digital strategy – Search analytics for content strategy and planning – Search analytics for paid advertising.

UNIT-V ROI, MOBILE ANAYTICS AND BUSINESS INTELLIGENCE
Return on Investment (ROI) – Return on Engagement, Influence, Experience – Tracking ROI – Understanding measurement fundamentals – Measurement reporting cadence - Mobile Analytics – Mobile market landscape – Mobile marketing measurement – Marketing activities – Audience/visitor metric – Mobile app performance - Social CRM – Social CRM initiative – Social CRM Initiative - Future of Digital Data – Business Intelligence

TEXT BOOKS:

1. Chuck Hemann and Ken Burbary, "Digital Marketing Analytics: Making Sense of Consumer Data ina Digital World", Que Publishing, 1 edition, ISBN-13: 978-0789750303, 2013.

REFERENCE BOOKS:

2. Simon Kingsnorth, "Digital Marketing Strategy: An Integrated Approach to Online Marketing",Kogan Page Publisher, First edition, ISBN-13: 978-0749474706, 2016.
3. Dave Chaffey, Fiona Ellis-Chadwick, "Digital Marketing – Strategy, Implementation and Practice", Pearson Education, Sixth edition, ISBN-13: 978-1292077611, 2016.

ROBOTIC AUTOMATION PROCESS
(PROFESSIONAL ELECTIVE –IV)

IV-B.Tech I-Semester	L	T	P	C
Course Code: A1DS711PE	3	0	0	3

COURSE OBJECTIVES:
Aim of the course is to make learners familiar with the concepts of Robotic Process Automation.

COURSE OUTCOMES:
1. Describe RPA, where it can be applied and how it's implemented.
2. Identify and understand Web Control Room and Client Introduction.
3. Understand how to handle various devices and the workload.
4. Understand Bot creators, Web recorders and task editors.

UNIT-I
Introduction to Robotic Process Automation & Bot Creation Introduction to RPA and Use cases – Automation Anywhere Enterprise Platform – Advanced features and capabilities – Ways to create Bots.

UNIT-II
Web Control Room and Client Introduction - Features Panel - Dashboard (Home, Bots, Devices, Audit, Workload, Insights) - Features Panel – Activity (View Tasks in Progress and Scheduled Tasks) - Bots (View Bots Uploaded and Credentials).

UNIT-III
Devices (View Development and Runtime Clients and Device Pools) - Workload (Queues and SLA Calculator) - Audit Log (View Activities Logged which are associated with Web CR) - Administration (Configure Settings, Users, Roles, License and Migration) - Demo of Exposed API's – Conclusion – Client introduction and Conclusion.

UNIT-IV
Bot Creator Introduction – Recorders – Smart Recorders – Web Recorders – Screen Recorders - Task Editor – Variables - Command Library – Loop Command – Excel Command – Database Command - String Operation Command - XML Command.

UNIT-V
Terminal Emulator Command - PDF Integration Command - FTP Command - PGP Command - Object Cloning Command - Error Handling Command - Manage Windows Control Command - Workflow Designer - Report Designer.

TEXT BOOKS:
1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots. with the leading RPA tool – UiPath Kindle Edition.

REFERENCE BOOKS:
1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition

BUSINESS INTELLIGENCE AND ANALYTICS
(PROFESSIONAL ELECTIVE- IV)

IV-B.Tech I-Semester | **L T P C**
Course Code: A1DS712PE | **3 0 0 3**

COURSE OBJECTIVES:
The course should enable the studets to learn:
1. Learn Business Intelligence and Analytics

COURSE OUTCOMES:
At the end of the course the students are able to:
1. Understand the essentials of BI & data analytics and the corresponding terminologies
2. Analyze the steps involved in the BI - Analytics process
3. Illustrate competently on the topic of analytics
4. Understand & Implement the K-Means Clustering with Iris Dataset
5. Demonstrate the real time scenario (Case study) by using BI & Analytics techniques

