Programme Ordinance, POs, PSOs and Course Outcomes (COs)

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING
FACULTY OF ENGINEERING & TECHNOLOGY
SCRIET,CH.CHARAN SINGH UNIVERSITY CAMPUS, MEERUT
2020-21

PROGRAMME ORDINANCE

1. ADMISSION

1.1 Admission to B.Tech. First year in 1st semester and lateral admission in B.Tech. Second year in 3rd semester (for diploma holder/B.Sc. candidates only) will be made as per the rules prescribed by the Academic Council of CCSU Meerut.

1.2 Admission on migration of a candidate from any other University to the University is not permitted.

2. ELIGIBILITY FOR ADMISSIONS

2.1 Admission to B. Tech. First Year through Entrance Examination:

(a) Eligibility for admission to under graduate courses in First year shall be as per guidelines of All India Council for Technical Education (AICTE) / Related Council and according to the latest U.P. Government notifications/rules.

2.2 Admission to B.Tech. Second Year through Lateral Entry Scheme:

(a) Candidates who have passed 3/4-year Diploma (with minimum 60% marks) from institutions recognized by the U.P. Board of Technical Education in any branch of Engineering/Technology except Agriculture Engineering are eligible for admission to Second year in any branch of Engineering. /Technology except Agriculture Engineering

(b) Candidates who have passed 3/4-year Diploma (with minimum 60% marks) from institutions recognized by the U.P. Board of Technical Education in Agriculture Engineering are only eligible for admission to Second year of Agriculture Engineering.

2.3 Direct admission on vacant seats at institution/college level: The eligibility criteria for direct admission on seats remaining vacant in first year after entrance examination counseling shall be such as may be notified from time to time.

2.4 The Academic Council shall have power to amend or repeal the eligibility criteria laid down at clause 2.1. & 2.2, as per the guidelines of AICTE.

3. ATTENDANCE

3.1 Every student is required to attend all the lectures, tutorials, practical's and other prescribed curricular and co-curricular activities. The attendance can be condoned up to 25% on medical grounds or for other genuine reasons beyond the control of students.

3.2 A further relaxation of attendance up to 15% for a student can be given by Head of Institution/college provided that he/she has been absent with prior permission of the Head of the institution/college for the reasons acceptable to him.

3.3 No student will be allowed to appear in the end semester examination if he / she do not satisfy the overall average attendance requirements of Clause Nos. 3.1, and 3.2. and such candidate(s) shall be treated as having failed due to detained and will be further governed by clause no. 4.2 & 4.3 and annexure I.

3.4 In each semester, the attendance shall be counted from the date of admission in the college or start of academic session whichever is later.

4. DURATION OF COURSES

4.1 Total duration of the B.Tech. Course shall be 4 years, each year comprising of two semesters. Each semester shall normally have teaching for the 90 working days or as prescribed by A.I.C.T.E. from time to time.

4.2 The student admitted to 1st year B.Tech shall complete the course within a period of seven academic years from the date of first admission, failing which he/she has to discontinue the course. The students admitted under lateral entry scheme (2nd Year B.Tech) shall complete the course within a period of six academic years from the date of first admission, failing which he/she has to discontinue the course.

4.3 A candidate, who has failed twice in first year due to any reason (either due to his/her non-appearance or he/she being not permitted to appear in semester examinations) shall not be allowed to continue his/her studies further. Provided further that if a student wishes to continue third time in first year he/she may be allowed on the terms and conditions laid down by the University for such permission but the maximum time allowed for completing the course will remain the same as in clause 4.2.

4.4 The minimum credit requirement for B.Tech degree is 160 credits.

5. CURRICULUM

5.1 The 4 year curriculum has been divided into 8 semesters and shall include lectures, tutorials, practicals, seminars and projects etc. in addition to industrial training and educational tour etc. as defined in the scheme and executive instructions issued by the University from time to time.

5.2 The curriculum will also include such other curricular, co-curricular and extracurricular activities as may be prescribed by the University from time to time.

6. CHANGE OF BRANCH

6.1 Change of branch may be allowed against the vacant seats in the following two stages, provided criteria at following sub clauses is satisfied:

(a) In first year, after the last date of admission to the B.Tech. Ist semester, on the basis of merit of entrance examination on vacant seat subject to clause 6.2.

(b) In the second year, on the basis of merit at the B.Tech. first year examination for those who are pass without any carry over paper subject to clause 6.2.

6.2 After change of branch, number of students in branch(s) shall neither increase over the intake approved by A.I.C.T.E. nor it will decrease below 75% of intake approved by A.I.C.T.E.

6.3 Change of branch facility is not applicable to following: -

(a) Candidates admitted in B.Tech. Agricultural Engineering/Biotechnology courses.

(b) Candidates admitted in second year of B.Tech. courses as per clauses 2.2

6.4 The change of branch if allowed will become effective from B.Tech. IIIrd semester.

6.5 The Branch change process must be completed by 30th August of each academic session. Further change of branch shall not be permitted.

7. CHANGE OF COLLEGE

7.1 Change of College shall not be permitted.

7.2 Change of study center shall not be permitted.

8. EXAMINATION

8.1 The performance of a student in a semester shall be evaluated through continuous class assessment and end semester examination. The continuous assessment shall be based on class tests, assignments/tutorials, quizzes/viva-voce and attendance. The marks for continuous assessment (Sessional marks) shall be awarded at the end of the semester. The end semester examination shall be comprised of written papers, practicals and viva-voce, inspection of certified course work in classes and laboratories, project work, design reports or by means of any combination of these methods.

8.2 The distribution of marks for sessional, end semester theory papers, practicals and other examinations, seminar, project and industrial training shall be as prescribed. The practicals, viva-voce, projects and reports shall be examined/evaluated through internal and external examiners as and when required.

8.3 The marks obtained in a subject shall consist of marks allotted in end semester theory paper and sessional work.

9. ELIGIBILITY OF PASSING

9.1 A student who obtained Grades A^{+} to E shall be considered as passed. If a student secured "F" grade, he /she has to reappear for the examination. It is mandatory for a student to earn therequired credits as mentioned in each semester.

(a) For a pass in a Theory Subject, a student shall secure minimum of 30% of the maximum marks prescribed by the University in the end semester examination and 40% of aggregate marks in the subject including sessional marks. i.e. Minimum Passing Grade is "E".

(b) For a pass in a Practical/Internship/Project/Viva-voce examination, a student shall secure a minimum of 50% of the maximum marks prescribed by the University in the relevant Practical/Internship/Project/Viva-voce examination and 40% of marks in the aggregate in

the Practical/Internship/Project/Viva-voce including sessional marks. i.e. Minimum Passing Grade in a course is "E".

(c) F
or a pass in the subject which has only sessional component and No End semester exam component, such as Seminar, a student shall secure a minimum of 40% of the maximum marks prescribed. i.e. Minimum Passing Grade is "E".

(d) F
or a pass in a subject having Theory and Practical component, a student shall secure minimum of 30% of the maximum marks prescribed by the University in theory examination and 50% of marks in practical examination; in addition the student must secure 40% of marks in the aggregate in the subject including theory, practical, theory sessional and practical sessional marks. i.e. Minimum Passing Grade in a course is "E"..

9.2 The students who do not satisfy the condition 9.1 or the student who remains absent shall be deemed to have failed in that subject and may reappear for the University examination in the subsequent examinations. However, the Sessional marks awarded to the student/s at previous attempt in the concerned subject will be carried forward.

9.3 A student may, at his/her desire, opt to abandon his/her performance of a semester in following manner.

(a) A student may opt to abandon his/her performance only in end semester examination of university for a given semester.

(b) A student may opt to abandon his/her Total Performance of a Semester which includes performance in university end semester examination and sessional marks of all theory and practical subjects.

(c) A student may opt to abandon his/her performance in University Examination of any or both semesters of the same academic year only.

(d) A student shall be allowed to abandon the performance maximum twice during the entire course of study.

(e) Performance of a semester, once abandoned, cannot be claimed again.

9.4 The student, who opts to abandon the performance of a semester as per clause 9.3, shall abandon performance in all the courses of that semester, irrespective of the fact whether the student has passed or failed in any subject of that semester.

9.5 A student, who opts to abandon the total performance of the semester including sessional marks as per 9.3(b) and 9.3(c), has to take readmission for the relevant semester(s). Readmission to the First semester in such cases shall not be considered as fresh admission i.e., the student will continue to have the same University Roll Number, which was allotted earlier.

9.6 The student, who opted to abandon his / her performance only in the university end semesterexamination of a semester and does not desire readmission, shall be permitted to re-

appear for examinations of all the subjects of the semester in the subsequent examinations as an Ex-

Student. However, the sessional marks obtained by the student in the abandoned semester shall be retained.

9.7 Such students who opted to abandon the performance at any stage of his/her study and has clearedany paper in more than one attempt are eligible for the award of *DIVISION* at the B.Tech. degree level but are not eligible for the award of RANKS and HONOURS degree.

9.8 The student who passes a course of a semester as per 9.1 shall not be allowed to appear for the same again, unless he/she opts for *abandoning of results* as per 9.3-9.7.

9.9 A student shall be declared to have completed the program of B.Tech. degree, provided the student has undergone the stipulated course work as per the regulations and has earned at least 160 Credits.

10. ELIGIBILITY FOR PROMOTION

10.1 There shall not be any restriction for promotion from an odd semester to the next evensemester.

10.2 For promotion from even semester to the next odd semester (i.e. of the next academicyear) the student has secured either of the semester of an academic year is fully cleared or earned the credit greater than or equal to minimum credit of either of the semester for example.

Example 1

1. **A Student of 1st year earned 10 credits in I semester and 8 credit in II semester. The total credit of I semester is 17.5 and II semestersare 20.5.**

Minimum Credit Threshold for Promotion Check Point	Credit* Threshold
First Year to Second Year	**17.5 credits in** First Year (I&II sem.)

Total credit earned by student is 18(10+8) therefore he / she is eligible for promotion from 1st to 2nd year.

Example 2

A Student of 1st year earned17.5 credit in I semester and 18 credit in II semester. The total credit of I semester is 17.5 and II semester is 20.5.

Minimum Credit Threshold for Promotion Check Point	Credit* Threshold
First Year to Second Year	**17.5 credits in First** Year (I&II sem.)

His / Her I semester is fully cleared therefore he / she is eligible for promotion to 2nd year.

10.3 In yearly result, a student shall be declared PASS only if he/ she secures"E" or above gradesin all the subjects and minimum Semester Grade Point Average (SGPA) of 5.0, in each semester of an academic year.

10.4 Student himself can decide to abandon the performance of any or both the semestersofsame academic year as per clause 9.3 and reappear in abandoned semester examination as per clauses 9.4, 9.5 & 9.6.

11. Carry over System

11.1 Following rules shall be followed for carry over papers:

(a) A candidate who satisfies the requirements of clause 9.1 (a) and 9.1 (b) will be appear in those theory papers / practical during respective end semester exams in which he/she failed.

(b) A candidate satisfying clause 9.3 (a) shall be required to appear in theory papers / practical examination to fulfil the requirements of clause 9.1(a) and 9.1 (b).

(c) A candidate shall be required to exercise his/her choice of minimum theory papers in which he/she desires to appear in the examination for improvement of SGPA to fulfil the requirements of clause 10.3.

(d) Candidate appearing for carry over paper in any semester shall be examined with the examination paper of that subject running in that semester.

11.2 All carryover examinations shall be held only with end semester examination.

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12. **RE-ADMISSION IN THE INSTITUTION/ COLLEGE**

A candidate may be allowed for re-admission provided he/she satisfies one of the following conditions:

(a)A candidate is declared fail.

(b) A candidate did not appear in a semester examination / or he/she was not granted permission to appear in the examination.

(c)A candidate has been detained by the institute and subsequently has been permitted to take re-admission.

(d) A candidate has own desire to abandon the performance of semester(s) as stated in clause 9.3 (b) and 9.3 (c).

13. COURSES

13.1There will be four types of courses.

(i) Foundation Courses: The Foundation Courses are of two kinds: *Compulsory Foundation* and *Elective foundation*.

"Compulsory Foundation": These courses are the courses based upon the content that leads to Knowledge enhancement. They are mandatory for all disciplines.

“Foundation Electives”: These are value-based courses aimed at man making education.

(ii) Core Courses: This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirements of a program in a said discipline of study.

(iii) Elective Courses: This is course, which can be chosen from the pool of papers. It may be supportive to the discipline/ providing extended scope/enabling an exposure to some other discipline / domain / nurturing student proficiency skills.

(iv) Mandatory Courses: These courses are mandatory for students joining B.Tech. Program and students have to successfully complete these courses before the completion of degree.

13.2 The minimum number of students to be registered for an Elective to be offered shall be not less than twenty.

13.3 A student shall exercise his option in respect of the electives and register for the same at the beginning of the concerned semester. The student may be permitted to opt for change of elective subject within 15 days from the date of commencement of the semester as per the calendar of the University.

14. **C**

OMPUTATION OF SGPA, YGPA AND CGPA

14.1 The Dr. A.P.J.AbdulKalam Technical University (APJAKTU) Lucknow adopts absolutegrading system wherein the marks are converted to grades and every semester results will be declared with semester grade point average (SGPA). Yearly Grade Point Average (YGPA) shall be calculated at each year by calculating from the formula given in section 14.4 (b) of an academic year. The Cumulative Grade Point Average (CGPA) shall be calculated at the end of last semester of the program. The grading system is with the following letter grades and grade points scale as given below:

Level	Outstanding	Excellent	Very Good	Good	Above Average	Average	Poor	Fail
Letter Grade	A^+	A	B^+	B	C	D	E	F
Grade Points	10	9	8	7	6	5	4	00
Score (Marks) Range (%)	≥ 90 (90-100)	<90 (80-89)	<80, ≥70 (70-79)	<70, ≥60 (60-69)	<60 ,≥50 (50-59)	<50, ≥45 (45-49)	<45, ≥40 (40-44)	< 40 (0-39)

14. 2

(a) A student obtaining Grade 'F' in a subject shall be considered failed in that subject and will be required to reappear in the examination. Such students after passing the failed subject in subsequent examination(s) will be awarded with grade according to marks he/she scores in the subsequent examination(s).

(b) If a student's SGPA in a semester is less than 5 to be declared pass in that semester as laid down by clause 10.3 of the ordinance, he/she shall be allowed to appear in the improvement examination of the theory subjects of that semester. Such student after passing the said subjects in subsequent examination(s) will be awarded with grade according to marks he/she scores in the subsequent examination(s).

14.3

(a) The University has right to scale/moderate the theory exam/practical exam/sessional marks of any subject whenever required for converting of marks in to letter grades on the basis of the result statistics of university as in usual practice.

(b) The modality for moderation of marks before the declaration of result shall be decided by a committee of Pro-Vice Chancellor, Dean UG, Assoc. Dean UG and Controller of Examination.

(c) The modality for moderation of marks if needed after the declaration of result shall be decided by a committee of Pro-Vice Chancellor, Dean UG, Assoc. Dean UG, Controller of Examination and an external member not below the rank of Professor nominated by the Vice Chancellor.

(d) If the candidate(s) appeared in the examination but theory marks are not available due to missing of copy by any reason, the average marks may be awarded as decided by the committee mentioned in 14.3(a). In case of missing/unavailable of sessional marks, Controller of Examination can take decision as per the provision laid down by the Examination Committee.

(d)The Committee defined in14.3 (a) shall also fix up the responsibility and recommend the punishment for occurrence of such case(s) in14.3(c).

(e) All the matters defined under 14.3(a) to 14.3 (d) shall be executed subject to the approval of Academic Council of the APJAKTU.

14.4 **Computation of SGPA, YGPA and CGPA**

The following procedure to compute the Semester Grade Point Average (SGPA), Yearly Grade Point Average (YGPA) and Cumulative Grade Point Average (CGPA):

(a) The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e SGPA (Si) = Σ (Ci x Gi) / ΣCi where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

(b) The YGPA(Yearly Grade Point Average) is calculated at end of each year as:

$$YGPA= (SGPA_{(odd)} * \sum C_{i(odd)} + SGPA_{(even)} * \sum C_{i(even)} / (\sum C_{i(odd)} + \sum C_{i(even)})$$

(c) The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e., CGPA = Σ (Ci x Si) / Σ Ci where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

(d) The SGPA shall be calculated at end of each semester and YGPA shall be calculated at the end of each academic year. CGPA shall be calculated at the end of last semester of the Program and shall be rounded off to 2 decimal places and reported in the transcripts / grade Sheet.

Illustration for Computation of SGPA, YGPA and CGPA

Computation of SGPA of odd semester Illustration No.1

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	5.5	B^+	8	5.5x8 = 44
Course 2	4	C	6	4x6 = 24
Course 3	5	B	7	5x7 = 35
Course 4	3	A^+	10	3x10= 30
Total	17.5			**133**

Thus, SGPA= 133/17.5 =7.6

Computation of SGPA of even semester Illustration No.2

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	5.5	B^+	8	5.5x8 = 44
Course 2	4	C	6	4x6 = 24
Course 3	5	B	7	5x7 = 35
Course 4	3	A^+	10	3x10= 30
Course 5	3	F	0	3x0= 00
Total	20.5			**133**

Thus, SGPA= 133/20.5 =6.48

$$YGPA= (SGPA_{(odd)} * \sum C_{i(odd)} + SGPA_{(even)} * \sum C_{i(even)} / (\sum C_{i(odd)} + \sum C_{i(even)})$$

Thus, YGPA = 7.6 * 17.5+6.48 *20.5 / (17.5 +20.5) = 6.99

Illustration No.2a

Course	Credit	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 5	3.0	E	4	3.0 x 4 = 12

C_i (First Attempt) + C_i (Subsiquent Attempt) = 133 + 12 = 145

Thus SGPA= 145/20.5 = 7.07

CGPA after Final Semester

Semester	I	II	III	IV	V	VI	VII	VIII
Credit	17.5	20.5	21.0	21.0	21.0	21.0	20	18.0
SGPA	7	8.5	9.2	6.86	8.18	7.73	8.68	9.4

Thus, CGPA= (17.5*x*7 + 20.5*x*8.5 + 21*x*9.2 + 21*x*6.86 + 21*x*8.18 + 21*x*7.73 + 20*x*8.68 + 18*x*9.4)/160 =8.66

14.5 Grade sheet: Based on the above recommendations on Letter grades, grade points, SGPA of each semester and YGPA of an academic year, a consolidated grade sheet indicating performance in a particular academic year.

14.6 CGPA (calculated at the end of the last semester of the program) shall be issued.

15. CONVERSION OF CGPA INTO PERCENTAGE

Conversion formula for the conversion of CGPA into Percentage is (CGPA-0.75) x 10 = Percentage of marks scored.

Illustration: (8.66-0.75) x 10 =79.1%

16. AWARD OF DIVISION, RANK AND MEDALS

16.1 Division and CGPA shall be awarded only afterthe eighth and final semester examination based on integrated performance of the candidate for all the eight semesters (six semesters for lateral entry) as per following details.

(a) After successful completion of 160 credits, a student shall be eligible to get under graduate degree in engineering/technology. A student will be eligible to get undergraduate degree with honours only, if he/ she voluntary completes additional University recommended courses only (equivalent to 20 credits offered by NPTEL of 4 weeks, 8 weeks and 12 weeks shall be of 2, 3 and 4 credits respectively) through MOOCs. For registration to MOOCs courses, the students shall follow NPTEL site http://nptel.ac.in/as per the NPTEL policy and norms. These students can register for their courses through NPTEL directly as per the course offering in odd/even semesters at NPTEL. The registration fees will be borned by the student. These NPTEL courses (recommended by the university) may be cleared during the B.Tech degree program (not necessary one course in each semester). After successful completion of these MOOCs courses the students, shall, provide their successful completion NPTEL status/ certificates to the university (COE) through their college of study only. The student shall

be awarded **First division with Honours** Degree only if he/she secures 7.50 or above CGPA and passed each subject of that degree program in single attempt without any grace marks, without any gap along with successful completion of MOOCS based course of 20 credits.

(b) The student shall be awarded **First division with Distinction** Degree only if he/she secures 7.50 or above CGPA and passed each subject of that degree program in single attempt without any grace marks and without any gap.

(c) A candidate who qualifies for the award of the degree by securing E or above grades in all subjects of all the semesters (eight semesters/six semesters) as applicable, and secures CGPA less than 7.5 and greater than or equal to 6.5 shall be declared to have passed the examination in FIRST DIVISION.

(d) All other candidates who qualify for the award of degree by securing E or above grades in all subjects of all semesters (eight semesters/six semesters as applicable) and secures CGPA below6.5 and greater than or equal to 5.0 shall be declared to have passed the examination in

SECOND DIVISION.

16.2 For award of ranks in a branch, a minimum of 10 students should have appeared in the 8th semester examination. The total number of ranks awarded shall be 10% of total number of students appeared in 8th semester or 10 students, whichever is less in that branch.

Illustration:

1. If 1028 students appeared for the 8th semester in Electronics and Communication Engineering Branch, the number of ranks to be awarded for Electronics and Communication Engineering will

10.

2. If 90 students appeared for the 8th semester in Biomedical Engineering Branch, the number of ranks to be awarded for Biomedical Engineering will be 09.

For award of rank in a branch of Engineering / Technology, the CGPA secured by the student from

(a) 1st to 8th semester for the students admitted to B.E./B.Tech. Program from 1st year, and

(b) 3rd to 8th semester for the students admitted to B.E./B.Tech. Program from 2nd year (Lateral Entry)

shall be considered.

A student shall be eligible for a rank at the time of award of degree in each branch of Engineering / Technology, provided the student

(a) Has passed 1st to 8th (students joining from 1st semester) or 3rd to 8th (in case of lateral entry) semester in all the subjects in first attempt only

(b) Has not repeated/rejected any of the lower semesters.

If two students get the same *CGPA*, the tie should be resolved by considering the number of times a student has obtained higher *SGPA;* but, if it is not resolved even at this stage, the number of times a student has obtained higher grades like A^+, A, B^+, B etc shall be taken into account in rank ordering of the students in a program.