UNIT-I BUSINESS INTELLIGENCE – INTRODUCTION
Introduction - History and Evolution: Effective and Timely decisions, Data Information and Knowledge, Architectural Representation, Role of mathematical Models, Real Time Business Intelligent System

UNIT-II DATA MINING & WAREHOUSING
Data Mining - Introduction to Data Mining, Architecture of Data Mining and How Data mining works(Process) , Functionalities & Classifications of Data Mining, Representation of Input Data, Analysis Methodologies. Data Warehousing - Introduction to Data Warehousing, Data Mart, Online Analytical Processing (OLAP) – Tools, Data Modelling, Difference between OLAP and OLTP, Schema – Star and Snowflake Schemas, ETL Process – Role of ETL

UNIT-III BI – DATA PREPARTTION
Data Validation - Introduction to Data Validation, Data Transformation – Standardization and Feature Extraction, Data Reduction – Sampling, Selection, PCA, Data Discretization.

UNIT-IV BI – DATA ANALYTICS PROCESS
ANALYTICS PROCESS - Introduction to analytics process, Types of Analytical Techniques in BI – Descriptive, Predictive, Perspective, Social Media Analytics, Behavioral, Iris Datasets

UNIT-V IMPLEMENTATION OF BI – ANALYTICS PROCESS
Operational Intelligence: Technological – Business Activity Monitoring, Complex Event Processing, Business Process Management, Metadata, Root Cause Analysis.

TEXT BOOKS:

1. Carlo-Vercellis, “Business Intelligence Data Mining and Optimization for Decision-Making”, First Edition Link : https://bit.ly/3d6XxOr
2. Drew Bentely, “Business Intelligence and Analytics” ,@2017 Library Pres., ISBN: 978-1-97892136-8 Link : https://www.academia.edu/40285447/Business_Intelligence_and_Analytics
3. Larissa T. Moss & Shaku Atre, “Business Intelligence Roadmap: The Complete Project Lifecycle For Decision-Support Applications”, First Edition, Addison-Wesley Professional,2003 4. Kimball, R., Ross, M., Thornthwaite, W., Mundy, J., and Becker, B. John, “The Data Warehouse LifecycleToolkit: Practical Techniques for Building Data Warehouse and Business Intelligence Systems”, Second Edition, Wiley & Sons, 2008.

REFERENCE BOOKS:

1. Cindi Howson, “Successful Business Intelligence”, Second Edition, McGraw-Hill Education, 2013.

PYTHON PROGRAMMING
(OPEN ELECTIVE- II)

IV-B.Tech I-Semester	L	T	P	C
Course Code: A1DS703OE	3	0	0	3

COURSE OBJECTIVES:

The course should enable the students to learn:

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:

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

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 stumpy, pandas and matplotlib.

UNIT – I INTRODUCTION TO PYTHON PROGRAMMING

Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules Sequences - Strings, Lists, and Tuples, Mapping and Set Types.

UNIT – II FILE, EXCEPTION HANDLING AND OOP

FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management,
*Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys Module, Related Modules Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

UNIT – III INTRODUCTION TO REGULAR EXPRESSIONS

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

UNIT – IV GUI PROGRAMMING

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers.

UNIT – V DATABASE PROGRAMMING

Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs)

TEXTBOOKS:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCE BOOKS:

1. Think Python, Allen Downey, Green Tea Press
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson 4. Learning Python, Mark Lutz, O'Really.

WEB REFERENCES:

1. https://www.programiz.com/python-programming
2. https://www.javatpoint.com/python-tutorial
3. https://www.geeksforgeeks.org/python-programming-language/

DATA ANALYTICS
(OPEN ELECTIVE- II)

IV-B.Tech I-Semester | **L T P C**
Course Code: A1DS704OE | **3 0 0 3**

COURSE OBJECTIVES:
The course should enable the students to learn:
1. To explore the fundamental concepts of data analytics.
2. To learn the principles and methods of statistical analysis
3. Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
4. To understand the various search methods and visualization techniques.