16.3 The Gold, Silver and any other Medals as decided by the university shall be awarded to students falls in the top ranks of various courses as per university rules.

17. SCRUTINY AND RE-EVALUATION

17.1 Scrutiny and re-evaluation shall be allowed in only theory papers.

17.2 Revaluation of theory/practical papers is permitted only with certain conditions as laid down by university.

18. UNFAIR MEANS

Cases of unfair means shall be dealt as per the rules and regulations of the University (**ANNEXURE-II**).

19. AWARD OF SESSIONAL MARKS

Sessional marks for theory subjects, practicals and project shall be awarded as prescribed and at present the break-up of sessional marks shall be as follows:

(a) Theory Subjects:

(i) Class test which will comprise 30 % of total theory marks with two mid-term tests of equal weightage.

(ii) Teacher Assessment Tutorial/Assignment/ Quizzes/ Attendance comprises 20% of total theory marks.

(b) Practicals,

(i) Two mid-term viva-voce/tests of equal weightage 30% of total Practical marks.

(ii) Teacher Assessment: Lab, Record/ Attendance 20% of total Practical marks.

(c) Make-up test may be held only for those students who could not appear in any one of mid-term class tests due to genuine reasons for which the prior permission from the Head of Institution/College was taken. Make up test shall ordinarily be held about two weeks before the semester examination. The syllabus for the make-up test shall be the whole syllabus covered by the subject teacher upto that time.

20. AWARD OF SEMINAR INDUSTRIAL TRAINING, EDUCATIONAL TOUR MARKS AT INSTITUTION/COLLEGE LEVEL

20.1 The marks of Seminar, Industrial Training, Educational tour marks shall be awarded on the following basis:

(i) Write-up / Report 50%

(ii) resentation 50%

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20.2 The marks in Seminar, Industrial Training and Educational Tour shall be awarded by a committee consisting of following members:

(i) Head of the Department or his/her nominee.

(ii) Concerned Officer – Incharge.
(iii) Senior Faculty Member of the department nominated by the Head of Department.

21. CANCELLATION OF ADMISSION

The admission of a student at any stage of study shall be cancelled if :

(a) He / She is not found qualified as per AICTE / State Government norms and guidelines or the eligibility criteria prescribed by the University. or

(b) He / She is found unable to complete the course within the stipulated time as prescribed in clause 4.2 or

(c) He / She is found involved in creating indiscipline in the Institution / College or in the University.

(a) The Academic Council shall have the power to relax any provision provided in the ordinance in any specific matter/situation subject to the approval of Executive Council of the University.

PROGRAMME OUTCOMES(POs)

PO1: Fundamental Engineering perspective: Apply the possess knowledge to solve complex computer science and engineering problems, using mathematics,science, engineering fundamentals and an engineering specialization.

PO2: Problem Tackling Skills: Based on the principles of mathematics, basic sciences, and engineering. Itidentify,formulate and solves complex engineering issues.

PO3: Blueprint designing skills: For public health, safety, cultural, environmental and other specific needs,it develops system component,processes and provide solution.

PO4: Investigative Skills: Creating, identifying and implementing appropriate techniques, resources, and modern engineering and IT tools including predicting and modeling complex engineering activities with anunder standingo of limitations.

PO5: Sensitive towards Society: Apply reasoning informed by contextual knowledge to assess social,health, safety, legal andcultural issues and the resulting responsibilities relevant to professional engineering.

PO6: Environment enthusiast: Understanding the effect of technical engineering solutions in social and environmental contexts and demonstrating the awareness of sustainable development and needs.

PO7:Sense of Professional etiquettes: It generates senseabout professional ethics and responsibility.

PO8:Teamwork:Work as an individual,as a member or leader in all multidisciplinary environments.

PO9: Expressive: Communicate effectively with the engineering community and with society atlarge on complex engineering practices, such as being able to understand and write effectivereports and documents on design,making effective presentations, and providing and obtainingclearguidance.

PO10: Quality of life: Engineering skills are used for solving personal as well as social problemsandimprovethequalityoflife.

PROGRAMMESPECIFICOUTCOMES(PSOs)

PSO1: Ability to exhibit logical and critical thinking along with essential analytical skills that are crucialfor understanding, analyzing and developing the software and hardware solutions in the field of computerscienceandengineering.

PSO2: Ability to develop software systems to enable the convenient use of the computing system andpossessprofessionalskillsandknowledgeaboutsoftwaredesignprocess.

PSO3: Ability to acquire knowledge in various fields of computer science, and to apply for successfulcareerinindustry,entrepreneurshipand/orhigherstudies.

PSO4: Ability to use the knowledge of ethical and management principles required for teamwork as well asforteamleadership.

PSO5: Ability to detect real life/social problems or any industrial automation problems and articulate andresolve them using advance computer technologies like data science and some specialized area of computerscienceintendingtoemulatehumanintelligencesuchasmachinelearning,computervision,patternrecognition,Naturallanguageprocessing.

CourseStructureandEvaluationScheme

SEMESTER-I

	Subject Name	Subject Code	PERIODS			EVALUATION SCHEME				END SEMESTER		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1.	Engineering Mathematics – I	BT – 105	3	1	0	30	20	50	-	100	-	150	4
2.	Engineering Physics / Engineering Chemistry	BT – 104/ BT - 103	3	1	0	30	20	50	-	100	-	150	4
3.	Basic Electrical Engineering / Emerging Domain in Electronics Engineering	BT – 101/ BT – 107	3	0	0	30	20	50	-	100	-	150	3
4.	Programming for Problem Solving/ Fundamentals of Mechanical Engineering & Mechatronics	BT – 102/ BT – 106	3	0	0	30	20	50	-	100	-	150	3
5.	Emerging Technology for Engineering / AI for Engineering	BT – 108/ BT – 109	2	0	0	15	10	25	-	25	-	50	2
6.	Soft Skill – I	BT - 110	2	0	0	15	10	25	-	25	-	-	NC
7.	Engineering Physics Lab / Engineering Chemistry Lab	BT – 154/ BT – 153	0	0	2	-	-	-	25	-	25	50	1
8.	Basic Electrical Engineering Lab / Electronics Engineering Lab	BT – 151/ BT – 157	0	0	2	-	-	-	25	-	25	50	1
9.	Programming for Problem Solving Lab / English Language Lab	BT – 152/ BT – 158	0	1	2	-	-	-	25	-	25	50	1
10.	Engineering Graphics & Design Lab/ Mechanical Workshop Lab	BT – 155/ BT – 156	0	1	2	-	-	-	50	-	50	100	1
11.	(For B. Tech. Hons. Degree)*												
	Total											**900**	**20**

SEMESTER-II

	Subject Name	Subject Code	PERIODS			EVALUATION SCHEME				END SEMESTER		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1.	Engineering Mathematics – I	BT – 205	3	1	0	30	20	50	-	100	-	150	4
2.	Engineering Physics / Engineering Chemistry	BT – 204/ BT - 203	3	1	0	30	20	50	-	100	-	150	4
3.	Basic Electrical Engineering / Emerging Domain in Electronics Engineering	BT – 201/ BT – 207	3	0	0	30	20	50	-	100	-	150	3
4.	Programming for Problem Solving/ Fundamentals of Mechanical Engineering & Mechatronics	BT – 202/ BT – 206	3	0	0	30	20	50	-	100	-	150	3
5.	Emerging Technology for Engineering / AI for Engineering	BT – 208/ BT – 209	2	0	0	15	10	25	-	25	-	50	2
6.	Soft Skill – I	BT - 210	2	0	0	15	10	25	-	25	-	-	NC
7.	Engineering Physics Lab / Engineering Chemistry Lab	BT – 254/ BT – 253	0	0	2	-	-	-	25	-	25	50	1
8.	Basic Electrical Engineering Lab / Electronics Engineering Lab	BT – 251/ BT – 257	0	0	2	-	-	-	25	-	25	50	1
9.	Programming for Problem Solving Lab / English Language Lab	BT – 252/ BT – 258	0	1	2	-	-	-	25	-	25	50	1
10.	Engineering Graphics & Design Lab/ Mechanical Workshop Lab	BT – 255/ BT – 256	0	1	2	-	-	-	50	-	50	100	1
11.	(For B. Tech. Hons. Degree)*												
	Total											**900**	**20**

SEMESTER-III

	Subject Name	Subject Code	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1.	Data Structure	BT – 306	3	1	0	30	20	50	-	100	-	150	4
2.	Computer Organization and Architecture	BT – 307	3	1	0	30	20	50	-	100	-	150	4
3.	Discrete Structures & Theory of Logic	BT – 308	3	0	0	30	20	50	-	100	-	150	3
4.	Computer System Security/ Python Programming	BT – 309/ BT – 310	2	0	0	15	10	25	-	50	-	-	0
5.	Engineering Science Course/ Mathematics – IV	BT - / BT – 305	3	1	0	30	20	50	-	100	-	150	4
6.	Universal Human Values / Technical Communication	BT – 314 / BT – 304	3 / 2	0 / 1	0 / 0	30	20	50	-	100	-	150	3
7.	Data Structures Using C Lab	BT – 356	0	0	2	-	-	-	25	-	25	50	1
8.	Computer Organization Lab	BT – 357	0	0	2	-	-	-	25	-	25	50	1
9.	Discrete Structure &Logic Lab	BT – 358	0	0	2	-	-	-	25	-	25	50	1
10.	Mini Project or Internship Assessment*	BT – 359	0	0	2	-	-	50	-	-	-	50	1
11.	MOOCs (Essential for Hons. Degree												
	Total											**950**	**22**

* The Mini Project or internship (3-4 weeks) conducted during summer break after II Semester and will be assessed during III Semester.

***Engineering Science Course:-**

1. Engineering Mechanics - BT – 319 2. Basics Data Structure & Algorithms BT – 320

3.	Material Science	-	BT – 321	4. Energy Science & Engineering BT – 322
5.	Sensor& Instrumentation	-	BT – 323	6. Introduction to Soft Computing BT – 324
7.	Analog Electronics	-	BT – 325	8. Electronics Engineering BT – 326

SEMESTER-IV

	Subject Name	Subject Code	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	Total	PS	TE	PE		
1.	Operating Systems	BT – 406	3	0	0	30	20	50	-	100	-	150	3
2.	Theory of Automata and Formal Languages	BT – 407	3	1	0	30	20	50	-	100	-	150	4
3.	Microprocessor	BT – 408	3	1	0	30	20	50	-	100	-	150	4
4.	Computer System Security/ Python Programming	BT – 409/ BT – 410	2	0	0	15	10	25	-	50	-	-	0
5.	Engineering Science Course/ Mathematics – IV	BT - / BT – 405	3	1	0	30	20	50	-	100	-	150	4
6.	Universal Human Values / Technical Communication	BT – 414 / BT – 404	3 2	0	0 0	30	20	50	-	100	-	150	3
7.	Operating Systems Lab	BT – 456	0	0	2	-	-	-	25	-	25	50	1
8.	Microprocessor Lab	BT – 458	0	0	2	-	-	-	25	-	25	50	1
9.	Python Language Programming Lab	BT – 459	0	0	2	-	-	-	25	-	25	50	1
10.	MOOCs (Essential												

	for Hons. Degree												
	Total											**900**	**21**

***Engineering Science Course:-**

1. Engineering Mechanics - BT – 419 2. Basics Data Structure & Algorithms -BT – 420
3.Material Science - BT – 421 4. Energy Science & Engineering- BT – 422
5. Sensor & Instrumentation- BT – 423 6. Introduction to Soft Computing- BT – 424
7.Analog Electronics- BT – 425 8. Electronics Engineering - BT – 426

SEMESTER-V

S.No.	Subject Name	Subject Code No.	L – T - P	Theory/ Lab Marks ESE	Sessional CT	Total TA	Credit	
1.	Managerial Economics	BT – 501	3--0--0	70	20	10	100	3
2.	Database Management System	BT – 509	3--0--0	70	20	10	100	3
3.	Design and Analysis of Algorithm	BT – 510	3--1--0	70	20	10	100	4
4.	Principle of Programming Language	BT – 511	3--0--0	70	20	10	100	3
5.	Web Technology	BT – 512	3--1--0	70	20	10	100	4
6.	Sociology/ Cyber Security	BT – 506/ BT – 515	3--0--0	70	20	10	100	3
7.	Database Management Systems Lab	BT – 559	0--0--2	50	-	50	100	1
8.	Design and Analysis of Algorithm Lab	BT – 560	0--0--2	50	-	50	100	1
9.	Principle of Programming Language Lab	BT – 561	0--0--2	50	-	50	100	1
10.	Web Technologies Lab	BT – 562	0--0--2	50	-	50	100	1
				620	120	260	1000	24

SEMESTER-VI

	Subject Name	Subject Code	L – T - P	ESE Marks	Sessional		Total	Credit
					CT	TA		
1.	Industrial Management	BT – 601	3-0-0	70	20	10	100	3
2.	Computer Networks	BT – 610	3-0-0	70	20	10	100	3
3.	**Departmental Elective – I** Data Warehousing & Data Mining	BT – 611	3-1-0	70	20	10	100	4
4.	Compiler Design	BT – 612	3-1-0	70	20	10	100	4
5.	Computer Graphics	BT – 613	3-0-0	70	20	10	100	3
6.	Sociology / Cyber Security	BT – 606 / BT – 615	3-0-0	70	20	10	100	3
7.	Computer Networks Lab	BT – 660	0-0-2	50	-	50	100	1
8.	Compiler Design Lab	BT – 662	0-0-2	50	-	50	100	1
9.	Computer Graphics Lab	BT – 663	0-0-2	50	-	50	100	1
10.	Data Warehousing & Data Mining Lab	BT – 661	0-0-2	50	-	50	100	1
	Total						**1000**	**24**

SEMESTER-VII

S. No.	Subject Name	Subject Code No.	L – T - P	Theory/ Lab Marks	Sessional		Total	Credit
				ESE	CT	TA		
1.	Introduction to Smart Grid	BT – 706	3--0--0	70	20	10	100	3
2.	Human Computer Interface	BT – 711	3--0--0	70	20	10	100	3
3.	Cloud Computing	BT – 712	3--1--0	70	20	10	100	4
4.	Distributed System	BT – 713	3--1--0	70	20	10	100	4
5.	Artificial Intelligence	BT – 714	3--0--0	70	20	10	100	3
6.	Distributed System Lab	BT – 763	0--0--2	50	-	50	100	1
7.	Artificial Intelligence Lab	BT – 764	0--0--2	50	-	50	100	1
8.	Industrial Training	BT – 761	0--0--3	-	-	100	100	2
9.	Project	BT – 762	0--0--6	-	-	200	200	3
				450	**100**	**450**	**1000**	**24**

SEMESTER-VIII

	Subject Name	Subject Code	L – T - P	ESE Marks	Sessional		Total	Credit
					CT	TA		
1.	Machine Learning	BT - 811	3-0-0	70	20	10	100	3
2.	Image Processing	BT - 812	3-1-0	70	20	10	100	4
3.	Data Compression	BT - 813	3-0-0	70	20	10	100	3
4.	Project	BT - 860	0-0-12	350	-	250	600	12
5.	Seminar	BT - 861	0-0-3	-	-	100	100	2
	Total			**560**	**60**	**380**	**1000**	**24**

B.Tech BT – 104	ENGINEERINGPHYSICS	3L:1T:0P	4Credits

CourseOutcome-

At the end of this course students will demonstrate the ability to:

1. To solve the classical and wave mechanics problems
2. To develop the understanding of laws of thermodynamics and their application invarious processes
3. To formulate and solve the engineering problems on Electro magnetism & Electromagnetic FieldTheory
4. To aware of limits of classical physics & to apply the ideas in solving the problems in their parent stream.

Unit	Topics	Lectures
I	**Relativistic Mechanics:** Frame of reference, Inertial & non-inertial frames, Galilean transformation,Michelson Morleyexperiment,Postulatesofspecialtheoryofrelativity,Lorentztransformations,Lengthcontraction,Time dilation, Velocity addition theorem,Variation of mass with velocity,Einstein‟smassenergyrelation,Relativisticrelationbetweenenergyand momentum,Masslessparticle.	8
II	**ElectromagneticFieldTheory:**Continuityequationforcurrentdensity,Displacement current, Modifying equation for the curl of magnetic field tosatisfycontinuityequation,Maxwell‟sequationsinvacuumandinnonconducting medium, Energy in an electromagnetic field, Poynting vector andPoynting theorem, Plane electromagnetic waves in vacuum and their transversenature.Relationbetweenelectricandmagneticfieldsofanelectromagnetic wave,Energy andmomentum carried by electromagnetic waves, Resultantpressure,Skindepth.	8
III	**QuantumMechanics:** Blackbodyradiation, Stefan‟slaw,Wien‟slaw,Rayleigh-JeanslawandPlanck‟slaw,Waveparticleduality,Matterwaves,Time-dependent andtimeindependentSchrodingerwaveequation,Borninterpretationofwavefunction,SolutiontostationarystateSchrodinger wave equation for one-Dimensional particle in a box, Comptoneffect.	8
IV	**WaveOptics:** Coherentsources, Interferenceinuniform and wedgeshaped thin films,Necessity of extendedsources,Newton's Ringsanditsapplications.Fraunhofferdiffraction at single slitandat doubleslit,absentspectra,Diffractiongrating,Spectrawithgrating,Dispersive power, Resolving power of grating, Rayleigh‟s criterion of resolution,Resolvingpowerofgrating.	8
V	**FibreOptics&Laser:**Optics**:**Introduction to fibre optics,Acceptanceangle,Numericalaperture,Normalizedfrequency,Classification of fibre, Attenuation and Dispersion in optical fibres. Laser:Absorptionofradiation,Spontaneousandstimulatedemissionof radiation, Einstein‟s coefficients, Population inversion, Various levels ofLaser,RubyLaser,He-NeLaser,Laserapplications.	8

ReferenceBooks:

1. ConceptsofModernPhysics–AurthurBeiser(McGrawHill)
2. IntroductiontoSpecialTheoryofRelativity-RobertResnick(Wiley)
3. Optics– Brijlal&Subramanian(S.Chand)
4. EngineeringPhysics:TheoryandPractical-KatiyarandPandey(WileyIndia)
5. AppliedPhysicsfor Engineers-NeerajMehta(PHILearning,New)
6. EngineeringPhysics-MalikHKandSinghAK(McGrawHill)

BT - 103	**ENGINEERRINGCHEMISTRY**	**3L:1T:0P**	**4Credits**

CourseOutcomes:At the end of this course students will demonstrate the ability tounderstand the

1. Use of different analytical instruments.
2. Measure molecular/ system properties such as surface tension, viscosity, conductance ofsolution,chloride and iron content in water.
3. Measure hardness of water.
4. Estimate the rate constant of reaction.
5. Useofdifferentanalyticalinstruments.
6. Measure molecular/ system properties such as surface tension, viscosity, conductance ofsolution,chloride and iron content in water.
7. Measure hardnessofwater.
8. Estimatethe rateconstantofreaction

Unit	**Topics**	**Lectures**
I	**AtomicandMolecularStructure:**Molecularorbital'sofdiatomicmolecules. Bandtheory of solids. Liquid crystal and its applications. Pointdefectsinsolids.StructureandapplicationsofGraphiteandFullerenes.ConceptsofNano-materialsanditsapplication.	8
II	**SpectroscopictechniquesandApplications:**Elementaryideaandsimpleapplications ofRotational,Vibrational,Ultraviolet&Visibleand Ramanspectroscopy.	8
III	**Electrochemistry:**NernstEquationandapplication,relationofEMFwiththermodynamicfunctions(ΔH,ΔFandΔS).Leadstoragebattery.**Corrosion**;causes, effectsand itsprevention.**PhaseRule**anditsapplicationtowatersystem.	8
IV	**WaterAnalysis;**Hardnessofwater,Techniquesforwatersoftening(Lime-soda,Zeolite,IonexchangeresinandReverseosmosismethod). **Fuels:**classification of fuels, Analysis of coal, Determination of calorific value(BombcalorimeterandDulong'smethods).	8
V	**Polymer;** Basic concepts of polymer-Blend and composites, Conducting andbiodegradablepolymers.Preparationandapplicationofsomeindustrially importantpolymers(Buna-S,Buna-N,Neoprene,Nylon-6, nylon-6,6 and Terylene). General methods of synthesis of organo metalliccompounds(Grignardreagent)andtheirapplications.	8

TextBooks:

1. UniversityChemistryByB.H.Mahan
2. UniversityChemistryByC.N.R.Rao
3. OrganicChemistryByI.L.Finar
4. PhysicalChemistryByS.Glasstone
5. EngineeringChemistryByS.S.Dara
6. PolymerChemistryByFreW.,Billmeyer

7. EngineeringChemistryBySatyaPrakash

BT – 105	**ENGINEERINGMATHMATICSI**	**3L:1T:0P**	**4Credits**

CourseOutcomes: At the end of this coursestudentswilldemonstratetheabilityto:

	CourseOutcome(CO)	**Bloom'sKnowledgeLevel (KL)**
CO 1	Remember the concept to fmatrices and apply for solving linear simultaneous equations.	K1&K3
CO 2	Understandtheconceptoflimit,continuityanddifferentiabilityandapplyinthestudyofRolle,s ,Lagrange,sandCauchymeanvalue theoremandLeibnitztheorems.	K2&K3
CO 3	Identifytheapplicationofpartialdifferentiationand applyforevaluatingmaxima,minima,seriesandJacobians.	K3&K5
CO 4	Illustratetheworkingmethodsofmultipleintegraland applyforfindingarea,volume,centreofmassandcentreofgravity.	K2&K3
CO 5	Remembertheconcept ofvectorandapplyfordirectionalderivatives, tangentand normalplanes.Alsoevaluateline,surfaceandvolumeintegrals.	K2&K5

COURSEOBJECTIVE:

The objective of this course is to familiarize the graduate engineers with techniques in calculus,multivariate analysis,vectorcalculus andlinearalgebra.Itaims toequip the studentswithstandard concepts and tools from intermediate to advanced level that will enable them totacklemoreadvancedlevelofmathematicsandapplicationsthattheywouldfindusefulintheirdisciplines.