COURSE OUTCOMES:
After completion of the course, students will be able to:
1. Understand the impact of data analytics for business decisions and strategy
2. Carry out data analysis/statistical analysis
3. To carry out standard data visualization and formal inference procedures
4. Design Data Architecture
5. Understand various Data Sources

UNIT – I
Data Management: Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality(noise, outliers, missing values, duplicate data) and Data Processing & Processing.

UNIT – II
Data Analytics: Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and variables, Data Modeling Techniques, Missing Imputations etc. Need for Business Modeling.

UNIT – III
Regression – Concepts, Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc. Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.

UNIT – IV
Object Segmentation: Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc. Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction

UNIT – V
Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

TEXT BOOKS:
1. Student's Handbook for Associate Analytics – II, III
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers

REFERENCE BOOKS:
1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addision Wisley, 2006
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway Labs Jeffrey D Ullman Stanford Univ.

WEB PROGRAMMING THROUGH PHP LAB

IV-B.Tech I-Semester | **L T P C**
Course Code: A1DS704PC | **0 0 2 1**

COURSE OBJECTIVES:

1. Get best technologies for solving web client/server problems
2. Solve and use JavaScript for dynamic effects and form input entry
3. Recognize appropriate client-side or server-side applications
4. Receive ability to adapt to changing web development and design skills and solid understanding of common design trends.
5. Develop web application software tools i.e. AJAX, PHP and xml etc. and

COURSE OUTCOMES:

1. Design web pages using HTML, Cascading Style Sheets and JavaScript
2. Write XML documents and Schemas.
3. Implement server-side programming using JDBC
4. Create dynamic web pages

LIST OF EXPERIMENTS:

1. Write a html program for Creation of web site with forms, frames, links, tables etc
2. Design a web site using HTML and DHTML. Use Basic text Formatting, Images
3. Create a script that asks the user for a name, then greets the user with Hello and the user name on the page
4. Create a script that collects numbers from a page and then adds them up and prints them to a blank field on the page
5. Create a script that prompts the user for a number and then counts from 1 to that number displaying only the odd numbers
6. Create a script that will check the field in Assignment 1 for data and alert the user if it is blank. This script should run from a button
7. Using CSS for creating web sites
8. Creating simple application to access data base using JDBC Formatting HTML with CSS
9. Program for manipulating Databases and SQL
10. Program using PHP database functions

IV - YEAR (II-SEMESTER)

OPERATIONS RESEARCH

IV-B.Tech II-Semester | **L T P C**
Course Code: A1DS801ES | **3 0 0 3**

COURSE OBJECTIVES:

Understanding the mathematical importance of development of model in a particular optimization model forthe issue and solving it.

COURSE OUTCOME:

Understanding the problem, identifying variables & constants, Formulation of optimization model and applying appropriate optimization technique

UNIT - I

Development-definition-characteristics and phases-Types of models-Operations Research models-applications.

Allocation: Linear Programming Problem Formulation-Graphical solution- Simplex method-Artificial variable techniques: Two-phase method, Big-M method.

UNIT - II

Transportation problem - Formulation-Optimal solution, unbalanced transportation problem- Degeneracy.

Assignment problem- Formulation-Optimal solution, - Variants of Assignment problem- Travelling salesman problem.

UNIT - III

Sequencing- Introduction-Flow-Shop sequencing- n jobs through two machines – n jobs through three machines- Job shop sequencing-two jobs through 'm' machines

Replacement: Introduction- Replacement of items that deteriorate with time- when money value is notcounted and counted- Replacement of items that fail completely- Group Replacement.

UNIT - IV

Theory of Games: Introduction- Terminology- Solution of games with saddle points and without saddlepoints.2 x 2 games- dominance principle- m x 2 & 2 x n games- Graphical method.

Inventory: Introduction- Single item, Deterministic models- purchase inventory models with one price break and multiple price breaks- Stochastic models _ Demand may be discrete variable or continuousvariable- single period model and no setup cost.

UNIT - V

Waiting lines: Introduction- Terminology- Single channel- Poisson arrivals and Exponential service times with infinite population.

Dynamic Programming: Introduction- Terminology, Bellman's principle of optimality- Applications of Dynamic programming- shortest path problem- linear programming problem.

TEXT BOOK:

1. Operations Research/ J. K. Sharma4e./ MacMilan
2. Introduction to OR/ Hillier & Libemann/TMH

REFERENCE BOOKS:

1. Introduction to OR/Taha/PHI
2. Operations Research/NVS Raju/SMS Education/3rd Revised Edition
3. Operations Research /A. M. Natarajan, P.Balasubramaniam, A. Tamilarasi/Pearson Education.
4. Operations Research/ Wagner/ PHI Publications.
5. Operations Research/M.V. Durga Prasad, K.Vijaya Kumar Reddy, J. Suresh Kumar/CengageLearning.

STATISTICAL MACHINE LEARNING
(PROFESSIONAL ELECTIVE-V)

IV-B.Tech II-Semester **L T P C**
Course Code: A1DS813PE **3 0 0 3**

COURSE OBJECTIVES:
The course should enable the students to learn:

1. Understand the statistical machine learning techniques
2. Gain knowledge on linear regression models ,Random Forests
3. KNN classifier Gain knowledge on the basics of probabilistic approaches like Naïve Bayes, Bayes Theorem
4. Acquire knowledge on Support Vector machines
5. Introduce the working principle of Artificial Neural networks
6. Understand the K-means clustering techniques, PCA and SVD

COURSE OUTCOMES:
At the end of the course the students are able to:

1. 1Acquire the knowledge on statistical machine learning techniques
2. Acquire the ability to build model based on logistic regression and random forest techniques
3. Understand the basic ideas of probability and work on probabilistic approaches like Naïve Bayes, Bayes Theorem
4. Apply the knowledge of Kernel functions in practical applications
5. Apply the knowledge of K-means clustering on real world examples
6. Acquire the knowledge on using PCA and SVD with Scikit-learn

UNIT-I
Statistical terminology for model building and validation-Machine Learning, Major differences between statistical modelling and machine learning, Steps in machine learning model development and deployment, Statistical fundamentals and terminology for model building and validation Bias versus variance trade-off, Train and test data Linear regression versus gradient descent Machine learning losses ,When to stop tuning machine learning models, Train, validation, and test data Cross-validation, Grid Search ,Machine learning model overview.

UNIT-II
Comparison between regression and machine learning models, Compensating factors in machine learning models, Assumptions of linear regression Steps applied in linear regression modelling, Example of simple linear regression from first principles, Machine learning models - ridge and lasso regression-Example of ridge regression machine learning, Example of lasso regression machine learning model, Logistic Regression Versus Random Forest-Maximum likelihood estimation, Terminology involved in logistic regression, Applying steps in logistic regression modelling, Random forest-Example of random forest using German credit data, Grid search on random forest, Variable importance plot, Comparison of logistic regression with random forest.

UNIT-III
K-nearest neighbors-KNN voter example, Curse of dimensionality-Curse of dimensionality with 1D, 2D, and 3D example, Curse of dimensionality with 3D example, KNN classifier with breast cancer Wisconsin data example, Naive Bayes, Probability fundamentals-Joint probability, Understanding Bayes theorem with conditional probability, Naive Bayes classification, Laplace estimator, Naive Bayes SMS spam classification Example.

UNIT-IV

Support Vector Machines and Neural Networks-Support vector machines working principles-Maximum margin classifier, Support vector classifier, Support vector machines, Kernel functions, Artificial neural networks – ANN, Forward propagation and back propagation, Optimization of neural networks-Stochastic gradient descent – SGD, Introduction to deep learning-Solving methodology, Deep learning software.

UNIT-V

K-means clustering-K-means working methodology from first principles, Optimal number of clusters and cluster evaluation, The elbow method, K-means clustering with the iris data example, Principal component analysis - PCA-PCA working methodology from first principles, PCA applied on handwritten digits using scikit-learn, Singular value decomposition – SVD, SVD applied on handwritten digits using scikit-learn.