The students will learn:

- To apply theknowledgeofdifferentialcalculusinthefieldofengineering.
- To deal with functions of several variables that is essential in optimizing the results of reallife problems.
- Multipleintegraltoolstodealwithengineeringproblemsinvolvingcentreofgravity,volume etc.
- To deal with vector calculus that is required in different branches of Engineering tograduate engineers.
- Theessentialtoolsofmatricesandlinearalgebra,Eigenvaluesanddiagonalization inaComprehensivemannerare required.

Unit	**Topics**	**Lectures**
I	**Matrices:**TypesofMatrices:Symmetric,Skew-symmetricandOrthogonal Matrices;ComplexMatrices,InverseandRankofmatrixusing elementary transformations, Rank-Nullity theorem; System of linearequations,Characteristicequation,Cayley-HamiltonTheoremanditsapplication,Eigenvaluesand eigenvectors;DiagonalisationofaMatrix	8
II	**DifferentialCalculus-I:**Introduction tolimits,continuityanddifferentiability,Rolle's Theorem,Lagrange'sMean valuetheorem andCauchymeanvaluetheorem,SuccessiveDifferentiation(n^{th}order derivatives), Leibnitz theorem and its application,Envelope of family ofoneandtwoparameter,Curvetracing: CartesianandPolarco-ordinates	8

III	**DifferentialCalculus-II:**Partialderivatives,Totalderivative,Euler'sTheorem for homogeneous functions, Taylor and Maclaurin's theorems forafunctionoftwovariables,MaximaandMinimaoffunctionsofseveral variables, Lagrange Method of Multipliers, Jacobians, Approximation oferrors	8
IV	**Multivariable Calculus-I: Multiple integration:** Double integral, Tripleintegral, Change of order of integration, Change of variables, **Application:**Areas and volumes, Center of mass and center of gravity (Constant andvariabledensities)	8
V	**Vector Calculus:** Vector identities (without proof), Vector differentiation:Gradient, Curl and Divergence and their Physical interpretation, Directionalderivatives. Vector Integration: Line integral, Surface integral, Volume integral, Gauss'sDivergence theorem, Green's theorem and Stoke's theorem (without proof)andtheirapplications	8

TextBooks:

1. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Publishing Company Ltd.,2008.
2. B.S.Grewal,HigherEngineeringMathematics, KhannaPublisher, 2005.
3. RK.Jain&SRK.Iyenger,AdvanceEngineeringMathematics,NarosaPublishingHouse2002.

ReferenceBooks:

1. E.Kreyszig, AdvanceEngineeringMathematics, JohnWiley&Sons, 2005.
2. PeterV.O'Neil,AdvanceEngineeringMathematics,Thomson(Cengage)Learning, 2007.
3. MauriceD.Weir,JoelHass,FrankR.Giordano,Thomas,Calculus,EleventhEdition,Pearson.
4. D. Poole,LinearAlgebra:AModernIntroduction, 2ndEdition,Brooks/Cole,2005.
5. VeerarajanT.,EngineeringMathematicsfor firstyear,McGraw-Hill, NewDelhi,2008.
6. Ray Wylie C and Louis C Barret, Advanced Engineering Mathematics, McGraw-Hill;SixthEdition.
7. P.SivaramakrishnaDasandC.Vijayakumari,EngineeringMathematics,1stEdition,PearsonEducation.
8. AdvancedEngineeringMathematics.ChandrikaPrasad,ReenaGarg,2018.
9. EngineeringMathemathics–I.ReenaGarg,2018.

CourseOutcomes: At the end of this course students will demonstrate the ability to:

	CourseOutcome(CO)	**Bloom'sKnowledgeLevel (KL)**
CO 1	Remember the concept of matrices and apply forsolvinglinear simultaneousequations.	K1&K3
CO 2	Understandtheconceptoflimit,continuityanddifferentiabilityandapplyinthestudyofRolle,s ,Lagrange,sandCauchymeanvalue theoremandLeibnitztheorems.	K2&K3
CO 3	Identifytheapplicationofpartialdifferentiationand applyforevaluatingmaxima,minima,seriesandJacobians.	K3&K5
CO 4	Illustratetheworkingmethodsofmultipleintegraland applyforfindingarea,volume,centreofmassandcentreofgravity.	K2&K3
CO 5	Remembertheconcept ofvectorandapplyfordirectionalderivatives, tangentand normalplanes.Alsoevaluateline,surfaceandvolumeintegrals.	K2&K5

	ENGINEERING MATHMATICSII	3L:1T:0P	4Credits

(Common toall B.Tech.Courses except B.Tech.,BiotechnologyandAgriculturalEngineering)

COURSEOBJECTIVE:

Theobjectiveofthiscourseistofamiliarizetheprospectiveengineerswithtechniquesinsequences,multivariateintegration,ordinaryandpartialdifferentialequationsandcomplexvariables.Itaimstoequipthestudentstodealwithadvancedlevelofmathematicsandapplications thatwouldbeessentialfortheirdisciplines.

Thestudentswilllearn:

- The effective mathematical tools for the solutions of differential equations that modelphysicalprocesses
- To apply integral calculusin variousfield of engineering.Apartfrom some otherapplicationsstudentswillhaveabasicunderstandingofBetaandGammafunctions.
- ThetoolofFourierseriesforlearningadvancedEngineeringMathematics.
- Thetoolsof differentiation of functionsof complexvariablesthatareusedinvarioustechniques dealingwithengineeringproblems.
- Thetoolsofintegrationoffunctionsofcomplexvariablesthatareusedinvarioustechnique s dealingwithengineeringproblems.

Unit	Topic	Lectures
I	**OrdinaryDifferentialEquationofHigherOrder:**Lineardifferentialequationof n^{th}orderwithconstantcoefficients,Simultaneouslineardifferentialequations,Secondorderlineardifferentialequationswithvariable coefficients, Solution by changing independent variable, Reduction of order,Normalform,Methodofvariationofparameters,Cauchy-Eulerequation.	8
II	**MultivariableCalculus-II:**IntroductionofImproperintegrals,Beta&Gamafunctionandtheirproperties,Dirichlet'sintegralanditsapplications, Applicationofdefiniteintegralstoevaluatesurfaceareasandvolumeofrevolutions.	8
III	**Sequences andSeries:**Definition of Sequenceandseries with examples,Convergence of sequence and series, Tests for convergence of series, (Ratiotest,D'Alembert'stest,Raabe'stest).Fourierseries,HalfrangeFouriersine andcosineseries.	8
IV	**Complex Variable–Differentiation:** Limit, Continuity and differentiability,Functionsofcomplexvariable,Analyticfunctions,Cauchy-Riemannequations (Cartesian and Polar form), Harmonic function, Method to findAnalyticfunctions,Conformalmapping,Mobiustransformationandtheir properties.	8
V	**ComplexVariable–Integration:**Complexintegrals,Contourintegrals,Cauchy-Integral theorem, Cauchy integral formula, Taylor's and Laurent'sseries (without proof), Singularities, Classification of Singularities, zeros ofanalyticfunctions,Residues,Methodsoffindingresidues,CauchyResidue theorem,Evaluationofrealintegralsof thetypes $\int_0^{2\pi} f(\cos\theta, \sin\theta)\, d\theta$, $\int_0^{\infty} f(\cos\theta, \sin\theta)\, d\theta$ and $\int_{-\infty}^{\infty} f(\cos\theta, \sin\theta)\, d\theta$ only.	8

TextBooks:

1. B. V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing CompanyLtd.,2008.
2. B.S.Grewal,HigherEngineeringMathematics, KhannaPublisher, 2005.
3. R.K.Jain&S.R.K.Iyenger,AdvanceEngineeringMathematics,NarosaPublishing-House,2002

ReferenceBooks:

1. E.Kreyszig,AdvanceEngineeringMathematics,JohnWiley&Sons,2005.
2. PeterV.O'Neil,AdvanceEngineeringMathematics,Thomson(Cengage)Learning, 2007.
3. MauriceD.Weir,JoelHass,FrankR.Giordano,Thomas,Calculus,EleventhEdition,Pearson.
4. G.BThomas,RLFinney, CalculusandAnalyticalGeometry,NinthEditionPearson,2002.
5. JamesWardBrownandRuelVChurchill,FourierSeriesandBoundaryValueProblems,8th Edition-McGraw-Hill
6. D. Poole,LinearAlgebra:AModernIntroduction, 2ndEdition,Brooks/Cole,2005.
7. VeerarajanT.,EngineeringMathematicsforfirstyear,McGraw-Hill,NewDelhi,2008.
8. CharlesERobertsJr,OrdinaryDiffrentialEquations,Application,ModelandComputing,CRCPress T&F Group.
9. Ray WylieC andLouis C Barret, AdvancedEngineeringMathematics,6th Edition,McGraw-Hill.
10. JamesWardBrownandRuelVChurchill,ComplexVariableandApplications,8thEdition,McGraw-Hill.
11. P. Sivaramakrishna Das and C. Vijayakumari, Engineering Mathematics, 1st Edition,PearsonIndiaEducationServices Pvt.Ltd.
12. AdvancedEngineeringMathematicsByChandrikaPrasad,ReenaGargKhannaPublishingHouse,Delhi.

COURSEOUTCOME: Aftercompletionofthecoursestudentwillbeableto

	CourseOutcome (CO)	**Bloom's KnowledgeLevel(KL)**
Attheendofthis course,thestudentswillbeableto:		
CO 1	Understandtheconceptofdifferentiationandapplyforsolvingdifferential equations.	K2&K3
CO 2	Remember the concept of definite integral and apply for evaluating surfaceareasandvolumes.	K1,K3& K5
CO 3	Understand the concept of convergence of sequence and series. AlsoevaluateFourierseries	K2&K5
CO 4	Illustrate the working methods of complex functions and apply for findinganalyticfunctions.	K3
CO 5	Apply the concept of complex functions for finding Taylor's series,Laurent'sseriesandevaluationofdefiniteintegrals.	K3&K5

BT – 254	PHYSICSLAB	0L:0T:2P	1Credit

SUGGESTIVELISTOFEXPERIMENTS:

Group A

1. TodeterminethewavelengthofsodiumlightbyNewton‟sringexperiment.
2. Todeterminethewavelengthofdifferentspectrallinesofmercurylightusingplanetransmissiongrating.
3. Todeterminethespecificrotationofcanesugarsolutionusingpolarimeter.
4. Todeterminethefocallengthofthecombinationoftwolensesseparatedbyadistanceandverifytheformulaforthefocallengthofcombinationoflenses
5. Tomeasureattenuationinanopticalfiber.
6. TodeterminethewavelengthofHe-Nelaserlightusingsingleslitdiffraction.
7. TostudythepolarizationoflightusingHe-Nelaserlight.
8. Todeterminethewavelengthofsodiumlightwiththehelpof Fresnel‟sbi-prism.
9. Todeterminethecoefficientofviscosityofagivenliquid.
10. Todeterminethevalueofaccelerationduetogravity(g)usingcompoundpendulum.

GroupB

1. Todeterminetheenergyband gapofagivensemiconductormaterial.
2. TostudyHallEffectanddetermineHallcoefficient,carrierdensityandmobilityofagivensemiconductor materialusingHalleffectsetup.
3. To determine the variation of magnetic field with the distance along the axis of acurrentcarryingcoilandestimatetheradius ofthe coil.
4. ToverifyStefan‟slawbyelectricmethod.
5. To determine resistance per unit length and specific resistance of a givenresistanceusingCareyFoster's Bridge.
6. To studytheresonanceconditionofaseriesLCRcircuit.
7. Todeterminetheelectrochemicalequivalent(ECE)ofcopper.
8. Tocalibratethegivenammeterandvoltmeterbypotentiometer.
9. Todrawhysteresis(B-Hcurve)ofaspecimenintheformofatransformerandtodetermineits hysteresisloss.
10. Tomeasurehighresistancebyleakagemethod.

ListofExperiments: Anytenexperiments(atleastfourfromeachgroup)withvirtuallink

	GroupA	VirtualLabLink	AlternateLabLink
1	To determinethewavelength ofsodium light by Newton's ringexperiment.	https://vlab.amrita.edu/?sub=1&brch=189&sim=335&cnt=1	http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/engg_physics/labs/exp1/simulation/simulator4.html?medium=1
2	Todeterminethewavelengthofdifferentspectrallinesofmercurylightusing planetransmissiongrating.	http://vlab.amrita.edu/?sub=1&brch=281&sim=334&cnt=1	
3	To determine the specific rotation ofcanesugarsolutionusingpolar		http://vlabs.iitb.ac.in/vlabs-dev/labs/physics-basics/labs/cane-sugar-rotation-iitk/simulation.html

	imeter		
4	To determine the focal length of thecombinationoftwolensesepara tedbyadistance and verify the formula for thefocallength ofcombinationoflenses.		http://vlabs.iitb.ac.in/vlabs-dev/labs/physics-basics/labs/focal-length-measurement-iitk/simulation.html

5	To measure attenuation in an opticalfiber.	http://vlab.amrita.edu/index.php?sub=59&brch=269&sim=1369&cnt=2873	http://vlabs.iitb.ac.in/vlabs-dev/labs/physics-basics/labs/numerical-aperture-measurement-iitk/simulation.html
6	TodeterminethewavelengthofHe-Nelaserlightusingsingleslitdiffraction.	http://vlab.amrita.edu/index.php/index.php?sub=1&brch=189&sim=334&cnt=1	https://youtu.be/0qIN2qHCvvs (Laserdiffractiongrating)
7	Tostudythepolarizationoflightusing He-Nelaserlight.		http://vlabs.iitb.ac.in/vlabs-dev/labs/physics-basics/labs/he-ne-laser-polarization-iitk/simulation.html
8	Todeterminethewavelengthofsodiumlightwiththehelpof Fresnel's bi-prism	http://vlabs.iitb.ac.in/vlabs-dev/labs/physics-basics/labs/fresnel-biprism-iitk/simulation.html	
9	Todeterminethecoefficientofviscosityofagivenliquid.	https://amrita.olabs.edu.in/?sub=1&brch=5&sim=225&cnt=2	
10	Todeterminethevalueofacceleration duetogravity(g)usingcompoundpendulum.	http://vlab.amrita.edu/?sub=1&brch=280&sim=210&cnt=2	
	GroupB		
1	Todeterminetheenergybandgap ofagivensemiconductormaterial.	http://vlabs.iitb.ac.in/vlabs-dev/labs/physics-basics/labs/energy-band-gap-iitk/simulation.html	http://vlabs.iitb.ac.in/vlabs-dev/labs/physics-basics/labs/energy-band-gap-iitk/simulation.html
2	To study Hall effect and determine Hallcoefficient, carrier density and mobilityof a given semiconductor material usingHalleffectsetup.	https://vlab.amrita.edu/?sub=1&brch=282&sim=879&cnt=1	https://youtu.be/lUugrqMOY7E(HallEffect)
3	To determine the variation of magneticfieldwiththedistancealongtheaxisofacurrentcarryingcoilandestimatethe radiusofthecoil.	http://vlab.amrita.edu/?sub=1&brch=192&sim=972&cnt=1	https://youtu.be/v2B0QyW8XJ0(VariationofMagneticFieldalongtheaxis ofcircularcoilcarrying current)
4	Toverify Stefan'slawbyelectricmethod..	http://vlabs.iitb.ac.in/vlabs-dev/vlab_bootcamp/bootcamp/vlabs_recbanda/labs/exp1/index.html	https://youtu.be/qyFQ31s-bAw(Stefans lawverification)

5	Todetermineresistanceperunit lengthand specific resistance of a givenresistanceusingCareyFoster'sBridge.	https://vlab.amrita.edu/?sub=1&brch=192&sim=346&cnt=1	http://vlabs.iitb.ac.in/vlabs-dev/labs/physics-basics/labs/carey-foster-bridge-iitk/simulation.html
6	Tostudytheresonancecondition ofaseries LCRcircuit.	https://vlab.amrita.edu/?sub=1&brch=75&sim=330&cnt=1	
7	Todeterminetheelectrochemicalequivalent (ECE)ofcopper.	http://learnphysics-dhruv.blogspot.com/2015/03/copper-voltameter-to-determine-electro.html	https://youtu.be/drV2nbDjR1k (ECEofCopperexperiment)
8	To calibrate the given ammeter andvoltmeterbypotentiometer.		
9	To drawhysteresis(B-Hcurve)ofaspecimenintheformofa transformer andtodetermineitshysteresisloss.		
10	Tomeasurehigh resistancebyleakagemethod	http://vlabs.iitb.ac.in/vlabs-dev/labs/physics-basics/labs/carey-foster-bridge-iitk/simulation.html	

ReferenceBooks

1. PracticalPhysics- K.K.Dey&B.N.Dutta(KalyaniPublishersNewDelhi)
2. EngineeringPhysics-TheoryandPractical-Katiyar&Pandey(WileyIndia)
3. EngineeringPhysicsPractical-SKGupta(KrishnaPrakashanMeerut)

CourseOutcomes:

1. To determine the wavelength of sodium light by Newton‟sringexperiment
2. Todeterminethewavelengthofsodiumlightwiththehelpof Fresnel‟sbi-prism
3. Todeterminethevariationofmagneticfieldwiththedistancealongtheaxisofacurrent carryingcoilandestimatetheradiusofthecoil.
4. To drawhysteresis(B-H curve) of a specimenin theform of atransformerandtodetermineitshysteresisloss.

BT – 253	**CHEMISTRYLAB**	**0L:0T:2P**	**1Credit**

SUGGESTIVELISTOFEXPERIMENTS:

LISTOFEXPERIMENTS

1. Determinationofalkalinityinthegivenwater sample.
2. DeterminationoftemporaryandpermanenthardnessinwatersampleusingEDTA.
3. DeterminationofironcontentinthegivensolutionbyMohr'smethod.
4. Determinationofviscosityofgivenliquid.
5. Determinationofsurfacetensionofgivenliquid.
6. Determinationofchloridecontentinwater sample.
7. Determinationofavailablechlorineinbleachingpowder.
8. DeterminationofpHbypH-metrictitration.
9. PreparationofPhenol-formaldehydeandUrea-formaldehyderesin.
10. DeterminationofCellconstantandconductanceofasolution.
11. Determinationofrateconstant ofhydrolysisofesters.
12. VerificationofBeer'slaw.

CourseOutcomes:Attheendofthiscoursestudentswilldemonstrate theabilityto:

1. Useofdifferentanalyticalinstruments.
2. Measuremolecular/systempropertiessuchassurfacetension,viscosity,
3. Measure conductance of solution, chloride and iron content in water, hardnessofwater.
4. Estimatetherateconstantofreaction.

BT – 201	**ELECTRICALENGINEERING**	**3L:0T:0P**	**3Credits**

Unit	Topics	Lectures
I	**DC Circuits :** Electrical circuitelements (R, L and C),Concept of activeand passive elements, voltage and current sources, concept of linearity andlinearnetwork,unilateralandbilateralelements,Kirchhoff'slaws,Loop andnodalmethodsofanalysis,Star-deltatransformation,Superpositiontheorem,Thevenintheorem,Nortontheorem.	8
II	**Steady- State Analysis of Single Phase AC Circuits:** Representation ofSinusoidalwaveforms–Averageandeffectivevalues,Form andpeakfactors, Concept of phasors, phasor representation of sinusoidal varyingvoltage andcurrent. Analysis of single phase AC Circuits consisting of R, L, C, RL, RC, RLCcombinations(SeriesandParallel),Apparent,active&reactivepower,Power factor, power factor improvement. Concept of Resonance in series &parallelcircuits,bandwidthandqualityfactor.Threephasebalancedcircuits, voltageandcurrentrelations instaranddeltaconnections.	8
III	**Transformers:** Magneticmaterials, BH characteristics,ideal and practicaltransformer,equivalentcircuit,lossesintransformers,regulationand efficiency.Auto-transformerandthree-phasetransformerconnections.	8
IV	**Electricalmachines:DCmachines:**Principle&Construction,Types,EMF equation ofgeneratorandtorque equation of motor, applications ofDCmotors(simplenumericalproblems) **ThreePhaseInductionMotor:**Principle&Construction,Types,Slip-torque characteristics, Applications (Numerical problems related to slip only)**Single Phase Induction motor:** Principle of operation and introduction tomethods ofstarting,applications. **Three Phase Synchronous Machines:** Principle of operation of alternatorandsynchronousmotorandtheirapplications.	8
V	**Electrical Installations:** Components of LT Switchgear: Switch Fuse Unit(SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Importance ofearthing.TypesofBatteries,ImportantcharacteristicsforBatteries.Elementa rycalculationsforenergyconsumptionandsavings,battery backup.	8

TextBook:

1. D.P.KothariandI.J.Nagrath,"BasicElectricalEngineering",McGrawHill.
2. D.C. Kulshreshtha,"BasicElectricalEngineering",McGrawHill.
3. RituSahdev,"BasicElectricalEngineering",KhannaPublishingHouse.
4. S. Singh, P.V. Prasad, "Electrical Engineering: Concepts andApplications"Cengage

ReferenceBooks:

1. E.Hughes,"ElectricalandElectronicsTechnology",Pearson,2010.
2. L.S.Bobrow, "FundamentalsofElectricalEngineering",OxfordUniversityPress.
3. V.D.Toro,"ElectricalEngineeringFundamentals",PearsonIndia.

SpokenTutorial(MOOCs):OpenSourceSpicecircuitSimulatorSoftware

1. AC DC CircuitAnalysisusingNgSpice,OpenSourceSpice circuit Simulator Software

CourseOutcomes: Attheendofthis coursestudentswilldemonstratetheabilityto:

1. Applytheconcepts ofKVL/KCLandnetworktheoremsinsolvingDCcircuits.
2. Analyzethesteady statebehaviorof singlephaseandthreephaseACelectricalcircuits.
3. Identify the application areas of a single phase twowinding transformer as well as anauto transformer and calculate their efficiency. Also identify the connections of a threephase transformer.
4. Illustrate the working principles of induction motor, synchronous machine as well as DCmachine andemploythemindifferentareaofapplications.
5. Describe the components of low voltage electrical installations and perform elementarycalculationsforenergyconsumption.

EMERGINGDOMAININELECTRONICS ENGINEERING (BT – 208)	3L:0T:0P	3Credits

Unit	Topics	Lectures
I	**SemiconductorDiode**:Depletionlayer,V-Icharacteristics,idealandpracticalDiodes,DiodeEquivalentCircuits,ZenerDiodesbreakdownmechanism(Zenerand avalanche)	3
	DiodeApplication: DiodeConfiguration, HalfandFullWaverectification, Clippers,Clampers,Zenerdiode asshuntregulator, Voltage-MultiplierCircuits	3
	SpecialPurposetwoterminalDevices: Light-EmittingDiodes,PhotoDiodes, VaractorDiodes,TunnelDiodes,Liquid-CrystalDisplays.	2
II	**BipolarJunctionTransistor:**TransistorConstruction,Operation,Amplificationaction.CommonBase,CommonEmitter,CommonCollectorConfiguration	4
	FieldEffectTransistor: Construction andCharacteristicof JFETs.TransferCharacteristic. MOSFET(MOS)(DepletionandEnhancement)Type,TransferCharacteristic.	4
III	**Operational Amplifiers:**Introduction,Op-AmpBasic,Practical Op-Amp Circuits(InvertingAmplifier, Non-invertingAmplifier, UnitFollower, Summing Amplifier,Integrator, Differentiator).Differential and Common-Mode Operation, Comparators.**IntroductionofIoTSystem,**ComponentsofIoTsystem:Microprocessorand	4
	Microcontroller,BluetoothTechnology,Wi-FiTechnology,ConceptofNetworking, SensorNodes,conceptofcloud.	4
IV	**DigitalElectronics:**Numbersystem&representation.IntroductionofBasicand UniversalGates,usingBooleanalgebrasimplificationofBooleanfunction.KMap Minimizationupto6Variable.	6
	IntroductionToICTechnology: SSI,MSI,LSI,VLSIIntegratedCircuits.	2
V	**Fundamentals of Communication Engineering:** Basics of signal representation andanalysis, Electromagnetic spectrum Elements of a Communication System, Need ofmodulationandtypicalapplications,Fundamentalsofamplitudemodulationanddemodulationtechniques.	4
	Introduction to Data Communications: Goals and applications of Networks.**General Model of Wireless Communication:** Evolution of mobile radiocommunicationfundamentals,GPRS,GSM,CDMA.ElementsofSatellite &Radar Communication,	4

TextBooks:

1. RobertL.Boylestand/LouisNashelsky"ElectronicDevicesandCircuitTheory",PearsonEducation.
2. HSKalsi,"ElectronicInstrumentation",McGrawPublication
3. GeorgeKennedy,"ElectronicCommunicationSystems",McGrawPublication
4. DavidA.Bell,"ElectronicDevicesandCircuits",OxfordUniversityPress.
5. JacobMillman,C.C.Halkias,StayabrataJit,"ElectronicDevicesandCircuits", McGrawHill
6. DavidA.Bell,Electronic Instrumentation and Measurements,LatestEdition,OxfordUniversityPressIndia

CourseOutcomes:Attheendofthiscoursestudentswilldemonstrate theabilityto:

1. UnderstandtheconceptofPNJunctionanddevices.
2. Understandtheconceptof BJT,FETandMOFET.

3. UnderstandtheconceptofOperationalamplifier
4. Understandtheconceptofmeasurementinstrument.
5. Understandtheworkingprincipleofdifferenttypeofsensorandtheiruses.
6. UnderstandtheconceptofIoTsystem&UnderstandthecomponentofIoTsystem

BT – 252	**PROGRAMMINGFORPROBLEMSOLVING**	**3L:0T:0P**	**3Credits**

Unit	Topics	Lectures
I	**Introduction to Programming: Introduction to components of acomputersystem:**Memory,processor,I/ODevices,storage,operating system, Concept of assembler, compiler, interpreter, loaderandlinker. **Idea of Algorithm:**Representation of Algorithm,Flowchart, Pseudocodewithexamples,Fromalgorithmstoprograms,sourcecode. **Programming Basics:** Structure of C program: writing and executing thefirstC program,Syntax andlogical errors in compilation, objectandexecutablecode.ComponentsofClanguage:StandardI/OinC, Fundamentaldatatypes,Variablesandmemorylocations,Storageclasses.	8
II	**Arithmeticexpressions&ConditionalBranching:Arithmeticexpressions and precedence:** Operators and expression using numericandrelationaloperators,mixedoperands,typeconversion,logicaloperators,bit operations, assignment operator, operator precedenceandassociatively. **Conditional Branching:** Applying if and switch statements, nesting ifandelse,useofbreakanddefaultwithswitch.	8
III	**Loops & Functions: Iteration and loops:** use of while, do while andforloops,multipleloopvariables,useofbreakandcontinuestatements. **Functions:**Introduction,typesoffunctions,functions witharray,passing parameterstofunctions,callbyvalue,callbyreference,recursivefunctions.	8
IV	**Arrays&BasicAlgorithms:Arrays:**Arraynotationandrepresentation, manipulating array elements, using multi dimensionalarrays. Character arrays and strings, Structure, union,enumerateddatatypes,Arrayofstructures,Passingarraystofunctions. **BasicAlgorithms:**Searching&BasicSortingAlgorithms(Bubble, Insertion and Selection), Finding roots of equations, Notion of order ofcomplexity.	8
V	**Pointer&FileHandling:Pointers:**Introduction,declaration,applications,Introductiontodynamicmemoryallocation(malloc,calloc,realloc,free), Useof pointersinself-referentialstructures,notionoflinkedlist(noimplementation) **Filehandling:**FileI/Ofunctions,Standard C preprocessors,definingandcallingmacros,command-line arguments.	8

TextBooks:

1. Schum‟sOutlineof ProgrammingwithCbyByronGottfried,McGraw-Hill
2. TheCprogrammingbyKernighanBrainW. andRitchieDennisM.,PearsonEducation.
3. ComputerBasicsandCProgrammingbyV.Rajaraman,PHILearningPvt.Limited,2015.
4. ComputerConceptsandProgramminginC,R.S.Salaria, KhannaPublishingHouse
5. ComputerConceptsandProgramminginC,EBalaguruswami,McGrawHill
6. ComputerScience-AStructuredProgrammingApproachUsingC,byBehrouzA.Forouzan,Richard

F.Gilberg,Thomson,ThirdEdition,Cengage Learning-2007.

7. LetUsCByYashwantP.Kanetkar.
8. ProblemSolvingandProgramDesigninC,byJeri R.Hanly,ElliotB.Koffman,PearsonAddison-Wesley,2006.
9. ProgramminginCbyKochanStephenG.PearsonEducation– 2015.
10. ComputerConceptsandProgramminginCbyD.S.YadavandRajeevKhanna,NewAgeInternationalPublication.
11. ComputerConceptsandProgrammingbyAnami,AngadiandManvi,PHIPublication.
12. ComputerConceptsandProgramminginCbyVikasGupta, WileyIndiaPublication
13. ComputerFundamentalsandProgramming inC.ReemaThareja,OxfordPublication
14. ProblemSolving andProgramminginC,R.S.Salaria,KhannaPublishingHouse.

1. algorithmsforarithmeticandlogicalproblems.
2. Totranslatethealgorithmstoprograms&execution(inClanguage).
3. Toimplementconditionalbranching,iterationandrecursion.
4. Todecomposeaproblemintofunctionsandsynthesizeacompleteprogramusingdivide andconquerapproach.
5. Tousearrays,pointersandstructurestodevelopalgorithmsandprograms.

BT-(missing code)	**FUNDAMENTALOFMECHANICAL ENGINEERINGANDMECHATRONICS**	**3L:0T:0P**	**3Credits**

Course Outcomes:

The students will be ableto		**Blooms Taxonomy**
CO1	Understandtheconceptofstressandstrain,factorofsafety,beams	K2
CO2	Understandthebasiccomponentandworkingofinternal combustionengines,electricandhybridvehicles,refrigeratorandheatpump,air-conditioning.	K2
CO3	Understandfluidproperties,conservationlaws,hydraulicmachineryusedinreall ife.	K2
CO4	Understandtheworkingprincipleofdifferentmeasuringinstrumentwith theknowledgeofaccuracy,errorandcalibration,limit,fit,toleranceandcontrolsy stem.	K2
CO5	Understand conceptofmechatronicswiththeiradvantages,scopeandIndustrial application,thedifferenttypesofmechanicalactuationsystem, thedifferent typesofhydraulicandpneumaticsystems.	K2
CO6	Applyconceptsofstrengthofmaterialforsafedesign,refrigerationfor calculationofCOP,conceptsoffluidmechanicsinreallife,conceptsofmeasurem entsinproductionsystems.	K3

Unit	Topics	Lectures
I	**UnitI:IntroductiontoMechanicsofSolid:** NormalandshearStress,strain,Hookes'law,Poisson'sratio,elasticconstants and their relationship, stress-strain diagram for ductile and brittlematerials,factorofsafety.Basic Numericalproblems. Types of beams under various loads, Statically Determinate Beams, Shearforceandbendingmomentinbeams,Shearforceandbendingmoment diagrams, Relationships between load, shear and bending moment. BasicNumericalproblems.	8
II	**IntroductiontoICEnginesandRAC:** **IC Engine:** Basic Components, Construction and Working of Two strokeand four stroke SI & CI engine, merits and demerits, scavenging process;Introductiontoelectric,andhybridelectricvehicles. **Refrigeration:**Itsmeaningandapplication,unitofrefrigeration;Coefficientof performance,methodsofrefrigeration,constructionandworking of domestic refrigerator, concept of heat pump. Formula basednumericalproblems oncoolingload. **Air-Conditioning:**Itsmeaningandapplication,humidity,drybulb,wet bulb, and dew point temperatures, comfortconditions, construction andworkingofwindowairconditioner.	10
III	**Introduction toFluidMechanicsandApplications:** **Introduction:** Introduction: Fluids properties, pressure, density, dynamicand kinematic viscosity, specific gravity, Newtonian and Non-Newtonianfluid,Pascal'sLaw,ContinuityEquation,Bernaulli'sEquationandi tsapplications,BasicNumericalproblems. Working principles of hydraulic turbines & pumps and their classifications,hydraulicaccumulators, hydraulicliftandtheirapplications.	7
IV	**Measurements and Control System:** Concept of Measurement, Error inmeasurements, Calibration, measurements of pressure, temperature, massflow rate, strain, force and torques; Concept of accuracy, precision andresolution,BasicNumericalproblems. System of Geometric Limit, Fit, Tolerance and gauges, Basic Numericalproblems. **Control System Concepts:** Introduction to Control Systems, Elements ofcontrolsystem,BasicofopenandclosedloopcontrolwithexampleExample.	8
V	**IntroductiontoMechatronics:**Evolution,Scope,Advantagesanddisadvanta gesof Mechatronics,Industrialapplicationsof Mechatronics,Introduction to autotronics, bionics, and avionics and their applications.Sensors and Transducers: Types of sensors, types of transducers and theircharacteristics. **Overview of Mechanical Actuation System** – Kinematic Chains, Cam,TrainRatchetMechanism,Gearsanditstype,Belt,Bearing, **HydraulicandPneumaticActuationSystems:**Overview:PressureControlV alves,Cylinders,DirectionControlValves,RotaryActuators,Accumulators,A mplifiers,and PneumaticSequencing Problems.	10

ReferenceBooks:

1. BasicMechanicalEngineering,GShanmugam,SRavindran,McGrawHill
2. BasicMechanicalEngineering,MPPooniaandSCSharma, Khanna Publishers
3. Mechatronics:Principles, ConceptsandApplications,NitaigourMahalik,McGrawHill
4. Mechatronics, As per AICTE: Integrated Mechanical Electronic Systems,K.P.Ramachandran,G.K.Vijayaraghavan,M.S.Balasundaram,WileyIndia
5. MechanicalMeasurements&Control,Dr.D.S.Kumar.MetropolitanBookCompany
6. FluidMechanicsandHydraulicMachines,MaheshKumar,PearsonIndia

BT – 255	ENGINEERINGGRAPHICSANDDESIGNLAB	**0L:1T:2P**	**1Credits**

CourseOutcomes: Attheendofthis coursestudents willdemonstratetheabilityto:

1. Understandingofthevisualaspectsofengineeringdesign
2. Understandingofengineering graphicsstandardsandsolidmodelling
3. Effectivecommunicationthroughgraphics
4. Applyingmodernengineering toolsnecessaryfor engineeringpractice
5. Applingcomputer-aidedgeometricdesign
6. AnalysisofIsometricviews

Creatingworkingdrawings

Unit	Topics	Lectures
I	**Introduction to Engineering Drawing, Orthographic Projections:** Principles of EngineeringGraphics and their significance,usage of Drawing instruments, lettering, Scales–Plain andDiagonal Scales. Principles of Orthographic Projections – Conventions – Projections of PointsandLinesinclinedtobothplanes;ProjectionsofplanesinclinedPlanes– AuxiliaryPlanes	8
II	**Projections and Sections of Regular Solids:** Sections in lined to both the Planes – AuxiliaryViews; Simple annotation, dimensioning and scale. Floor plans the include: windows, doors andfixtures such as WC, Both, sink, shower, etc. Prism, Cylinder, Pyramid, Cone–Auxiliary Vies:DevelopmentofsurfacesofRightRegularSolids –Prism, Pyramid, CylinderandCone.	8
III	**Isometric Projections:** Principles of Isometric projection – Isometric Scale, Isometric Views,Conventions; Isometric Views of lines, Planes Simple and compound Solids; Conversion ofIsometricViewstoOrthographicViewsandVice-versa,Conversions.	8

IV	**ComputerGraphics:**Listingthecomputertechnologiestheimpactongraphicalcommunication, Demonstrationknowledge of the theory ofCADsoftware[suchas:TheMenuSystem,Tollbars(Standard,ObjectProperties,Draw,ModifyandDimension),DrawingArea(Background,Crosshairs,CoordinateSystem),Dialogboxesandwindows,Shortcutmenus(ButtonBars),TheCommandLine(whereapplicable),TheStatusBar,Different methods of zoom as used in CAD, Select and erase objects: Isometric Views of lines,Planes,SimpleandcompoundSolids]; Set up of the drawing page and the printer, including scale settings, Setting up of units anddrawinglimits;ISOandANSIstandardsforcoordinatedimensioningandtoleranci ng;Orthographic constraints, Snap to objects manually and automatically; Producing drawings byusing various coordinate input entry methods to draw straight lines, Applying various ways ofdrawingcircles: Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers,layers to create drawings, Create, edit and use customized layers; Changing line lengths throughmodifyingexistinglines(extend/lengthen);Printingdocumentstopaterusingtheprintcommand:orthographicprojectiontechniques;Drawingsectionalviewsofcompositerightregular geometric solids and project the true shape of the sectioned surface; Drawing annotation,Computer-aided design (CAD) software modelling of parts and assemblies. Parametric and non-parametricsolid,surface,andwireframemodels.Parteditingandtwo-dimensionaldocumentationofmodels.Planarprojectiontheory,includingsketchingofperspective, isometric, Multiview, auxiliary, and section views. Spatial visualization exercises Dimensioningguidelines,tolerancingtechniques; dimensioningandscalemultiviewsofdwelling.	8
V	**Demonstrationofasimpleteamdesignproject:**Geometryandtopologyofengineeredcomponents:creationofengineeringmodelsandtheirpresentationinstandard2Dblueprintformandas3Dwire-frameandshadedsolids;meshedtopologiesforengineeringanalysisandtool-pathgenerationforcomponentmanufacture;geometricdimensioningandtolerancing;Useofsolid-modellingsoftwareforcreatingassociativemodelsatthecomponentandassemblylevels;floorplansthatinclude:windows,doors,and fixturessuchasWC,bath,sink,shower,etc.Applyingcolorcodingaccordingtobuildingdrawingpractice;Drawingsectional elevationshowing foundation toceiling; IntroductiontoBuildingInformationModeling(BIM).	8

TextBooks:

1. Bhatt N.D.,PanchalV.M.&IngleP.R. (2014),EngineeringDrawing,CharotarPublishingHouse.
2. Shah,M.B.&Rana B.C.(2008),EngineeringDrawingandComputerGraphics,PearsonEducation
3. AgrawalB.&AgrawalC.M.(2012),EngineeringGraphics,McGrawPublication
4. EngineeringGraphics&Design,A.P.Gautam&PradeepJain,KhannaPublishingHouse
5. Narayana,K.L.&PKannaiah(2008),TextbookonEngineeringDrawing,ScitechPublishers.(Correspondingsetof)CAD SoftwareTheoryandUserManuals.

Mechanical Workshop Lab	BT – 156 (interchange the position)	**0L:1T:2P**	**1Credit**

SUGGESTIVE LIST OF EXPERIMENTS:

Course Objective (Heading must):

Thestudentswillbeableto		**BloomsTaxonomy**
CO1	Usevariousengineeringmaterials,tools,machinesandmeasuringequipments.	**K3**
CO2	Performmachineoperations inlatheandCNC machine.	**K3**
CO3	Performmanufacturing operationsoncomponentsinfittingandcarpentryshop.	**K3**
CO4	Performoperationsinwelding,moulding,castingandgascutting.	**K3**
CO5	Fabricateajobby3Dprintingmanufacturingtechnique	**K3**

S. No.	**MechanicalWorkshop**	**Duration**
1	**IntroductiontoMechanicalworkshopmaterial,toolsandmachines**	
	Tostudylayout,safetymeasuresanddifferentengineeringmaterials(mild steel, mediumcarbonsteel,highcarbonsteel,highspeedsteelandcastironetc)usedinworkshop.	**3Hours**
	To study and use of different types of tools, equipments, devices & machinesusedinfitting,sheetmetalandweldingsection.	
	Todeterminetheleastcountofverniercaliper,vernierheightgauge, micrometer(Screwgauge)andtakedifferentreadingovergivenmetallicpiecesusingtheseinstruments.	
2	**Machine shop**	
	Demonstrationofworking,constructionandaccessoriesforLathemachine	**3Hours**
	PerformoperationsonLathe-Facing,PlaneTurning,stepturning,taperturning,threading,knurlingandparting.	
3	**Fitting shop**	
	1. Practicemarkingoperations. 2. Preparation of U or V -Shape Male Female Work piece which contains:Filing,Sawing,Drilling,Grinding.	**3Hours**
4	**CarpentryShop**	
	StudyofCarpentryTools,Equipmentanddifferentjoints.	
	MakingofCrossHalflapjoint,HalflapDovetail jointandMortiseTenonJoint	**3Hours**
5	**WeldingShop**	
	IntroductiontoBIstandardsandreadingofweldingdrawings.	

	Practice of Making following operationsButtJoint LapJointTIG WeldingMIG Welding	**6Hours**
6	**MouldingandCastingShop**	
	IntroductiontoPatterns,patternallowances,ingredientsofmouldingsandandmeltingfurnaces. Foundrytoolsandtheirpurposes DemoofmouldpreparationandAluminumcastingPractice–StudyandPreparationofPlasticmould	**6Hours**
7	**CNC Shop**	
	Study of main features and working parts of CNC machine and accessoriesthatcanbeused. PerformdifferentoperationsonmetalcomponentsusinganyCNCmachines	**6Hours**
8	**Toprepareaproduct using 3Dprinting**	**3Hours**

ReferenceBooks:

1. WorkshopPractice,HSBawa,McGrawHill
2. MechanicalWorkshopPractice,KCJohn,PHI
3. WorkshopPracticeVol1,andVol2,byHazraChoudhary,MediapromotersandPublications
4. CNCFundamentalsandProgramming,ByP.M.Agrawal,V.J.Patel,Charotar Publication.

BT – 258	**ENGLISHLAB**	**0L:1T:2P**	**1Credit**

CourseObjectives:

1. TofacilitatesoftwarebasedlearningtoprovidetherequiredEnglishLanguageproficiencytostudents.
2. To acquaintstudents with specific dimensions of communication skillsi.e.Reading,Writing,Listening,ThinkingandSpeaking.
3. Totrainstudentstousethecorrectanderror-freewritingbybeingwellversedinrulesofEnglishgrammar.
4. Tocultivaterelevanttechnicalstyleofcommunicationandpresentationattheirworkplaceandalsoforacademicuses.
5. Toenablestudentstoapplyitforpracticalandoralpresentationpurposesbybeinghonedupinpresentationskills andvoice-dynamics.

SYLLABUS:PROFESSIONALCOMMUNICATIONLABSHALLHAVETWOPARTS:

Courseoutcome: Attheendofthiscoursestudentswilldemonstratetheability:

1. Students will be enabled to understand the basic objective of the course by being acquaintedwith specific dimensions of communication skills i.e. Reading, Writing, Listening, ThinkingandSpeaking.
2. Students would be able to create substantial base by the formation of strong professionalvocabularyforitsapplicationatdifferentplatformsandthroughnumerousmodesasComprehension,reading,writingandspeakingetc.
3. Students will apply it at their work place for writing purposes such as Presentation/officialdrafting/administrative communication and use it for document/project/report/research paperwriting.
4. Students will be made to evaluate the correct and error-free writing by being well-versed inrulesofEnglishgrammarandcultivaterelevanttechnicalstyleofcommunication&presentationattheirworkplace andalsoforacademicuses.
5. Students will apply itfor practical and oral presentation purposes by being honed up inpresentationskillsandvoice-dynamics.Theywillapplytechniquesfordevelopinginterpersonalcommunicationskillsandpositiveattitudeleadingtotheirprofessionalcompetence.

Interactiveand CommunicativePracticalwithemphasisonOralPresentation/SpokenCommunicationbasedonInternationalPhoneticAlphabets (LP.A.)