TEXT BOOKS:

1. Pratap Dangeti,"Statistics forMachine Learning":,Packt PublishingLtd,,2017.
2. Masashi Sugiyama,"Introduction to Statistical Machine Learning",Elsevier,2016

REFERENCE BOOKS:

1. Gareth James,Daniela Witten,Trevor Hastie and Robert Tibshirani, An Introduction to StatisticalLearning with Applications in R, Springer,2015
2. Hastie Trevor, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Springer-Verlag New York Inc, February2009

CRYPTOGRAPHY AND NETWORK SECURITY
(PROFESSIONAL ELECTIVE-V)

IV-B.Tech II-Semester | **L T P C**
Course Code: A1DS814PE | **3 0 0 3**

COURSE OBJECTIVES:

To learn

1. To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures.
2. To explain various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes.
3. To familiarize Digital Signature Standard and provide solutions for their issues.
4. To familiarize with cryptographic techniques for secure (confidential) communication of two parties over an insecure (public) channel; verification of the authenticity of the source of a message

COURSE OUTCOMES:

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

1. Identify basic security attacks and services
2. Use symmetric and asymmetric key algorithms for cryptography
3. Design a security solution for a given application
4. Analyze Key Management techniques and importance of number Theory.
5. Understanding of Authentication functions the manner in which Message Authentication Codes and Hash Functions works.

UNIT-I:

Introduction: Security trends, The OSI Security Architecture, Security Attacks, Security Services and Security Mechanisms, A model for Network security.

Classical Encryption Techniques: Symmetric Cipher Modes, Substitute Techniques, TranspositionTechniques, Stenography.

UNIT-II:

Block Cipher and Data Encryption Standards: Block Cipher Principles, Data Encryption Standards, the Strength of DES, Block Cipher Design Principles.

Advanced Encryption Standards: Evaluation Criteria for AES, the AES Cipher.

More on Symmetric Ciphers: Multiple Encryption, Triple DES, Block Cipher Modes of Operation, Stream Cipher and RC4.

UNIT-III:

Public Key Cryptography and RSA: Principles Public key crypto Systems the RSA algorithm, Key Management, Diffie Hellman Key Exchange.

Message Authentication and Hash Functions: Authentication Requirement, Authentication Function, Message Authentication Code, Hash Function, Security of Hash Function and MACs.

Hash and Mac Algorithm: Secure Hash Algorithm, Whirlpool, HMAC, CMAC. DIGITAL SIGNATURE: Digital Signature, Authentication Protocol, Digital Signature Standard.

UNIT-IV:

Authentication Application: Kerberos, X.509 Authentication Service, Public Key Infrastructure. EMAIL SECURITY: Pretty Good Privacy (PGP) and S/MIME.

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT-V:

Web Security: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats.

FIREWALL: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

1. William Stallings (2006), Cryptography and Network Security: Principles and Practice, 4th edition, PearsonEducation, India.
2. William Stallings (2000), Network Security Essentials (Applications and Standards), Pearson Education,India.

REFERENCE BOOKS:

1. Charlie Kaufman (2002), Network Security: Private Communication in a Public World, 2nd edition,Prentice Hall of India, New Delhi.
2. Atul Kahate (2008), Cryptography and Network Security, 2 nd edition, Tata Mc Grawhill, India.
3. Robert Bragg, Mark Rhodes (2004), Network Security: The complete reference, Tata Mc Grawhill, India.