LISTOFPRACTICALS

1. GroupDiscussion:Practical basedonAccurateandCurrentGrammaticalPatterns.
2. Conversational Skills for Interviews under suitable Professional Communication Lab conditionswithemphasis onKinesics.
3. CommunicationSkillsforSeminars/Conferences/WorkshopswithemphasisonParalinguistic /Kinesics.
4. PresentationSkillsfor TechnicalPaper/ProjectReports/ProfessionalReportsbased onproperStress andIntonationMechanics
5. Official/PublicSpeakingbasedonsuitableRhythmicPatterns.
6. ThemePresentation/KeynotePresentationbasedoncorrectmethodologiesargumentation
7. IndividualSpeechDelivery/ConferencingwithskillstodefendInterjections/Quizzes.
8. Argumentative Skills/Role PlayPresentationwithStressandIntonation.
9. ComprehensionSkillsbasedonReadingandListeningPractical'sonamodelAudio

1. **ComputerassistedsoftwarebasedLanguageLearning:**Softwarebasedself-guidedlearningtoprovidetherequiredEnglishlanguageproficiencytostudentsfromanemployability andcareerreadinessstandpoint.ThesoftwareshouldaligntoCommonEuropean Framework of Reference for Languages (CEFR) and deliver a CEFR level – B2uponcompletion.
2. **Interactive Communication Skills:** Students should practice the language with variety ofactivities and exercises based on employability skills as startup presentations, GD, Mockinterview,Videoportfolio,Extempore,Roleplay,JustAMinute(JAM)etc.

Suggestedsoftware:

- ***OxfordAchiever***byOxfordUniversityPress.
- ***CambridgeEnglishEmpower***byCambridgeUniversityPress.
- ***MePro.***byPearsonIndia EducationServices Pvt.Ltd.
- ***NewInteractions***byMcGraw-HillIndia.

ReferenceBooks:

1. WordPowerMadeEasybyNormanLewis,W.R.GoyalPub. &Distributors, 2009,Delhi.
2. Manual of Practical Communication by L.U.B. Pandey; A.I.T.B.S. Publications India Ltd.;KrishanNagar,2013,Delhi.
3. ACourseinPhoneticsand SpokenEnglish,Sethi&Dhamija:,Prentice Hall
4. EnglishPronouncingDictionary,JoansDaniel,CambridgeUniversityPress,2007.
5. EnglishGrammarandUsagebyR.P.Sinha,OxfordUniversityPress,2005,NewDelhi.
6. English Grammar, Composition and Usage by N.K. Agrawal & F.T. Wood, Macmillan IndiaLtd.,NewDelhi.
7. EffectiveCommunicationSkill,KulbhusanKumar,RSSalaria, KhannaPublishingHouse
8. EnglishGrammar &CompositionbyWren&Martin,S.Chand&Co.Ltd.,NewDelhi.
9. CommunicationSkillsforEngineersandScientists,SangeetaSharmaet.al.PHILearningPvt.Ltd,2011,New Delhi.
10. PersonalityDevelopment,HaroldR.Wallace&L.AnnMasters,CengageLearning,NewDelhi
11. PersonalityDevelopment&SoftSkills,BarunK.Mitra,OxfordUniversityPress,2012NewDelhi.
12. BusinessCorrespondenceandReportWritingbyProf.R.C.Sharma&KrishnaMohan,McGraw Hill&Co.Ltd.,2001,NewDelhi.
13. DevelopingCommunicationSkillsbyKrishnaMohan,MeeraBannerji-MacmillanIndiaLtd.1990,Delhi.
14. Spoken English- A Manual of Speech and Phonetics by R. K. Bansal & J.B.Harrison, OrientBlackswan,2013,NewDelhi.
15. BusinessEnglishbyKenTaylor,OrientBlackswan, 2011,NewDelhi.

PROGRAMMINGFORPROBLEM SOLVING(BT – 252)	0L:1T:2P	1Credit

KCS151P-Programming forProblemSolvingLab		
CourseOutcome(CO)		Bloom'sKnowledgeLevel(KL)
Attheendofcourse,thestudentwillbeableto:		
CO 1	Abletoimplementthealgorithmsanddrawflowchartsforsolving MathematicalandEngineeringproblems.	K3,K4
CO 2	Demonstrate an understanding of computer programming languageconcepts.	K3,K2
CO 3	AbilitytodesignanddevelopComputerprograms,analyzes,andinterpretsthec onceptofpointers,declarations,initialization,operations onpointersand theirusage.	K6,K4
CO 4	Abletodefinedatatypesandusetheminsimpledataprocessing applicationsalsohe/shemustbeabletousethe conceptofarrayofstructures.	K1,K5
CO 5	Developconfidenceforselfeducationandabilityforlife-longlearningneededforComputerlanguage.	K3,K4

Lab No.	Expt.	Program
LAB1	**1**	Write a program to calculate the area of triangle using formula at=√s(s-a)(s-b)(s-c)
	2	Basic salary of an employee is input through the keyboard. The DA is 25%of the basic salary while the HRA is 15% of the basic salary. ProvidentFundisdeductedattherateof10%ofthegrosssalary(BS+DA+HRA). ProgramtocalculatetheNetSalary.
	3	Writeaprogramtodeterminetherootsofquadraticequation.
	4	Writeaprogramtofindthelargestofthreenumbersusingnestedifelse.
	5	Write a program to receive marks of physics, chemistry & maths from user&checkits eligibilityforcourse if a) Marksofphysics > 40 b) Marksofchemistry>50 c) Marksofmath's>60 d) Total of physics & math's marks > 150or e) Totalofthreesubjectsmarks >200
LAB2	**6**	Writeaprogramtofindthevalueofyforaparticularvalueofn.Thea,x,b,nisinputb yuser ifn=1 y=ax%bif n=2 y=ax2+b2 ifn=3 y=a-bx

		ifn=4 y=a+x/b

	7	WriteaprogramtoconstructaFibonacciseriesuptonterms.
	8	WriteaprogramtofindwhetherthenumberisArmstrongnumber.
	9	Writeaprogramtogeneratesumofseries1!+2!+3!+ ---------- n!
	10	Writeaprogramtofindthesumoffollowingseries1-X1/1!+X2/2!- ……Xn/n!.
LAB3	**11**	Writeaprogramtoprinttheentireprimenobetween1and300.
	12	WriteaprogramtoprintoutalltheArmstrongnumberbetween100and500.
	13	Writeaprogramtodrawthefollowingfigure:321 21 1 * ** ***
	14	Writeaprogramtoreceiveafive-digitnoanddisplayaslike24689:2 4 6 8 9
LAB4	**15**	Writeafunctionthatreturnsumofalltheodddigitsofagivenpositivenoenteredthro ughkeyboard.
	16	Write a program to print area of rectangle using function & return its valuetomainfunction.
	17	Writeaprogramtocalculatethefactorialforgivennumberusingfunction.
	18	WriteaprogramtofindsumofFibonacciseriesusingfunction.
	19	Write factorial function & use the function to find the sum of seriesS=1!+2!+ n!.
LAB5	**20**	Writeaprogramtofindthefactorialofgivennumberusingrecursion.
	21	Writeaprogramtofindthesumofdigitsofa5digitnumberusing recursion.
	22	WriteaprogramtocalculatetheGCDofgivennumbersusingrecursion.
	23	Writeaprogramtoconvertdecimalnumberintobinarynumber.
	24	Writeaprogramtoconvertbinarynumberintodecimalnumber.
LAB6	**25**	Writeaprogramtodeleteduplicateelementinalistof10elements&displayit onscreen.
	26	Writeaprogramtomergetwosortedarray&noelementisrepeatedduringmerging.
	27	Writeaprogramtoevaluatetheadditionofdiagonalelements oftwosquarematrixes.
	28	Write a program to find the transpose of a given matrix & check whether itissymmetricornot.
	29	WriteaprogramtoprintthemultiplicationoftwoN*N(Square) matrix.
LAB7	**30**	WriteaprograminCtocheckwhetherthegivenstringisapalindromeor

		not.
	31	Writeprogramtosortthearrayofcharacter(String)inalphabeticalorderlike STRINGinGINRST.
	32	Writeaprogramtoremovealltheblank spacefromthestring&printit,alsocountthenoofcharacters.
	33	Writeaprogramtostorethefollowingstring“zero”,“one” ---------- “five”. Printthenoinwords,giveninfigureas3205.
LAB8	**34**	Write a program to compare two given dates. To store a date uses astructurethatcontainsthreemembersnamelyday,monthandyear.Ifthedatesar eequalthendisplaymessageequalotherwiseunequal.
	35	Defineastructurethatcandescribeahotel.Itshouldhavethememberthatincludesth ename,address,grade,roomchargeandnumberofrooms. Writeafunctiontoprintouthotelofgivengradeinorderofroomcharges.
	36	Define a structure called cricket with player name, team name, battingaverage,for50players&5teams. Printteamwise listcontainsnamesofplayerwiththeirbattingaverage.
LAB9	**37**	Write a c program to copy & count the character content of one file saysa.txttoanotherfileb.txt.
	38	Write a program to take 10 integers from file and write square of theseintegerinotherfile.
	39	Write a program to read number from file and then write all ‘odd’ numbertofileODD.txt&alleventofileEVEN.txt.
	40	Writeaprogramtoprintalltheprimenumber,between1to100infileprime.txt.
	41	WritethefollowingCprogramusingpointer: a) Tosortthelistofnumbersthroughpointer b) Toreversethestring throughpointer.
LAB10	**42**	Writeaprogramtofindthelargestnoamong20integersarrayusingdynamic memoryallocation.
	43	UsingDynamicMemoryAllocation,Writeaprogramtofindthetransposeofgiv enmatrix.
	44	Write a program to find the factorial of given number using command lineargument.
	45	Write a program to find the sum of digits of a 5 digit number usingcommandlineargument.

Note:

a) **TheInstructormayadd/delete/modify/tuneexperiments, whereverhe/shefeelsinajustifiedmanner**

*b) **Itisalsosuggestedthatopensourcetoolsshouldbepreferredtoconductthelab.Someopen sourceonlinecompilertoconductthe Clabareasfollows:***

- **https://www.jdoodle.com/c-online-compiler/**
- **https://www.tutorialspoint.com/compile_c_online.php**
- **https://www.programiz.com/c-programming/online-compiler/**
- **https://www.hackerrank.com/**

KCS151P-ProgrammingforProblemSolvingLab:MappingwithVirtualLab

NameoftheLab	NameoftheExperiment
ProblemSolvingLab	NumericalRepresentation
	BeautyofNumbers
	MoreonNumbers
	Factorials
	StringOperations
	Recursion
	AdvancedArithmatic
	SearchingandSorting
	Permutation
	Sequences

BT – 251	**ELECTRICALENGINEERINGLAB**	**0L:0T:2P**	**1Credit**

CourseOutcomes: Attheendofthis coursestudentswilldemonstratetheabilityto:

1. Conductexperiments illustratingtheapplicationofKVL/KCLandnetworktheoremstoDCelectricalcircuits.
2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure powerinsinglephase as wellasthreephaseelectricalcircuits.
3. Performexperimentillustrating BHcurveofmagneticmaterials.
4. CalculateefficiencyofasinglephasetransformerandDCmachine.
5. Perform experiments on speed measurement and reversal of direction of three phase inductionmotorandIdentifythetype ofDCandACmachines based ontheirconstruction.

SUGGESTIVELISTOFEXPERIMENTS:

(A) Hardwarebasedexperiments

1. VerificationofKirchhoff‟slaws.
2. VerificationofSuperpositionandTheveninTheorem.
3. Measurementofpowerandpowerfactorinasinglephaseacseriesinductivecircuitand studyimprovementofpowerfactorusingcapacitor
4. StudyofphenomenonofresonanceinRLCseriescircuitandobtainresonantfrequency.
5. Connectionandmeasurementofpowerconsumptionofafluorescentlamp(tubelight).
6. Measurement of power in 3- phase circuit by two wattmeter method and determination of itspowerfactor forstaras wellasdeltaconnectedload.
7. DeterminationofparametersofacsinglephaseseriesRLC circuit.
8. ToobservetheB-HloopofaferromagneticmaterialinCRO.
9. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phasetransformer.
10. Determinationofefficiencyofadcshuntmotorbyload test.
11. Tostudyrunning and speed reversalofathreephaseinduction motorand recordspeed in bothdirections.
12. Demonstration of cut-out sections of machines: dc machine, three phase induction machine,single phaseinductionmachineandsynchronousmachine.

(B) Experimentsavailableonvirtuallab

1. Kirchhoff‟slaws. Virtuallablink:http://vlab.amrita.edu/?sub=3&brch=75&sim=217&cnt=2
2. TheveninTheorem. Virtuallablink:https://vlab.amrita.edu/?sub=1&brch=75&sim=313&cnt=1
3. RLCseriesresonance. Virtuallablink:https://vlab.amrita.edu/?sub=1&brch=75&sim=330&cnt=1
4. Measurementofpower in3-phasecircuitbytwo wattmetermethodanddeterminationofitspowerfactor forstaras wellasdeltaconnectedload.

Virtuallablink:http://vp-dei.vlabs.ac.in/Dreamweaver/measurement.html

5. DeterminationofparametersofacsinglephaseseriesRLC circuit. Virtuallablink:https://vlab.amrita.edu/?sub=1&brch=75&sim=332&cnt=1
6. ToobservetheB-HloopofaferromagneticmaterialinCRO. Virtuallablink:https://vlab.amrita.edu/?sub=1&brch=282&sim=1507&cnt=2
7. Determination of the efficiency of a dc motor by loss summation method(Swinburne's test).Virtuallablink:http://em-iitr.vlabs.ac.in/exp5/index.php?section=Theory

BT – 257	**ELECTRONICSLAB**	**0L:0T:2P**	**1Credit**

SUGGESTIVELISTOFEXPERIMENTS:

Part A

1. StudyofvarioustypesofActive&PassiveComponentsbasedontheirratings.
2. IdentificationofvarioustypesofPrintedCircuitBoards(PCB)andsolderingTechniques.
3. PCBLab:a.Artwork&printingofasimplePCB. b.Etching&drillingofPCB
4. Windingshop:Stepdowntransformerwindingoflessthan5VA.
5. Soldering shop: Soldering and disordering of Resistor in PCB.Soldering and disorderingofICinPCB.SolderinganddisorderingofCapacitorinPCB

PartB

1. Study of Lab Equipments and Components: CRO, Multimeter, and Function Generator,Powersupply-Active,Passive ComponentsandBreadBoard.
2. P-N Junction diode: Characteristics of PN Junction diode - Static and dynamic resistancemeasurementfromgraph.
3. Applications of PN Junction diode: Half & Full wave rectifier- Measurement of Vrms,Vdc,andripplefactor.
4. Characteristics of Zener diode: V-I characteristics of zener diode, Graphical measurementofforwardandreverseresistance.
5. Characteristic ofBJT:BJTinCEconfiguration.
6. TostudyOperationalAmplifierasAdderandSubtractor
7. VerificationofTruthTableofVarious LogicGate.
8. Implementation of the given Boolean function using logic gates in both SOP and POSforms.

(C)

Part A	**PCB Lab**: a. Artwork & printing of asimplePCB.b.Etching&drillingofPCB	Thispracticalisnotpossiblebyvirtuallab.Itwillbeconductedonlyin physicalmode
Part B	StudyofLabEquipment's andComponents:CRO,Multimeter, Function Generator,Powersupply- Active,PassiveComponentsandBreadBoard.	NA,These testequipmentcanbeDemonstratedonlinefromanylabofECEdepartment orphysical modeisonlyoption.

(D) Experimentsavailableonvirtuallab

P-NJunctionon diode:Characteristicsof PNJunctiondiode-Staticanddynamicresistance measurementfromgraph.	http://vlabs.iitkgp.ernet.in/be/exp5/index.html
ApplicationsofPNJunctiondiode:Half&Fullwaverectifier- Measurementof Vrms,Vdc,andripplefactor.	http://vlabs.iitkgp.ernet.in/be/exp6/index.htmlhttp://vlabs.iitkgp.ernet.in/be/exp7/index.html
Characteristics of Zener diode: V-IcharacteristicsofZenerdiode,Graphical measurementofforwardandreverseresistance.	http://vlabs.iitkgp.ernet.in/be/exp10/index.html
Characteristic of BJT: BJT in CE configuration.	http://vlabs.iitkgp.ernet.in/be/exp11/index.html
TostudyOperationalAmplifierasAdderandSubtractor	http://vlabs.iitkgp.ernet.in/be/exp17/index.htmlhttp://vlabs.iitkgp.ernet.in/be/exp18/index.html
VerificationofTruthTableofVariousLogicGate	https://de-iitr.vlabs.ac.in/digital-electronics-iitr/exp/truth-table-gates/
Implementation of thegiven BooleanfunctionusinglogicgatesinbothSOPandPOS forms.	https://de-iitr.vlabs.ac.in/digital-electronics-iitr/exp/realization-of-logic-functions/

BT – 209	**ARTIFICALINTELLIGENCEFOR ENGINEERS**	**2L:0T:0P**	**2Credit**

Thestudents willbe ableto		BloomsTaxonomy
CO1	UnderstandtheevolutionandvariousapproachesofAI	**K2**
CO2	Understanddatastorage,processing,visualization,anditsuseinre gression,clusteringetc.	**K2**
CO3	Understandnaturallanguageprocessingandchatbots	**K2**
CO4	Understandthe conceptsofneuralnetworks	**K2**
CO5	Understandtheconceptsofface, object,speechrecognitionandrobots	**K2**

Course	**Topics**
Unit1	**AnoverviewtoAI**
1.1	TheevolutionofAItothepresent
1.2	VariousapproachestoAI
1.3	Whatshould allengineersknowabout AI?
1.4	Otheremergingtechnologies
1.5	AIandethicalconcerns
Unit2	**Data&Algorithms**
2.1	HistoryOfData
2.2	DataStorageAndImportanceofDataanditsAcquisition
2.3	TheStagesofdataprocessing
2.4	DataVisualization
2.5	Regression,Prediction&Classification
2.6	Clustering&RecommenderSystems
Unit3	**NaturalLanguageProcessing**
3.1	Speechrecognition
3.2	Naturallanguageunderstanding
3.3	Naturallanguagegeneration
3.4	Chatbots
3.5	MachineTranslation
Unit4	**ArtificialNeuralNetworks**
4.1	DeepLearning
4.2	RecurrentNeuralNetworks
4.3	ConvolutionalNeuralNetworks
4.4	TheUniversalApproximationTheorem
4.5	GenerativeAdversarialNetworks
Unit5	**Applications**
5.1	Imageandfacerecognition
5.2	Objectrecognition
5.3	SpeechRecognitionbesidesComputerVision
5.4	Robots
5.5	Applications

ReferenceBooks:

1. ArtificialIntelligence:AModernApproachbyStuart Russelland PeterNorvig, Prentice Hall
2. ArtificialIntelligencebyKevin Knight,ElaineRich,ShivashankarB.Nair,Publisher:McGrawHill
3. DataMining:ConceptsandTechniquesbyJiaweiHan,MichelineKamber,JianPei,Publisher :ElsevierScience.
4. Speech&LanguageProcessingbyDanJurafsky,Publisher:PearsonEducation
5. Neural Networks and Deep LearningA Textbook by Charu C. Aggarwal, Publisher: SpringerInternationalPublishing
6. IntroductiontoArtificialIntelligenceByRajendraAkerkar,Publisher:PHILearning

BT – 208	**EMERGINGTECHNOLOGYFOR ENGINEERING**	**2L:0T:0P**	**2Credit**

CourseObjectives:

1. TounderstandthebasicconceptsofIoT,followedbymajorcomponents,itslayerarchitecture and how IoT is impacting the Industry in the various forms along with majorapplications.
2. To make students aware about basic concepts of cloud computing, its benefits and differentapplications alongwithinsightsofmajorservice providers.
3. To understand the basic concepts of Blockchain and its underlying technologies with itsimplementationas cryptocurrencies.
4. To understand the concept of Additive Manufacturing, its applications in various fields andthebasicconceptsofdrones,theirassemblyandgovernmentregulationsinvolved.
5. To introduce students to the upcoming technology and to develop the required skills forpracticalapplications.

Thestudentswillbeableto		**BloomsTaxonomy**
CO1	Understand the concepts of internet of things, smart cities andindustrialinternetofthings	**K2**
CO2	Understandtheconceptsofcloudcomputing	**K2**
CO3	Understand theconceptsofblockchain,cryptocurrencies,smartcontracts	**K2**
CO4	Understanddesignprinciples,tools,trendsin3Dprintinganddrones	**K2**
CO5	Understand augmented reality(AR),virtualreality(VR),5Gtechnology,brain computerinterface andhumanbrain	**K2**

Course	**EMERGINGTECHNOLOGYFORENGINEERING**
Unit1	**InternetofThings**
1.1	WhatistheInternetofThings?
1.2	Sensors,theirtypesandfeatures
1.3	IoTcomponents:layers
1.4	Smart Cities
1.5	IndustrialInternetofThings
Unit2	**CloudComputing**
2.1	CloudComputing:it'snatureandbenefits
2.2	AWS
2.3	Google
2.4	Microsoft
2.5	Vendor Offering-IBM
Unit3	**Blockchain**
3.1	WhatisBlockchain?Fundamentals
3.2	PrinciplesandTechnologies
3.3	Cryptocurrencies
3.4	SmartContracts
3.5	BlockchainApplicationsandusecases

Unit4	DigitalManufacturing:3DPrinting&Drones
4.1	Thehistoryandsurveyof3DPrinting
4.2	DesignPrinciplesandTools
4.3	EmergingTrends &UseCasesin3DPrinting
4.4	IntroductionofDrones,EngineeringDisciplines
4.5	MultirotorDroneAssemblyCourse/Regulationsandproceduresforbecomingadronepilot
Unit5	**FutureTrends**
5.1	AugmentedReality(AR)andVirtualReality(VR)
5.2	History,objective&globalscenarioof5GTelecom
5.3	5GinIndia,ApplicationandUseCases
5.4	BrainComputerInterface,Application,ModalandGlobalMarket
5.5	BrainComputerInterface andHumanBrain

ReferencesBooks:

IoT:

1. InternetofThings(IoT):SystemsandApplications:MehmetR.Yuce,JamilY.Khan
2. IoTFundamentals:NetworkingTechnologies,ProtocolsandUseCasesfortheInternetofThings:DavidHanes,PatrickGrossetete,GonzaloSalgueiro.
3. DesigningtheInternetofThings: McEwen,Adrian,Cassimally,Hakim.

CloudComputing:

1. MasteringCloudComputing:FoundationsandApplicationsProgrammingBookbyChristianVecchiola,RajkumarBuyya,and S.ThamaraiSelvi
2. CloudComputing–Concepts,TechnologyandArchitecturePearsonThomasErl
3. Cloud Computing Master the Concepts, Architecture and Applications with Real-world examples and Case studies By Ruchi Doshi, Temitayo Fagbola, MehulMahrishi.

Blockchain:

1. BlockChain:BlueprintforaNewEconomy,O'Reilly,MelanieSwan
2. BlockchainBasics:ANon-TechnicalIntroductionin25Stepsby:DanielDrescher.

DigitalManufacturing:

1. DesigningReality:HowtoSurviveandThriveintheThirdDigitalRevolutionbyProf.NielGershenfeld.
2. AdditiveManufacturingTechnologies:3DPrinting,RapidPrototyping,andDirect DigitalManufacturingbyIanGibson.
3. BuildaDrone:AStep-by-StepGuidetoDesigning,Constructing,andFlyingYourVeryOwnDronebyBarryDavies.

FutureTrends:

1. Alan BCraig,William RSherman andJeffreyDWill,"DevelopingVirtualRealityApplications:FoundationsofEffective Design",MorganKaufmann,2009.
2. Doug A Bowman, Ernest Kuijff, Joseph J La Viola, Jr and Ivan Poupyrev, "3DUserInterfaces,TheoryandPractice",AddisonWesley,USA,2005.
3. SimonHaykin,"CommunicationSystems",4thEdition,WileyIndia

BT - 210	**SOFTSKILLS-I**	**2L:0T:0P**

SOFTSKILLS-I

CourseOutcome:

Unit1-Studentswillbeenabledto**understand**thecorrectusageofgrammar.

Unit2-Studentswill **apply**thefundamental inputsofcommunicationskillsinmakingspeechdelivery,individualconference,andgroupcommunicatio n.

Unit3-

Studentswill**evaluate**theimpactofinterpersonalcommunicationontheirperformanceasaprofessionalan dinobtainingprofessionalexcellenceatthe workplace.

Unit4-

Skillsandtechniquesofpersuasionandnegotiationwould**enhance**thelevelofstudentsatmultifariousadm nistrativeandmanagerial platforms.

Unit 5-Student will be able to **equip** with basics of communication skills and will **apply** it for practical andoralpurposesbybeinghonedupinpresentationskillsandvoice-dynamics.

UNITI-BasicsofApplied Grammarandusage

Tenses: Part of Speech, Active & Passive Voice, Articles, Subject-verb agreement, Antonyms, Synonyms, PrefixandSuffix,Narration,Conditionalsentences,Concord,Tagquestions,punctuationmarks.

UNITII-PresentationandInteractionSkills

Speech Delivery,Interjecting: Objectives&Methodology;GroupDiscussion: Objectives&Methods;ThemePresentation: Methods; Argumentative skills: Pattern and Ingredients; Debate & Discussion: Unity, Coherence &Emphasis.PublicSpeaking:AudienceAnalysis:ApproachandStyle.Interviews:Types;Focus & Objectives.

UNITIII-InterpersonalCommunicationSkills

Features: Methods; Principles; Requisites; Team- work; Skills: Empathy, Emotional Intelligence, empathy andlistening skills. Time Management; Attitude; Responsibility. Leadership qualities: Integrity; Values; Trust; Self-Confidence&Courage;CommunicationandNetworking;Speedreading;ProblemSolving&Trouble-Shooting

UNITIV-PersuasionandNegotiationSkills

Definition;UnderstandingAttitude,Beliefs,ValuesandBehavior;TheprocessofPersuasion:AnalysisofAudien ce; Classification of Audience; Egoistic and Non-Egoistic; Specific Techniques for Specific Audience;SkillsofPersuasion,StepstoPersuasion/Influence,Negotiation:Definition;ProcessofNegotiation:C haracteristics;Qualitiesofgoodnegotiator;ApproachestoNegotiation.

UNITV-CommunicationSkills

Introduction to oral communication, Nuances & Modes of Speech Delivery, Public speaking: confidence, clarity,andfluency,NonverbalCommunication:Kinesics,ParalinguisticfeaturesofVoice-

Dynamics,Proxemics,Chronemics,andPresentationStrategies:planning,preparation,organization,delivery.

PrescribedBooks:

1. **TechnicalCommunication,(SecondEd.);O.U.P.,**MeenakshiRaman& S.SharmaNewDelhi,2011
2. **BusinessCommunicationforManagers**, PayalMehra,Pearson,Delhi, 2012.
3. **PersonalityDevelopment,**HaroldR.Wallaceet.al,CengageLearningIndiaPvt.Ltd;NewDelhi2006
4. **Practical Communication** by L.U.B. Pandey; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2013,Delhi.
5. **PersonalityDevelopment&SoftSkills,**BarunK.Mitra,OxfordUniversityPress,NewDelhi,2012.
6. **PublicSpeaking,**WilliamS.Pfeiffer,Pearson,Delhi,2012.
7. **HumanValues,**A.N.Tripathi,NewAgeInternationalPvt.Ltd.Publishers NewDelhi,2005

BT - 210	**SOFTSKILLS-II**	**2L:0T:0P**

SOFTSKILLS-II

CourseOutcome:

Unit1-Studentswillbeabletoconversewell witheffectiveLSRWskillsinEnglish.

Unit2-

Studentswill**evaluate**theimportanceofconversationintheirpersonalandprofessi onaldomainand**apply**itforextendingtheirprofessional frontiers.

Unit3-

Studentswilllearnto**apply**motivationskillsfortheirindividualandprofessionalexcellenc e.

Unit4-

Studentswill**utilize**theirteamworkandtheirinterpersonalcommunicationskill stosurviveandexcelattheirwork-place.

Unit 5-Students will learnto**evaluate** creativityfor their professional innovationandcritical thinkingfor theircompetence.

UNITI-LSRWSkills

Active Listening: Meaning and Art of Listening, Pronunciation, Tongue-Twisters, Stress in English Language,Readingstyle:Skimming;Scanning;Churning&Assimilation,Effectivewritingtools,Writing:Meth ods:Inductive;Deductive;Exposition;Linear;Interrupted;Spatial&Chronologicaletc

UNITII-Conversational&SocialSkills

DefinitionofConversation;SpeechandConversation:Distinction;ListeningandConversation;SustainingInter est;RulesofConversation;ConversationandPersonality;ImportanceofConversation:CompetenceRelationshi ps;SocialSkills:RoleofCommunication;PurposefulSocializing;Attributes:EffectiveCommunication; Conflict Resolution;; Relationship Management; Respect; Improvement Techniques: Feedback;GoalSetting;AffordingResources;AdoptingInterpersonalSkills;Importance.

UNITIII-MotivationSkills

Motivation: Definition; Sources of Motivation: Initiative; Willingness To Work; Eagerness to take on Work;Initiative; Learning Ability; Going Extra Miles; Learning And Analysis; Motivating Others: Techniques; One ToOneCorrespondence;Understanding;IndividualMotivation;MobilizingOptimalPerformance;PraiseandC ompliment;GoalSettingforIndividualEmployee;IndividualCultivationofSkills;FacilitatingActiveInvolvem ent;TrustintheWorkingHands.

UNITIV-Work-PlaceSkills

Managing Stress; Techniques:Applicationof 4A's;Avoid;Alter;Access;Adapt;Resilience: Flexibility inThought and Behavior; Tolerance and Self-Belief; Team-Work and Communication; Compassion in Leadership;CommunicationSkills;ListeningandResponding;SpeakingSkills;PositiveThinking:Controlling Mind.

UNITV- CreativityandCriticalThinking

Creativity: Definition; Characteristics of Creative Person: Fluency; Originality; Curiosity; Critical Thinking: Definition;Abilities: Discerning Facts and Claims; Credibility Analysis; Identifying Valid Reasons; Distinguishing Relevant fromIrrelevantFact/Claims;DetectingBias;KnowingtheHiddenMotives;CreativeMethods;Features.

PrescribedBooks:

1. **TechnicalCommunication,(SecondEd.);O.U.P.,**MeenakshiRaman&S.SharmaNewDelhi,2011
2. **PersonalityDevelopment,**HaroldR.Wallaceet.al,CengageLearningIndiaPvt.Ltd;NewDelhi2006
3. **PersonalityDevelopment&SoftSkills,**BarunK.Mitra,OxfordUniversityPress,NewDelhi,2012.
4. **PracticalCommunication**byL.U.B.Pandey;A.I.T.B.S.PublicationsIndiaLtd.;KrishanNagar,2013 ,Delhi.
5. **DevelopingCommunication Skills:**byKrishnaMohan,MeeraBanerji;McMillanIndiaLtd,Delhi,1990.
6. **CommunicationSkillsforEngineersandScientists:**SangeetaSharmaet.al.,THILearningPvtLtd,NewDelhi,2011.
7. **PublicSpeaking,**WilliamS.Pfeiffer,Pearson,Delhi,2012.
8. **HumanValues,**A.N.Tripathi,NewAgeInternationalPvt.Ltd.PublishersNewDelhi,2005.

AGuidetoInductionProgram

1Introduction

(InductionProgramwasdiscussedandapproved forallcollegesbyAICTEinMarch

*2017. It was discussed and accepted by the Council of IITs for all IITs in August 2016. It was originally proposed by aCommittee of IIT Directors and accepted at the meeting of all IIT Directors in March 2016.*1 *This guide has beenpreparedbasedontheReportoftheCommitteeofIIT Directorsandtheexperiencegainedthroughitspilotimplementation in July 2016 as accepted by the Council of IITs. Purpose of this document is to help institutions inunderstandingthespirit oftheacceptedInductionProgramandimplementingit.)*

Engineering colleges were established to train graduates well in the branch/department of admission, have a holisticoutlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge andskills in the area of his study. However, he must also have broad understanding of society and relationships. Characterneedstobenurturedas anessentialqualitybywhichhewouldunderstandandfulfillhisresponsibilityasanengineer,acitizenandah umanbeing.Besidestheabove,severalmeta-skillsandunderlyingvaluesareneeded.

There is a mad rush for engineering today, without the student determining for himself his interests and his goals. Thisis a major factor in the current state of demotivation towards studies that exists among UG students. The success ofgaining admission into a desired institution but failure in getting the desired branch, with peer pressure generating itsown problems, leads to a peer environment that is demotivating and corrosive. Start of hostel lifewithout closeparentalsupervisionatthesametime,furtherworsensitwithalsoapoordailyroutine.

To come out of this situation, a multi-pronged approach is needed. One will have to work closely withthe newlyjoined students in making them feel comfortable, allow them to explore their academic interests and activities, reducecompetitionandmakethem

A Committee of IITDirectors was setup inthe 152nd Meeting of IITDirectorson 6th September 2015 at IIT Patna,on how to motivate undergraduate students at IITs towards studies, and to develop verbal ability. The Committeesubmitteditsreporton19thJanuary2016.Itwasconsideredatthe153rdMeetingofallIITDirectorsatIITMandion26March2016,andtheacceptedreportcameouton31

March 2016. The Induction Program was an important recommendation, and its pilot was implemented by three IITs,namely, IIT(BHU), IIT Mandi and IIT Patna in July 2016. At the 50thmeetingoftheCouncilofIITson23August 2016, recommendation on the Induction Program and the report of its pilot implementation were discussedand the program was accepted for all IITs, work forexcellence, promote bonding withinthem,buildrelationsbetweenteachersandstudents, giveabroaderviewoflife,andbuildcharacter.

2.InductionProgram

Whennew studentsenteraninstitution,they comewithdiversethoughts,backgroundsandpreparations.Itisimportant to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense oflarger purpose. Precious little is done by most of the institutions, except for an orientation program lasting a couple ofdays.

We propose a 3-week long induction program for the UG students entering the institution, right at the start. Normalclasses start only after the induction program is over. Its purpose is to make the students feel comfortable in their newenvironment,openthemup,setahealthy daily routine,createbondinginthe batch as well as between facultyand students, develop awareness,

sensitivity and understanding of the self, people around them, society at large, andnature.2

ThetimeduringtheInductionProgramisalsousedtorectifysomecriticallacunas,forexample,Englishbackground, for those students who have deficiency in it. The following are the activities under the induction programinwhichthestudentwouldbefullyengagedthroughoutthedayfortheentire durationoftheprogram.

2InductionProgram as described here borrows fromthree programs running earlieratdifferent institutions:(1)Foundation Program running at IIT Gandhinagar since July 2011, (2) Human Values course running at IIIT Hyderabadsince July 2005, and (3) Counselling Service or mentorship running at several IITs for many decades. Contribution ofeachoneisdescribednext.

CounsellingatsomeoftheIITsinvolvessettingupmentor-mentee network under which 1st year students wouldbe divided into small groups, each assigned a senior student asastudentguide,andafacultymemberasamentor. Thus, a new student gets connected to a faculty member as well as a senior student, to whom he/she could gotoincase ofanydifficultywhetherpsychological,financial,academic,orotherwise.

The Induction Program defined here amalgamates all the three into an integratedwhole, which leads to its higheffectiveness interms of building physicalactivity,creativity,bonding,andcharacter.It develops sensitivitytowards selfandone"srelationships,buildsawarenessabout othersandsociety beyondthe individual,andalsoinbondingwiththeirownbatch-matesanda seniorstudent besidesafacultymember.

Scaling up the above amalgamation to an intake batch of 1000 plus students was done at IIT (BHU), Varanasi startingfromJuly2016.

PhysicalActivity

This wouldinvolve adaily routine of physicalactivity with games and sports. It would start with all students comingto the field at 6 am for light physical exercise or yoga. There would also be games in the evening or at other suitabletimes according to the local climate. These would help develop team work. Each student should pick one game andlearn it for three weeks. There could also be gardening or other suitably designed activity where labour yields fruitsfromnature.

CreativeArts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting,sculpture,pottery,music,danceetc.Thestudentwouldpursueiteverydayforthedurationofthepr ogram.

These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity whichwould, hopefully,flowintoengineeringdesignlater.

UniversalHumanValues

It gets the student to explore oneself and allows one to experience the joy of learning,standuptopeer pressure,takedecisionswithcourage,beawareofrelationshipswithcolleaguesandsupportingstaffintheh ostelanddepartment, be sensitive to others, etc. Need for character building has been underlined earlier. A module in UniversalHumanValuesprovidesthe base.

Methodology of teaching this content is extremelyimportant. It mustnot be throughdo"sand dont"s, but get studentstoexploreand think byengagingthem ina dialogue. It is best taught throughgroup discussions andreal life activities rather than lecturing. The role of group discussions,however,withclarityof thought of theteacherscannotbeoveremphasized.Itisessentialforgivingexposure,guidingthoughts,andrealizingva lues.

The teachersmustcomefromallthedepartmentsratherthanonlyone department like HSS or from outside oftheInstitute.Experimentsinthisdirectionat IIT(BHU)arenoteworthyandone canlearnfrom them.3

Discussions would be conducted insmall groups of about 20 students with a faculty mentoreach. It is to openthinking towards the self. Universal Human Valuesdiscussionscouldeven continuefor restofthesemester asanormalcourse,andnotstopwiththeinductionprogram.

Besides drawing the attention of the student to larger issues of life, it would build relationships between teachers andstudents whichlastfortheirentire4-yearstayandpossiblybeyond.

The Universal Human Values Course is a result of a long series of experiments at educational institutes starting fromIIT-Delhi and IIT Kanpur in the 1980s and 1990s as an elective course, NIT Raipur in late 1990s as a compulsory one-week off campus program. The courses at IIT(BHU) which started from July 2014, are taken and developed from

twocompulsorycoursesatIIITHyderabadfirstintroducedinJuly2005.

Literary

Literaryactivitywouldencompassreading,writingandpossibly,debating,enactingaplayetc.

ProficiencyModules

This period can be used to overcome some critical lacunas that students might have, for example, English, computerfamiliarity etc.These should runlike crashcourses,sothatwhennormalcoursesstartaftertheinductionprogram, the student hasovercomethelacunassubstantially.Wehopethatproblemsarising due to lack ofEnglish skills, wherein students start lagging behind or failing in severalsubjects, for no fault of theirs, would,hopefully,becomeathingofthe past.

LecturesbyEminentPeople

This period can be utilized forlectures by eminentpeople, say,once aweek.Itwould give the students exposure topeoplewhoaresociallyactiveorinpublic life.

VisitstoLocalArea

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarizethemwiththeareaaswellasexposethemtotheunderprivileged.

FamiliarizationtoDept./Branch&Innovations

The students should be told about different methodofstudycomparedto coaching that is needed at IITs. Theyshould be told aboutwhat getting into a branch or department means what role it plays insociety, through itstechnology.Theyshouldalsobe shownthelaboratories,workshops&otherfacilities.

3 Schedule

The activities during the InductionProgramwouldhaveanInitialPhase,a Regular Phase and a Closing Phase.TheInitialandClosingPhaseswouldbetwodayseach.

InitialPhase

Time	Activity
Day0	
Whole day	Studentsarrive-Hostelallotment.(Preferablydopreallotment)
Day1	
09:00am -03:00pm	Academic
registration04:30pm-06:00pm	
	Orientation
Day2	
09:00am -10:00am	
	Diagnostictest(forEnglishe
tc.)10:15am-12:25pm	Visit torespective Depts.
12:30pm-01:55pm	Lunch
02:00pm-02:55pm	
	Director"sAddress
03:00pm-05:00pm	
	InteractionwithPare
nts	
03:30pm-05:00pm	Mentor-Menteegroups-Introductionwithingroup.
	(SameasUniversalHumanValuesgroups)

RegularPhase

AftertwodaysisthestartoftheRegularPhaseofinduction.Withthisphasetherewouldberegularprogram tobefollowedeveryday.

DailySchedule

Someoftheactivitiesareonadailybasis,whilesomeothersareatspecifiedperiods withintheInductionProgram. Wefirstshowatypicaldailytimetable.

Day 3onwards06:00am		**Activity**Wakeupcall	**Rema**
1.	06:30am- 07:10am	Physicalactivity(mildexercise/yoga)	
2.	07:15am -08:55am	Bath,Breakfast,etc.	
3.	09:00am- 10:55am	CreativeArts/UniversalHumanValues	Halfthegroups
4.	11:00am-12:55pm	UniversalHumanValues/CreativeArts	
5.	01:00pm-02:25pm	Lunch	
6.	02:30pm-03:55pm	AfternoonSessionSeebelow.	
7.	04:00pm-05:00pm	AfternoonSessionSeebelow.	
8.	05:00pm-05:25pm	Break/lighttea	

9.	05:30pm-06:45pm	Games/SpecialLectures	
10.	06:50pm-08:25pm	Rest andDinner	
11.	08:30pm-09:25pm	Informalinteractions(inhostels)	

Sundays areoff.Saturdays havethesamescheduleasaboveor haveoutings.

Follow Up after Closure: A question comes up as to what would be the follow up program after theformal3-weekInductionProgramisover?Thegroupswhichareformedshouldfunction as mentor mentee network. A student should feelfree to approach his faculty mentororthe student guide, whenfacing any kind of problem, whether academic or financial or psychological etc. (For every 10 undergraduate first yearstudents, there would be a senior student as a student guide, and for every 20 students, there would be a facultymentor.) Such a group should remain for the entire 4-5 yeardurationofthestayofthestudent.Therefore,itwouldbegoodtohave groupswiththestudentsaswellas teachersfrom thesame department/discipline.Herewelistsomeimportantsuggestions whichhavecomeupandwhichhavebeenexperimentedwith.

FollowUpafterClosure–SameSemester

It is suggested that the groups meet with their faculty mentors once a month, within the semester after the 3-weekInduction Program is over. This should be a scheduled meeting shown in the timetable. (The groups are of course freeto meet together on their own more often, for the student groups to be invited to their faculty mentor‟s homefordinnerortea,naturewalk,etc.)

FollowUp–SubsequentSemesters

Itisextremelyimportantthatcontinuitybemaintainedinsubsequent semesters.

It is suggested that at the start of the subsequent semesters (upto fourth semester), three days be set aside for three fulldays of activities related to follow up to Induction Program. The students be shown inspiring films, do collective artwork,andgroupdiscussions beconducted.Subsequently,thegroups shouldmeetatleastonceamonth.

4 Summaries

Engineeringinstitutionsweresetuptogeneratewelltrainedmanpowerinengineeringwithafeelingofresponsibilitytowardsoneself,one'sfamily,andsociety.The incomingundergraduate students are drivenbytheir parents and society to join engineering without understanding their own interests and talents. As a result, moststudents failtolinkupwiththegoalsoftheirowninstitution.

The graduating studentmust have valuesas a humanbeing, and knowledge and meta skills relatedto his/herprofession as an engineer and as a citizen. Most students who get demotivated to study engineering or their branch,alsolose interest inlearning.

TheInductionProgram isdesignedtomake the newly joined students feel comfortable, sensitize themtowards exploring their academic interests and activities, reducing competition and making them work for excellence,promote bonding within them, build relations between teachers and students, give a broader view of life, and buildingofcharacter.

The Universal Human Values component, which acts as an anchor, develops awareness and sensitivity, feeling ofequality, compassion and oneness, draw attention to society and we are aware that there are advantages in mixingthe students from different depts. However, in mixing, it is our experience that the continuity of the group togetherwith the faculty mentor breaks down soon after. Therefore, the groups be from the same dept. but hostel wings havethe mixed students from different depts. For example, the hostel room allotment should be in alphabetical orderirrespective of dept. nature, and character to follow through. It also makes them reflect on their relationship with theirfamilies and extended family in the college (with hostel staff and others). It also connects students with each other andwithteacherssothattheycanshareanydifficultytheymightbefacingandseekhelp.