SOFT COMPUTING
(PROFESSIONAL ELECTIVE-V)

IV-B.Tech II-Semester | **L T P C**
Course Code: A1DS815PE | **3 0 0 3**

COURSE OBJECTIVES:

The course should enable the students to learn:

1. To teach basic neural networks, fuzzy systems, and optimization algorithms concepts and their relations
2. To provide knowledge of Neuron model, and Applications of NN to discuss their work
3. To provide the graduate the better understanding of Fuzzy Logic and Evolutionary Computations

COURSE OUTCOMES:

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

1. To understand neural network (NN) paradigms
2. Apply different supervised learning algorithms on given data
3. Understand feedback neural networks & self-organizing feature map
4. To learn fuzzy logic To have a knowledge of evolutionary computations, genetic algorithm(GA), evolutionary programming, classifier systems, genetic programming parse trees, mathematical foundation of GA variants of GA

UNIT-I

BASICS OF ARTIFICIAL NEURAL NETWORK: Characteristics of Neural Networks, Structure and working of a biological neural network, Artificial neural network: terminology, models of neurons: McCulloch Pitts model, Perceptron model, Adaline model, topology, Basic learning laws.

FUNCTIONAL UNITS FOR ANN FOR PATTERN RECOGNITION TASK: Pattern recognition problem, Basic functional units, PR by functional units.

UNIT-II

FEEDFORWARD NEURAL NETWORKS:

SUPERVISED LEARNING - I: Perceptron's - Learning and memory, Learning algorithms, Error correction and gradient decent rules, Perceptron learning algorithms.

SUPERVISED LEARNING-II: Back propagation, Multi layered network architectures, Back propagation learning algorithm, Example applications of feed forward neural networks.

UNIT-III

FEEDBACK NEURAL NETWORKS & SELF ORGANIZING FEATURE MAP: Introduction, Associative learning, Hopfield network, Error performance in Hopfield networks, simulated annealing, Boltzmann machine and Boltzmann learning, state transition diagram and false minima problem, stochastic update, simulated annealing, Boltzmann machine, bidirectional associative memory, bam stability analysis. Self-organization, generalized learning laws, competitive learning, vector quantization, self-organizing feature map, applications of self-organizing feature map.

UNIT-IV

FUZZY LOGIC: Fuzzy set theory, crisp sets, operations on crisp set, fuzzy sets, fuzzy versus crisp, operations, fuzzy relations, crisp relations, properties. Fuzzy logic Application: Fuzzy Control of BloodPressure.

UNIT-V

FUZZY LOGIC IN DATABASE AND INFORMATION SYSTEMS: Fuzzy Information, Fuzzy Logic in database Systems, Fuzzy Relational data Models, operations in Fuzzy Relational data Models, Design theory for Fuzzy Relational databases, Fuzzy information Retrieval and Web search, Fuzzy Object Oriented databases.

GENETIC ALGORITHMS: Introduction to Genetic Algorithms, Evolutionary Algorithms.

TEXT BOOKS:

1. Satish Kumar (2004), Neural Networks A classroom Approach, Tata McGraw Hill Publication,New Delhi.
2. Lotfi A. Zadeh(1997), Soft computing and Fuzzy Logic, World Scientific Publishing Co., Inc. RiverEdge, NJ, USA.

REFERENCE BOOKS:

1. B. Yegnanarayana (2006), Artificial Neural Networks, Prentice Hall of India, New Delhi, India.
2. John Yen, Reza Langari (2006), Fuzzy Logic, Pearson Education, New Delhi, India.
3. S. Rajasekaran, Vijaylakshmi Pari (2003), Neural networks, Fuzzy Logic and Genetic Algorithms Synthesis and Applications, Prentice Hall of India, New Delhi, India.

COMPUTATIONAL LINGUISTICS AND NATURAL LANGUAGE PROCESSING
(Open Elective-III)

IV-B.Tech II-Semester	L	T	P	C
Course Code: A1DS805OE	3	0	0	3

COURSE OBJECTIVES:
The course should enable the students to learn:
1. To explain natural language processing and to learn how to apply basic algorithms in this Field.
2. To facilitate the algorithmic description of the main language levels: morphology, syntax, Semantics,and pragmatics, as well as the resources of natural language data - corpora.
3. To impart basics of knowledge representation, inference, and relations to the artificial Intelligence.