ComputerOrganizationandArchitecture(BT –307**)**

CourseOutcome(CO)		Bloom'sKnowledgeLevel(KL)
Attheendofcourse,thestudentwillbeabletounderstand		
CO1	Studyofthebasicstructureandoperationofadigitalcomputersystem.	K1,K2
CO2	Analysisofthedesignofarithmetic&logicunitandunderstandingofthefixedpointandfloating-pointarithmeticoperations.	K2,K4
CO3	Implementationofcontrolunittechniquesandtheconceptof Pipelining	K_3
CO4	Understandingthehierarchicalmemorysystem,cachememoriesandvirtualmemory	K_2
CO5	UnderstandingthedifferentwaysofcommunicatingwithI/Odevicesandstandard I/Ointerfaces	K2,K4

DETAILEDSYLLABUS		3-1-0
Unit	**Topics**	**Proposed Lecture**
I	**Introduction**:Functionalunitsofdigitalsystemandtheirinterconnections,buses,busarchitecture,typesofbusesandbusarbitration.Register,busandmemorytransfer.Processororganization, generalregistersorganization,stackorganizationandaddressingmodes.	**08**
II	**Arithmeticandlogicunit:**Lookaheadcarriesadders.Multiplication:Signedoperandmultiplication,Boothsalgorithmandarraymultiplier.Divisionandlogicoperations.Floatingpoint arithmeticoperation,Arithmetic&logicunitdesign.IEEEStandardforFloatingPointNumbers	**08**
III	**Control Unit:** Instruction types, formats, instruction cycles and sub cycles (fetch and execute etc),microoperations,execution ofacompleteinstruction.Program Control,ReducedInstructionSetComputer,Pipelining.Hardwireandmicroprogrammedcontrol:microprogrammesequencing, conceptofhorizontalandverticalmicroprogramming.	**08**
IV	**Memory:**Basicconceptandhierarchy,semiconductorRAMmemories,2D&21/2Dmemory organization. ROM memories.Cache memories: concept and design issues & performance, addressmappingandreplacementAuxiliarymemories:magneticdisk,magnetictapeandoptical disks Virtualmemory:conceptimplementation.	**08**
V	**Input / Output**: Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types ofinterrupts andexceptions.Modesof Data Transfer: Programmed I/O, interruptinitiatedI/OandDirectMemoryAccess.,I/Ochannelsandprocessors.SerialCommunication:Synchronous& asynchronouscommunication,standardcommunicationinterfaces.	**08**

Textbooks:

1. ComputerSystemArchitecture-M.Mano
2. CarlHamacher,ZvonkoVranesic,SafwatZakyComputerOrganization,McGraw-Hill,FifthEdition,Reprint2012
3. JohnP.Hayes,ComputerArchitectureandOrganization,TataMcGrawHill,ThirdEdition,1998.Referencebooks
4. WilliamStallings,ComputerOrganizationandArchitecture-DesigningforPerformance,PearsonEducation,Seventhedition,2006.
5. BehroozParahami,"ComputerArchitecture",OxfordUniversityPress,EighthImpression,2011.
6. DavidA.PattersonandJohnL.Hennessy,"ComputerArchitecture-AQuantitativeApproach",Elsevier,adivisionofreedIndiaPrivateLimited,Fifthedition,2012
7. StructuredComputerOrganization,Tannenbaum(PHI)

DETAILEDSYLLABUS

COMPUTERSYSTEMSECURITY (BT – 309)		
CourseOutcome(CO)		**Bloom'sKnowledgeLevel(KL)**
Attheend ofcourse ,thestudentwillbe ableto understand		
CO 1	Todiscover software bugs that pose cyber security threats and to explain how to fix the bugs tomitigate such threats	**K_1,K_2**
CO 2	Todiscovercyberattackscenariostowebbrowsersandwebserversandtoexplainhowtomitigate such threats	**K_2**
CO 3	Todiscoverandexplainmobilesoftwarebugsposingcybersecuritythreats,explainandrecreate exploits,and toexplainmitigationtechniques.	**K_3**
CO 4	Toarticulatetheurgentneedforcybersecurityincriticalcomputersystems,networks,andworldwide web,andto explainvariousthreatscenarios	**K_4**
CO 5	Toarticulatethewellknowncyberattackincidents,explaintheattackscenarios,andexplainmitigationtechniques.	**K_5,K_6**
DETAILEDSYLLABUS		**3-1-0**

Unit	**Topic**	**Proposed Lecture**
I	**Computer System Security Introduction**: Introduction, What is computer security and what to learn? , Sample Attacks, The Marketplace for vulnerabilities, Error 404 Hacking digital India part 1chase. **Hijacking & Defense:** Control Hijacking ,More Control Hijacking attacks integer overflow ,MoreControlHijackingattacksformatstringvulnerabilities,DefenseagainstControlHijacking-Platform Defenses, Defense against Control Hijacking - Run-time Defenses, Advanced ControlHijackingattacks.	08
II	**ConfidentialityPolicies:**ConfinementPrinciple,DetourUnixuserIDsprocessIDsandprivileges ,Moreonconfinementtechniques,Systemcallinterposition,Error404digitalHackinginIndiapart2chase,VMbasedisolation,Confinementprinciple,Softwarefaultisolation, Rootkits ,IntrusionDetectionSystems	08
III	**Secure architecture principles isolation and leas:** Access Control Concepts , Unix and windowsaccess controlsummary,Otherissuesinaccess control ,Introductiontobrowserisolation. **Web security landscape :**Web security definitions goals and threatmodels,HTTP contentrendering .Browser isolation .Security interface , Cookies frames and frame busting, Major webserverthreats ,Crosssiterequestforgery,Cross sitescripting,DefensesandprotectionsagainstXSS ,Findingvulnerabilities ,Securedevelopment.	08
IV	**Basic cryptography:** Public key cryptography ,RSA public key crypto ,Digital signature Hashfunctions,Publickeydistribution,Realworldprotocols,Basicterminologies,Emailsecurity certificates ,TransportLayer securityTLS,IP security, DNS security.	08

V	**InternetInfrastructure:**Basicsecurityproblems,Routingsecurity,DNSrevisited,Summaryofweaknessesofinternetsecurity,.LinklayerconnectivityandTCPIPconnectivity,Packetfilteringfirewall,Intrusiondetection.	08

B.TECH.(COMPUTERSCIENCEANDENGINEERING)THIRD SEMESTER(DETAILEDSYLLABUS)

DATASTRUCTURE(BT – 306**)**		
CourseOutcome(CO)		**Bloom'sKnowledgeLevel(KL)**
Attheendofcourse,thestudentwillbeabletounderstand		
CO1	Describehowarrays,linkedlists,stacks,queues,trees,andgraphsarerepresentedinmemory, usedbythealgorithmsandtheircommonapplications.	**K_1,K_2**
CO2	Discussthecomputationalefficiencyofthesortingandsearchingalgorithms.	**K_2**
CO3	ImplementationofTreesandGraphsandperformvariousoperationsonthesedatastructure.	**K_3**
CO4	Understandingtheconceptofrecursion,applicationofrecursionanditsimplementationand removalofrecursion.	**K_4**
CO5	Identifythealternativeimplementationsofdatastructureswithrespecttoitsperformancetosolvearealworldproblem.	**K_5,K_6**

DETAILEDSYLLABUS		**3-1-0**
Unit	**Topics**	**Proposed Lecture**
I	**Introduction:**BasicTerminology,ElementaryDataOrganization,BuiltinDataTypesinC. Algorithm, Efficiency of an Algorithm,Timeand Space Complexity,Asymptoticnotations:BigOh,BigThetaandBigOmega,Time-Spacetrade-off.AbstractData Types(ADT) **Arrays**: Definition,Single and Multidimensional Arrays,Representationof Arrays:Row MajorOrder, and Column Major Order, Derivation of Index Formulae for 1-D,2-D,3-D and n-D ArrayApplicationofarrays,SparseMatricesand theirrepresentations. **Linked lists:** Array Implementation and Pointer Implementation of Singly Linked Lists, DoublyLinked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal,PolynomialRepresentationandAdditionSubtraction&MultiplicationsofSingle variable&Two variablesPolynomial.	08
II	**Stacks:**AbstractDataType,PrimitiveStackoperations:Push&Pop,ArrayandLinkedImplementation of Stack in C, Application of stack: Prefix and Postfix Expressions, Evaluation ofpostfix expression,Iteration and Recursion- Principles of recursion,Tailrecursion, RemovalofrecursionProblemsolvingusingiterationandrecursionwithexamplessuchasbinarysearch,Fibonaccinumbers,andHanoitowers.Tradeoffsbetweeniterationandrecursion. **Queues:**OperationsonQueue:Create,Add,Delete,FullandEmpty,Circularqueues,Arrayand linkedimplementationofqueuesinC,DequeueandPriorityQueue.	08
III	**Searching:**ConceptofSearching,Sequentialsearch,IndexSequentialSearch,BinarySearch.Concept of Hashing & Collision resolution Techniques used in Hashing. **Sorting:** Insertion Sort,Selection,BubbleSort,QuickSort,MergeSort,HeapSortandRadixSort.	08

IV	**Graphs:**TerminologyusedwithGraph,DataStructureforGraphRepresentations:AdjacencyMatrices,AdjacencyList,Adjacency.GraphTraversal:DepthFirstSearchandBreadthFirstSearch,ConnectedComponent,SpanningTrees,MinimumCostSpanningTrees:PrimsandKruskalalgorithm.TransitiveClosureandShortestPathalgorithm:WarshalAlgorithmandDijikstra Algorithm.	08
V	**Trees:**BasicterminologyusedwithTree,BinaryTrees,BinaryTreeRepresentation:ArrayRepresentationandPointer(LinkedList)Representation,BinarySearchTree,StrictlyBinaryTree,CompleteBinary Tree.AExtended Binary Trees,TreeTraversalalgorithms:Inorder,PreorderandPostorder,ConstructingBinary TreefromgivenTreeTraversal,OperationofInsertation,Deletion, Searching & Modification of datain Binary Search . Threaded Binary trees, TraversingThreadedBinarytrees.HuffmancodingusingBinaryTree.Concept&BasicOperationsforAVL Tree,BTree&BinaryHeaps	08

Textbooks:

1. AaronM.Tenenbaum,YedidyahLangsamandMosheJ.Augenstein,"DataStructuresUsingCandC++",PHI LearningPrivateLimited,DelhiIndia
2. HorowitzandSahani,"FundamentalsofDataStructures",GalgotiaPublicationsPvtLtdDelhiIndia.
3. Lipschutz,"DataStructures"Schaum'sOutlineSeries,TataMcGraw-hillEducation(India)Pvt.Ltd.
4. Thareja,"DataStructureUsingC"OxfordHigherEducation.
5. AKSharma,"DataStructureUsingC",PearsonEducationIndia.
6. RajeshK.Shukla,"DataStructureUsingCandC++"WileyDreamtechPublication.
7. MichaelT.Goodrich,RobertoTamassia,DavidM.Mount"DataStructuresandAlgorithmsinC++",WileyIndia.
8. P.S.Deshpandey,"CandDatastructure",WileyDreamtechPublication.
9. R.Kruseetal,"DataStructuresandProgramDesigninC",PearsonEducation.
10. Berztiss,AT:Datastructures,TheoryandPractice,AcademicPress.
11. JeanPaulTrembleyandPaulG.Sorenson,"AnIntroductiontoDataStructureswithapplications",McGrawHill.
12. AdamDrozdek"DataStructuresandAlgorithminJava",CengageLearning

DiscreteStructures&TheoryofLogic(BT – 308 **)**

CourseOutcome(CO)		Bloom'sKnowledgeLevel(KL)
Attheendofcourse,thestudentwillbeabletounderstand		
CO1	Writeanargumentusinglogicalnotationanddetermineiftheargumentisorisnotvalid.	K_3,K_4
CO2	Understandthebasicprinciplesofsetsandoperationsinsets.	K_1,K_2
CO3	Demonstrateanunderstandingofrelationsandfunctionsandbeabletodeterminetheir properties.	K_3
CO4	Demonstratedifferenttraversalmethodsfortreesandgraphs.	K_1,K_4
CO5	ModelproblemsinComputerScienceusinggraphsandtrees.	K_2,K_6

DETAILED SYLLABUS		3-0-0
Unit	**Topic**	**Proposed Lecture**
I	**Set Theory**: Introduction, Combination of sets, Multisets, Ordered pairs. Proofs of some generalidentities on sets.Relations: Definition, Operations on relations, Properties of relations, CompositeRelations,Equalityofrelations,Recursivedefinitionofrelation,Orderofrelations. **Functions:** Definition, Classification offunctions, Operations onfunctions, Recursively definedfunctions.GrowthofFunctions. **NaturalNumbers:**Introduction,Mathematical Induction,Variantsof Induction,Induction withNonzeroBasecases.ProofMethods,Proofbycounter–example,Proofby contradiction.	**08**
II	**AlgebraicStructures:**Definition,Groups,Subgroupsandorder,CyclicGroups,Cosets,Lagrange'stheorem,NormalSubgroups,PermutationandSymmetricgroups,GroupHomomorphisms,Definitionandelementarypropertiesof RingsandFields.	**08**
III	**Lattices**:Definition,Propertiesoflattices– Bounded,Complemented,ModularandCompletelattice.BooleanAlgebra:Introduction,AxiomsandTheoremsofBooleanalgebra,Algebraicmanipulationof Booleanexpressions.SimplificationofBooleanFunctions,Karnaughmaps,Logic gates,DigitalcircuitsandBooleanalgebra.	**08**
IV	**PropositionalLogic:**Proposition,wellformedformula,Truthtables,Tautology,Satisfiability,Contradiction,Algebraofproposition,TheoryofInference.(8) **PredicateLogic:**Firstorderpredicate,wellformedformulaofpredicate,quantifiers,Inference theoryofpredicatelogic.	**08**
V	**Trees:**Definition,Binarytree,Binarytreetraversal,Binarysearchtree. **Graphs:**Definitionandterminology,Representationofgraphs,Multigraphs,Bipartitegraphs,Planargraphs,IsomorphismandHomeomorphismofgraphs,EulerandHamiltonianpaths,Graphcoloring,RecurrenceRelation&Generatingfunction:Recursivedefinitionoffunctions,Recursivealgorithms,Method ofsolvingrecurrences. **Combinatorics**:Introduction,CountingTechniques,PigeonholePrinciple	**08**

Textbooks:

1.Koshy,DiscreteStructures,ElsevierPub.2008KennethH.Rosen,DiscreteMathematicsandItsApplications,6/e, McGraw-Hill,2006.

2. B.Kolman,R.C.Busby,andS.C.Ross,DiscreteMathematicalStructures,5/e,PrenticeHall,2004.

3.E.R.Scheinerman,Mathematics:ADiscreteIntroduction,Brooks/Cole,2000.

4.R.P.Grimaldi,DiscreteandCombinatorialMathematics,5/e,AddisonWesley,20045.Lipts chutz,Seymour,“ DiscreteMathematics”,McGrawHill.

6.Trembley,J.P&R.Manohar,“DiscreteMathematicalStructurewithApplicationtoComputerScience”,McGrawH ill.

4.Deo,7.Narsingh,“GraphTheoryWithapplicationtoEngineeringandComputer.Science.”,PHI.

8.Krishnamurthy,V.,“CombinatoricsTheory&Application”,East-WestPressPvt.Ltd.,NewDelhi

Electronics Engineering BT – 326	**3L:1T:0P**	**4Credits**

CourseOutcomes:

Attheendofthiscoursestudentswilldemonstratetheabilityto:

1. UnderstandtheconceptofPNjunctionandspecialpurposediodes.
2. Studytheapplicationofconventionaldiodeandsemiconductordiode.
3. AnalysetheI-VcharacteristicsofBJTandFET.
4. AnalyzetheofOp-Amp,amplifiers,integrator,anddifferentiator.

Understandtheconceptofdigitalstorageoscilloscopeandcompareof DSOwithanalogoscilloscope

Unit	Topics	Lectures
I	PNjunctiondiode:Introductionofsemiconductormaterials;Semiconductordiode:Depletionlayer,V-Icharacteristics,idealandpractical, diode resistance, capacitance, diode equivalent circuits, transitionanddiffusioncapacitance,Zenerdiodesbreakdownmechanism(Zenerand avalanche).	8
II	Diode application: Series, parallel and series, parallel diode configuration,half and full wave rectification, clippers, clampers, Zener diode as shuntregulator, voltage-multiplier circuits special purpose two terminal devices :light-emittingdiodes,Varactor(Varicap)diodes,tunneldiodes,liquid-crystaldisplays.	8
III	Bipolarjunctiontransistorsandfieldeffecttransistor:Bipolarjunctiontransistor:Transistorconstruction,operation,amplificationaction,commonbase,commonemitter,commoncollectorconfigurationdcbiasing BJTs: operating point, fixed-bias, emitter bias, voltage-divider biasconfiguration.Collectorfeedback,emitter-followerconfiguration.Biasstabilization. CE, CB, CC amplifiers and AC analysis of single stage CEamplifier(reModel),Fieldeffecttransistor:Constructionand characteristic of JFETs. AC analysis of CS amplifier, MOSFET (depletionandenhancement)type,transfercharacteristic.	8
IV	Operationalamplifiers:Introduction and block diagramofOp-Amp,ideal&practicalcharacteristicsofOp-Amp,differentialamplifiercircuits,practicalOp-Ampcircuits(invertingamplifier,non-invertingamplifier,unitygainamplifier,summingamplifier,integrator,differentiator),Op-Ampparameters:inputoffsetvoltage,outputoffsetvoltage,inputbiased current,inputoffsetcurrentdifferentialandcommon-modeoperation.	8
V	Electronicinstrumentationandmeasurements:Digitalvoltmeter:Introduction,RAMPtechniquesdigitalmultimeters:IntroductionOscilloscope:introduction,basicprinciple,CRT,blockdiagramofoscilloscope,simple,measurementofvoltage,currentphaseandfrequency using CRO, introduction of digital storage oscilloscope and comparison ofDSOwith analogoscilloscope.	8

Text/ReferenceBooks:

1. RobertL.Boylestand/LouisNashelsky,“ElectronicDevicesandCircuitTheory,”LatestEdition,PearsonEducation.
2. HSKalsi,“ElectronicInstrumentation”,LatestEdition,TMHPublication.
3. Meetidehran/ A.K. singh “fundamental of electronics Engineering”, New ageinternationalpublisher.

TechnicalCommunication(BT 304)
(Effectivefromthesession2019-20)

CourseOutcomes

1. Students willbeenabledto **understand**thenatureandobjectiveofTechnicalCommunicationrelevantfortheworkplaceasEngineers.
2. Studentswill**utilize**thetechnicalwritingforthepurposesofTechnicalCommunicationanditsexposureinvariousdimensions.
3. Students wouldimbibeinputsbypresentationskillsto**enhance**confidenceinfaceofdiverseaudience.
4. Technicalcommunicationskillswill**create**avastknow-howoftheapplicationofthelearningtopromotetheirtechnicalcompetence.
5. Itwouldenablethemto**evaluate**theirefficacyasfluent&efficientcommunicatorsbylearningthevoice-dynamics.

Unit-1FundamentalsofTechnical Communication:
TechnicalCommunication:Features;DistinctionbetweenGeneralandTechnicalCommunication;LanguageasatoolofCommunication;DimensionsofCommunication:Reading & comprehension; Technical writing: sentences; Paragraph; Technical style: Definition,types & Methods; The flow of Communication: Downward; upward, Lateral or Horizontal;BarrierstoCommunication.

Unit-IIForms ofTechnicalCommunication:
Technical Report: Definition & importance;Thesis/Project writing: structure& importance;synopsis writing: Methods; Technical research Paper writing: Methods & style; Seminar &Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; 7 Csofeffectivebusinesswriting:concreteness,completeness,clarity,conciseness,courtesy,correctness,consideration,C.V./Resumewriting;TechnicalProposal:Types,Structure &Draft.

Unit-IIITechnicalPresentation:Strategies& Techniques
Presentation:Forms;interpersonalCommunication;Classroompresentation;style;method;Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance;emotion;Humour;ModesofPresentation;OvercomingStageFear;AudienceAnalysis&retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; AudienceParticipation:Quizzes&Interjections.

Unit-IVTechnical CommunicationSkills:

Interview skills; GroupDiscussion: Objective & Method; Seminar/ConferencesPresentationskills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis;Criticalthinking;Nuances:Expositionnarration&Description;effectivebusinesscommunication competence: Grammatical; Discourse competence: combination of expression &conclusion;Socio-linguisticcompetence:Strategiccompetence:Solutionofcommunicationproblemswithverbalandnonverbalmeans.

Unit-VDimensionsofOralCommunication&VoiceDynamics:

Code and Content; Stimulus & Response; Encoding process; Decoding process; PronunciationEtiquette; Syllables; Vowel sounds; Consonant sounds; Tone: Rising tone; Falling Tone; Flow inSpeaking; Speaking with a purpose; Speech & personality; Professional Personality Attributes:Empathy;Considerateness;Leadership;Competence.

ReferenceBooks

1. TechnicalCommunication–PrinciplesandPracticesbyMeenakshiRaman &SangeetaSharma,OxfordUniv.Press,2007,NewDelhi.
2. PersonalityDevelopmentand SoftSkillsbyBarunK. Mitra,OUP, 2012, NewDelhi.
3. SpokenEnglish-AManualofSpeechandPhoneticsbyR.K.Bansal&J.B.Harrison,OrientBlackswan,2013,NewDelhi.
4. BusinessCorrespondenceandReport WritingbyProf.R.C.Sharma&KrishnaMohan,TataMcGrawHill&Co.Ltd.,2001,NewDelhi.
5. Practical Communication: Process and Practice by L.U.B. Pandey; A.I.T.B.S.PublicationsIndiaLtd.;KrishanNagar,2014,Delhi.