COURSE OUTCOMES:
After completion of the course, students will be able to:
1. Recognize the concepts of Natural Language Processing
2. Familiarize with Text processing, Lexical Analysis, Syntactic and Semantic Analysis aspects.
3. Design and develop NLP with Corpus creation with key focus on Tree Bank annotation
4. Appreciate the nuances of Statistical techniques with modern speech recognition
5. Recognize the applications of NLP in various sectors like healthcare and education.

UNIT – I
CLASSICAL APPROACHES TO NATURAL LANGUAGE PROCESSING: Introduction – Context - Classical Toolkit - Text Preprocessing – Tokenization – Sentence Segmentation - Lexical Analysis – Finite State Morphonology – Finite State Morphology – Paradigm based Lexical Analysis - Syntactic Parsing – Cocke-Kasami-Younger Algorithm – Deductive Parsing – LR Parsing – Constraint based Grammars – Issues in Parsing - Semantic Analysis – Theories and approaches to Semantic Representation – Fine Grained Lexical Semantic Analysis: Case studies - Natural Language Generation – Components of a Generator – Approaches to Text Planning – Linguistic Component.

UNIT – II
ANNOTATION, TAGGING AND PARSING: Corpus Size, Representation, Sampling – Data Capture – Corpus Mark up and Annotation – Multilingual Corpora – Multimodal Corpora -Corpus Annotation Types - Morph syntactic Annotation – Tree banks: Syntactic, Semantic, and Discourse Annotation - Process of Building Tree banks - Applications of Tree banks - Searching Tree banks. Fundamental Statistical Techniques: Binary Linear Classification – One versus-All Method for Multi-Category Classification - Maximum Likelihood Estimation - Generative and Discriminative Models - Mixture Model and EM - Sequence Prediction Models. Part-of-Speech Tagging: General Framework – POS Tagging Approaches – Other Statistical and Machine Learning Approaches. Statistical Parsing: Basics - Probabilistic Context-Free Grammars - Generative Models - Discriminative Models - Beyond Supervised Parsing.

UNIT – III
MULTIWORD EXPRESSIONS, WEB DISTANCE AND WORD SIMILARITY, WORD SENSE DISAMBIGUATION: Multiword Expressions: Linguistic Properties of MWEs – Types of MWEs – MWE Classification – Research Issues - Methods of Word Similarity – Normalized Web Distance Method – Kolmogorov Complexity – Information Distance – Normalized Web Distance – Applications – Word Sense Inventories and Problem Characteristics – Applications of Word Sense Disambiguation – Approaches to Sense Disambiguation: Supervised, Lightly Supervised and Unsupervised.

UNIT – IV
SPEECH RECOGNITION, ALIGNMENT, STATISTICAL MACHINE TRANSLATION: Modern Speech Recognition: Architectural Components – Historical Developments – Speech Recognition Applications – Technical Challenges and Future Research Directions – Alignment: Basics – Sentence Alignment – Character, Word, Phrase Alignment – Structure and Tree Alignment – Biparsing and ITG Tree Alignment – Statistical Machine Translation: Approaches – Language Models – Parallel Corpora – Word Alignment – Phrase Library – Translation Models – Search Strategies – Research Areas.

UNIT – V

APPLICATIONS: Information Retrieval – Indexing – IR Models – Evaluation and Failure Analysis – Natural Language Processing and Information Retrieval – Question Answering – Generic Question Answering System – Evaluation of Question Answering system – Multilinguality in Question Answering System – Recent trends and Related Works – Information Extraction – IE with Cascaded Finite State Transducers – Learning based Approaches in IE – Report generation – Emerging Applications of Natural language Generation in Information – Biomedical Text Mining – Sentiment Analysis and Subjectivity.

TEXT BOOKS:

1. Introduction to Linguistics and Natural Language Processing (IBM ICE Publications).
2. Daniel and Martin J. H., "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Prentice Hall, 2009.

REFERENCE BOOKS:

2. Manning C. D. and Schutze H., "Foundations of Statistical Natural Language processing", First Edition, MIT Press, 1999
3. Allen J., "Natural Language Understanding", Second Edition, Pearson Education, 2003.

REINFORCEMENT LEARNING
(OPEN ELECTIVE – III)

IV-B.Tech II-Semester | **L T P C**
Course Code: A1DS806OE | **3 0 0 3**

COURSE OBJECTIVESRE
The course should enable the students to learn:

1. course should enable the students to learn:
2. Learn how to define RL tasks and the core principals behind the RL, including policies, valuefunctions, deriving Bellman equations (as assets by the assignments, an exam and quizzes)
3. Implement in code common algorithms following code standards and libraries used in RL (as assessed by the assignments and final project)
4. Understand and work with tabular methods to solve classical control problems (as assessed by the assignments, quizzes and final exam)
5. Understand and work with approximate solutions (deep Q network based algorithms) (as assessed by the assignments and final exam)
6. Learn the policy gradient methods from vanilla to more complex cases (as assessed by theassignments, quizzes and final exam)
7. Explore imitation learning tasks and solutions (as assessed by the quizzes and final exam) • Recognize current advanced techniques and applications in RL (as assessed by the final project, quizzes and final exam)

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

1. Understand the need for machine learning for various problem solving
2. Familiarize the basics of Reinforcement Learning
3. Explain various tabular solution methods
4. Familiarize in approximate solution methods
5. Explain about classic conditioning and explore few applications

UNIT – I
Introduction to Machine Learning : Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT – II
Introduction to Reinforcement Learning and optimization: Reinforcement Learning: Introduction - Elements of Reinforcement Learning - Limitations and Scope- An Extended Example: Tic-Tac-Toe- Multi-armed Bandits: K {PAGE} armed, test beds, incremental implementation, Optimal initialization- Gradient Bandit, associative Search.

UNIT – III
Basic Tabular Solution Methods: Finite Markov Decision Processes- Goals, Rewards, Returns, Episodes- Optimal policies and optimal valued functions. Dynamic Programming: Policy Evaluation (Prediction) - Policy Improvement - Policy Iteration - Value Iteration- Asynchronous Dynamic Programming - Generalized Policy Iteration. Monte Carlo Methods: Monte Carlo Prediction - Monte Carlo Estimation of Action Values - Monte Carlo Control - Monte Carlo Control without Exploring Starts - Off-policy Prediction via Importance Sampling. Temporal-Difference Learning: TD Prediction - Advantages of TD - Incremental Implementation - Off-policy Monte Carlo Control.

UNIT – IV

Approximate Solution Methods : On-policy Prediction with Approximation : Value-function Approximation -The Prediction Objective (VE) - Stochastic-gradient and Semi-gradient Methods - Linear Methods –Feature Construction for Linear Methods- Nonlinear Function Approximation: Artificial Neural Networks - Least- Squares TD - Memory-based Function Approximation - Kernel-based Function Approximation.

UNIT – V

Classical Conditioning & Case studies Classical Conditioning : Blocking and Higher-order Conditioning - The Rescorla -Wagner Model - TD Model -Simulations - Instrumental Conditioning - Delayed Reinforcement- Cognitive Maps. Case Studies: Samuel's Checkers Player, Optimizing Memory Control, Human-level Video Game Play- Autonomous UAV Navigation and path planning -Drones for Field Coverage.

TEXT BOOKS:

1. Richard S.Sutton and Andrew G. Barto, , Introduction to Reinforcement Learning',2nd Edition, MITPress, 2017.
2. Tom M.Mitchell,—Machine Learning,McGraw-Hill Education (India) Private Limited, 2013

REFERENCE BOOKS:

1. Sigaud O.&Buffet O. ,Markov Decision Processes in Artificial Intelligence', editors, ISTE Ld., Wileyand Sons Inc, 2010.
2. Dragun Vrabie,Kyriakos G.Vamvoudakis,Frank L.Lewis.,Optimal Adaptive Control and DifferentialGames by Reinforcement learning principles,2012.