6. ModernTechnicalWritingbySherman,TheodoreA(et.al);ApprenticeHall;NewJerse y;U.S.
7. ATextBookofScientificandTechnicalWritingbyS.D.Sharma;VikasPublication,Delhi.
8. SkillsforEffective BusinessCommunicationbyMichaelMurphy,HarwardUniversity,U.S.
9. Business Communication forManagersbyPayalMehra, PearsonPublication,Delhi.

UniversalHuman Valuesand ProfessionalEthics
BT – 314 3

L	T	P	C
0	0	3	

Objectives:

1. Tohelpstudentsdistinguishbetweenvaluesandskills,andunderstandthenee d,basic guidelines, contentand processofvalueeducation.
2. Tohelpstudentsinitiateaprocessofdialogwithinthemselvestoknowwhatt hey‘reallywant to be’intheir lifeand profession
3. Tohelpstudentsunderstandthemeaningofhappinessandprosperityforahu manbeing.
4. Tofacilitatethestudentstounderstandharmonyatallthelevelsofhumanlivi ng,and live accordingly.
5. Tofacilitatethestudentsinapplyingtheunderstandingofharmonyinexiste ncein their profession and leadan ethicallife

CourseOutcome:

Oncompletionofthiscourse,thestudentswillbeableto

1. Understandthesignificanceofvalueinputsinaclassroom,distinguishbetw een values and skills, understand the need, basic guidelines, content andprocess of value education, explore the meaning of happiness and prosperityanddoacorrectappraisal of thecurrentscenarioin thesociety
2. DistinguishbetweentheSelfandtheBody,understandthemeaningofHarm onyin theSelftheCo-existenceofSelfand Body.
3. Understand the value of harmonious relationship based on trust, respect andothernaturallyacceptablefeelingsinhuman-humanrelationshipsandexploretheirrolein ensuringaharmonious society
4. Understandtheharmonyinnatureandexistence,andworkouttheirmutuall yfulfillingparticipationin thenature.
5. Distinguish between ethical and unethical practices, and start working outthestrategytoactualize aharmoniousenvironmentwherevertheywork.

CatalogueDescription

Every human being has two sets of questions to answer for his life: a) what todo? and, b) how to do?. The first set pertains to the value domain, and the otherto the skill domain. Both are complimentary, but value domain has a higherpriority. Today, education has become more and more skill biased, and hence,thebasicaspirationofahumanbeing,thatistolivewithhappinessandpros perity,getsdefeated,inspiteofabundanttechnologicalprogress.Thiscourse is aimed at giving inputs that will help to ensure the right understandingand right feelings in the students in their life and profession, enabling them toleadanethicallife.Inthiscourse,thestudentslearntheprocessofself-exploration,the difference between the Self and the Body, thenaturally acceptablefeelingsinrelationships ina family,the comprehensivehuman goal in the society, themutual fulfillment in the nature and the co-existence in existence. As a natural outcome of such inputs, they are able toevaluate anethicallifeandprofession ahead.

UNIT-1 **CourseIntroduction-Need,BasicGuidelines,ContentandProcessfor ValueEducation**

Understanding the need, basic guidelines, content and process for Value Education,Self-Exploration–what is it? - its content and process; 'Natural Acceptance' andExperientialValidation-asthemechanismforselfexploration,ContinuousHappinessandProsperity-AlookatbasicHumanAspirations,RightunderstandingRelationshipandPhysicalFacilities-thebasicrequirementsforfulfillmentofaspirationsofeveryhumanbeingwiththeircorrectpriority,UnderstandingHappinessandProsperitycorrectly-Acriticalappraisalofthecurrent scenario, Method to fulfillthe above human aspirations: understanding andlivingin harmonyat various levels.

UNIT-2 **UnderstandingHarmonyintheHumanBeing-HarmonyinMyself**

Understanding human being as a co-existence of the sentient 'I' and the material'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha,Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer),Understandingthecharacteristicsandactivitiesof'I'andharmonyin'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correctappraisalofPhysicalneeds,meaningofProsperityin detail, Programs to oensureSanyamand Swasthya.

UNIT-3 **Understanding Harmony in the Family and Society-Harmony inHuman-HumanRelationship**

UnderstandingharmonyintheFamily-thebasicunitofhumaninteraction,Understandingvaluesinhuman-humanrelationship;meaningof*Nyaya*andprogram for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect(*Samman*) as the foundational values of relationship, Understanding the meaning of*Vishwas*;Differencebetweenintentionandcompetence,Understandingthemeaning of*Samman*,Differencebetween respect anddifferentiation; the othersalient values in relationship, Understanding the harmony in the society (societybeinganextensionoffamily):*Samadhan*,*Samridhi*,*Abhay*,*Sah-astitva*ascomprehensive Human Goals, Visualizing a universal harmonious order in society-UndividedSociety(*AkhandSamaj*),UniversalOrder(*SarvabhaumVyawastha*)-fromfamilyto world family!.

UNIT-4 **Understanding Harmony in the Nature and Existence - Wholeexistenceas Co-existence**

UnderstandingtheharmonyintheNature,Interconnectednessandmutualfulfillment among the four orders of nature- recyclability and self-regulation innature,UnderstandingExistenceasCo-existence(*Sah-astitva*)ofmutuallyinteracting units in all-pervasive space, Holistic perception of harmony at all levelsof existence.

UNIT-5 **Implications of the above Holistic Understanding of Harmony onProfessionalEthics**

Natural acceptance of human values, Definitiveness of EthicalHuman Conduct,BasisforHumanisticEducation,HumanisticConstitutionandHumanisticUniversalOrder,CompetenceinProfessionalEthics:a)Abilitytoutilizetheprofessional competence for augmenting universal human order, b)Abilitytoidentifythescopeandcharacteristicsofpeople-friendlyandeco-friendly. production systems, technologies and management models, Case studies of typicalholistic technologies, management models and production systems, Strategy fortransition from the present state to Universal Human Order: a) At the level ofindividual: as socially and ecologically responsible engineers, technologists andmanagers,b)Atthelevelofsociety:asmutuallyenrichinginstitutionsandorganizations.

TextBooks :

1. RR Gaur,R Sangal,G PBagaria, 2009,AFoundationCoursein HumanValuesand Professional Ethics.

References :

1. IvanIllich, 1974, Energy & Equity, The Trinity Press, Worcester, andHarperCollins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as ifpeople mattered, Blond &Briggs, Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W.Behrens III, 1972, Limits to Growth – Club of Rome's report, UniverseBooks.
5. ANagraj,1998,JeevanVidyaEkParichay,DivyaPathSansthan,Amarkantak.
6. PLDhar,RRGaur,1990,ScienceandHumanism,CommonwealthPublishers.
7. ANTripathy,2003,HumanValues,NewAgeInternationalPublishers.
8. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik)KrishiTantraShodh,Amravati.
9. EGSeebauer&RobertL.Berry,2000,FundamentalsofEthicsforScientists&Engineers ,Oxford University Press
10. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics(including HumanValues),EasternEconomy Edition,PrenticeHallofIndia Ltd.
11. BPBanerjee,2005,Foundationsof EthicsandManagement,ExcelBooks.
12. B LBajpai,2004,Indian Ethosand Modern Management,New RoyalBookCo., Lucknow. Reprinted 2008.

ModeofEvaluation:

Assignment/Seminar/ContinuousAssessmentTest/SemesterEndExam

Mathematics–III (BT – 305)

(IntegralTransform&DiscreteMaths)

(To beoffered toCEand AlliedBranchesCE/EV)

SubjectCode	KAS303/KAS403					
Category	BasicScienceCourse					
SubjectName	MATHEMATICS-III(IntegralTransform &DiscreteMaths)					
SchemeandCredits	**L-T-P**	**Theory Marks**	**Sessional**		**Total**	**Credit**
			Test	**Assig/Att.**		
	3—1—0	100	30	20	150	4
Pre-requisites(if any)	KnowledgeofMathematicsIandIIofB.Tech or equivalent					

COURSEOUTCOMES

	CourseOutcome(CO)	**Bloom's Knowledge Level(KL)**
	Attheend ofthis course,thestudents willbeable to:	
CO1	RemembertheconceptofLaplacetransformandapplyinsolving reallifeproblems.	K1&K3
CO2	Understandthe conceptofFourierandZ–transformtoevaluate engineeringproblems	K2&K4
CO3	RemembertheconceptofFormalLogic,GroupandRingsto evaluatereal lifeproblems	K1&K5
CO4	Applythe concept ofSet,Relation, functionandCounting Techniques	K3
CO5	Applythe conceptofLatticesandBooleanAlgebratocreateLogicGatesan dCircuits,TruthTable, Boolean Functions, KarnaughMaps	K3&K6

K1–Remember,K2–Understand,K3–Apply,K4–Analyze,K5–Evaluate,K6–Create

Thestudents willlearn:

- Theideaof Laplacetransformoffunctionsandtheirapplication
- Theideaof Fouriertransform offunctionsandtheirapplications
- Thebasicideas oflogicand Groupanduses.
- Theideas ofsets, relation, functionand countingtechniques.
- Theideaoflattices,Booleanalgebra,TablesandKarnaughmaps.

LaplaceTransform ***(8)***

Laplace transform,Existence theorem,Laplace transformsof derivativesandintegrals,Initialand final value theorems, Unit step function, Dirac- delta function, Laplace transform of periodicfunction,InverseLaplacetransform,Convolutiontheorem,Applicationtosolvesimplelineara ndsimultaneous differentialequations.

MODULEII

IntegralTransforms **(9)**

Fourier integral, Fourier Transform , Complex Fourier transform, Inverse Transforms,ConvolutionTheorems,Fouriersineandcosinetransform,Applicationsof Fouriertransformtosimple one dimensional heat transfer equations, wave equations and Laplace equations, Z-Transformand its application to solvedifferenceequations.

Module-III ***(8)***

Formal Logic ,Group, Ring and Field: Introduction to First order logic, Proposition, AlgebraofProposition,Logicalconnectives,Tautologies,contradictionsandcontingency,Logicalimplication, Argument, Normal form, Rules of inferences, semi group, Monoid Group, Group,Cosets,Lagrange's theorem, Congruence relation , Cyclic and permutation groups, Propertiesofgroups, Rings andFields(definition, examples and standardresultsonly)

Module-IV ***(10)***

Set,Relation,functionandCountingTechniques-IntroductionofSets,RelationandFunction, Methods of Proof, Mathematical Induction, Strong Mathematical Induction, Discretenumeric function and Generating functions, recurrence relations and their solution , Pigeonholeprinciple.

Module-V ***(10)***

Lattices and Boolean Algebra: Introduction, Partially ordered sets, Hasse Diagram, Maximaland Minimal element, Upper and Lower bounds, Isomorphic ordered sets, Lattices, BoundedLatticesand , DistributiveLattices.

Duality, Boolean Algebras as Lattices, Minimization of Boolean Expressions, prime Implicants,LogicGates andCircuits, Truth Table, BooleanFunctions,Karnaugh Maps.

TextBooks

1. E.Kreyszig:AdvancedEngineeringMathematics;JohnWiley&Sons.
2. R.K.Jain&S.R.K.Iyenger:AdnancedEngineeringMathematics,Narosa PublishingHouse.
3. C.L.Liu: Elements of Discrete Mathematics; Tata McGraw- Hill Publishing CompanyLimited,NewDelhi.
4. S. Lipschutz, M.L. Lipson and Varsha H. Patil: Discrete Mathematics; Tata McGraw-HillPublishingCompanyLimited, New Delhi
5. B.Kolman,RobertC.Busby&S.C.Ross:DiscreteMathematicalStructures'5thEdition, Perason Education (Singapore), Delhi,India.

ReferenceBooks

1. B.S.Grewal:HigherEngineeringMathematics;KhannaPublishers,NewDelhi.
2. B.V. Ramana: Higher Engineering Mathematics; Tata McGraw- Hill PublishingCompanyLimited, NewDelhi.
3. PeterV.O'Neil.AdvancedEngineeringMathematics,Thomas(Cengage)Learning.
4. KennethH.Rosem:DiscreteMathematicsitsApplication,withCombinatoricsandGraphTheory;Tata McGraw- Hill PublishingCompanyLimited, NewDelhi
5. K.D.Joshi:FoundationofDiscreteMathematics;NewAge International(P)Limited,Publisher,New Delhi.

Evaluationmethodologytobefollowed:

Theevaluationandassessmentplan consistsof thefollowing components:

a. Classattendance andparticipationinclassdiscussionsetc.
b. Quiz.
c. Tutorialsandassignments.
d. Sessionalexamination.
e. Finalexamination.

AwardofInternal/ExternalMarks:

Assessmentprocedurewillbeas follows:

1. Thesewillbecomprehensiveexaminationsheldon-campus(Sessionals).
2. Quiz.
   a. Quiz willbeof typemultiplechoice,fill-in-the-blanks ormatchthecolumns.
   b. Quizwillbeheld periodically.
3. Tutorialsandassignments
   a. Theassignments/home-work maybeof multiplechoicetypeorcomprehensive type atleastone assignment from eachModule/Unit.
   b. Thegradesanddetailedsolutionsofassignments (ofbothtypes)willbeaccessibleonlineafterthesubmissiondeadline.
4. Finalexaminations.
   Thesewillbecomprehensiveexternalexaminationsheldon-campusoroffcampus(Externalexamination)ondatesfixedbytheDr.APJAbdulKalamTechnical University,Lucknow.

Microprocessor(BT – 408**)**

CourseOutcome(CO)		Bloom'sKnowledgeLevel(KL)
Attheendofcourse,thestudentwillbeabletounderstand		
CO1	ApplyabasicconceptofdigitalfundamentalstoMicroprocessorbasedpersonalcomputer system.	K3,K4
CO2	Analyzeadetaileds/w&h/wstructureoftheMicroprocessor.	K2,K4
CO3	Illustratehowthedifferentperipherals(8085/8086)areinterfacedwith Microprocessor.	K_3
CO4	AnalyzethepropertiesofMicroprocessors(8085/8086)	K_4
CO5	Evaluatethedatatransferinformationthroughserial&parallelports.	K_5

DETAILED SYLLABUS		**3-1-0**
Unit	**Topic**	**Proposed Lecture**
I	Microprocessorevolutionandtypes,microprocessorarchitectureandoperationofitscomponents, addressingmodes,interrupts,datatransferschemes,instructionanddataflow,timerandtiming diagram,Interfacingdevices.	**08**
II	Pin diagram and internal architecture of 8085 microprocessor, registers, ALU, Control & status,interrupt andmachine cycle.Instruction sets. Addressing modes.Instruction formats InstructionClassification:datatransfer,arithmeticoperations,logicaloperations,branching operations, machinecontrolandassemblerdirectives.	**08**
III	Architectureof8086microprocessor:registerorganization,businterfaceunit,executionunit, memoryaddressing,andmemorysegmentation.Operatingmodes.Instructionsets,instructionformat,Typesofinstructions.Interrupts:hardwareandsoftwareinterrupts.	**08**
IV	Assemblylanguageprogrammingbasedonintel8085/8086.Instructions,datatransfer,arithmetic,logic,branchoperations,looping,counting,indexing,programmingtechniques,counters andtime delays,stacksandsubroutines,conditionalcallandreturninstructions	**08**
V	Peripheral Devices:8237DMAController,8255programmableperipheralinterface,8253/8254programmabletimer/counter,8259programmableinterruptcontroller,8251USARTandRS232C.	**08**

Textbooks:

1. Gaonkar,RameshS,"MicroprocessorArchitecture,ProgrammingandApplicationswith
2. 8085",PenramInternationalPublishing.
3. RayAK,BhurchandiKM,"AdvancedMicroprocessorsandPeripherals",TMH
4. HallDV,"MicroprocessorInterfacing',TMH
5. Liuand,"IntroductiontoMicroprocessor",TMH
6. Brey,BarryB,"INTELMicroprocessors",PHI
7. RenuSigh&B.P.GibsonGA,"MicrocomputerSystem:The8086/8088family'',PHI
8. AdityaPMathurSigh,"Microprocessor,InterfacingandApplicationsMRafiqzzaman,"Microprocessors,TheoryandApplications
9. J.L.Antonakos,AnIntroductiontotheIntelFamilyofMicroprocessors,Pearson,1999

B.TECH.(COMPUTERSCIENCEANDENGINEERING)

FOURTHSEMESTER(DETAILEDSYLLABUS)

Operatingsystems(BT – 406**)**

CourseOutcome(CO)		**Bloom'sKnowledgeLevel(KL)**
Attheendofcourse,thestudentwillbeabletounderstand		
CO1	UnderstandthestructureandfunctionsofOS	K_1,K_2
CO2	LearnaboutProcesses,ThreadsandSchedulingalgorithms.	K_1,K_2
CO3	UnderstandtheprinciplesofconcurrencyandDeadlocks	K_2
CO4	Learnvariousmemorymanagementscheme	K_2
CO5	StudyI/OmanagementandFilesystems.	K_2,K_4

DETAILED SYLLABUS		**3-0-0**
Unit	**Topic**	**Proposed Lecture**
I	**Introduction**:Operatingsystemandfunctions,ClassificationofOperatingsystems-Batch,Interactive,Timesharing,RealTimeSystem,MultiprocessorSystems,MultiuserSystems,MultiprocessSystems,MultithreadedSystems,OperatingSystemStructure-Layeredstructure,SystemComponents,OperatingSystemservices,ReentrantKernels,MonolithicandMicrokernel Systems.	**08**
II	**Concurrent Processes**: Process Concept, Principle of Concurrency, Producer / Consumer Problem,Mutual Exclusion, Critical Section Problem, Dekker's solution, Peterson's solution,Semaphores,TestandSetoperation;ClassicalProbleminConcurrency-DiningPhilosopherProblem,Sleeping BarberProblem;InterProcessCommunicationmodelsandSchemes,Processgeneration.	**08**
III	**CPU Scheduling:** Scheduling Concepts, Performance Criteria, Process States, Process TransitionDiagram, Schedulers, Process Control Block (PCB), Process address space, Process identificationinformation,Threadsandtheirmanagement,SchedulingAlgorithms,MultiprocessorScheduling. Deadlock:Systemmodel,Deadlockcharacterization,Prevention,Avoidanceanddetection, Recoveryfromdeadlock.	**08**
IV	**MemoryManagement:**Basicbaremachine,Residentmonitor,Multiprogrammingwithfixedpartitions, Multiprogramming with variable partitions, Protection schemes, Paging, Segmentation,Pagedsegmentation,Virtualmemoryconcepts,Demandpaging,Performanceofdemandpaging, Pagereplacementalgorithms,Thrashing,Cachememoryorganization,Localityofreference.	**08**
V	**I/O Management and Disk Scheduling**: I/O devices, and I/O subsystems,I/O buffering, Diskstorageanddiskscheduling,RAID.FileSystem:Fileconcept,Fileorganizationandaccessmechanism,Filedirectories,andFilesharing,Filesystemimplementationissues,Filesystem protectionandsecurity.	**08**

Textbooks:

1. Silberschatz,GalvinandGagne,"OperatingSystemsConcepts",Wiley
2. SibsankarHalderandAlexAAravind,"OperatingSystems",PearsonEducation
3. HarveyMDietel,"AnIntroductiontoOperatingSystem",PearsonEducation
4. DMDhamdhere,"OperatingSystems:AConceptbasedApproach",2ndEdition,
5. TMH5.WilliamStallings,"OperatingSystems:InternalsandDesignPrinciples",6thEdition,PearsonEducation

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Textbooks:

1. WilliamStallings,NetworkSecurityEssentials:ApplicationsandStandards,PrenticeHall,4thedition,2010.

2. MichaelT.GoodrichandRobertoTamassia,IntroductiontoComputer Security,AddisonWesley,2011.

3. WilliamStallings,NetworkSecurityEssentials:ApplicationsandStandards,PrenticeHall,4thedition,2010.

4. AlfredJ.Menezes,PaulC.vanOorschotandScottA.Vanstone,HandbookofAppliedCryptography,CRCPress,2001.

PYTHONPROGRAMMING (BT – 410)		
CourseOutcome(CO)		**Bloom'sKnowledgeLevel(KL)**
Attheend ofcourse ,thestudentwillbe ableto understand		
CO1	Toreadandwritesimple Pythonprograms.	K_1,K_2
CO2	TodevelopPythonprogramswithconditionalsandloops.	K_2,K_4
CO3	TodefinePythonfunctionsandto usePythondatastructures–-lists,tuples,dictionaries	K_3
CO4	Todoinput/outputwithfilesinPython	K_2
CO5	Todosearching,sortingand mergingin Python	K_2,K_4

DETAILED SYLLABUS		**3-1-0**
Unit	**Topic**	**Proposed Lecture**
I	**Introduction:**TheProgrammingCycleforPython, PythonIDE,InteractingwithPythonPrograms,Elements ofPython,TypeConversion. **Basics:**Expressions,AssignmentStatement,ArithmeticOperators,OperatorPrecedence,BooleanExpression.	**08**
II	**Conditionals:**ConditionalstatementinPython(if-elsestatement,itsworkingandexecution),Nested-ifstatement andElifstatement inPython,ExpressionEvaluation&FloatRepresentation. **Loops:**Purposeandworkingofloops,Whileloopincludingitsworking,ForLoop,NestedLoops, Breakand Continue.	**08**
III	**Function:**PartsofAFunction,ExecutionofAFunction,KeywordandDefaultArguments,Scope Rules. **Strings:**LengthofthestringandperformConcatenationandRepeatoperationsinit.IndexingandSlicingofStrings. **PythonDataStructure:**Tuples,UnpackingSequences,Lists,MutableSequences,ListComprehension, Sets , Dictionaries **HigherOrderFunctions:**Treat functionsasfirst classObjects ,LambdaExpressions	**08**

IV	**SieveofEratosthenes:**generateprimenumberswiththehelpofanalgorithmgivenbytheGreekMathematiciannamedEratosthenes, whosealgorithmisknownas SieveofEratosthenes. **FileI/O:** FileinputandoutputoperationsinPythonProgramming **ExceptionsandAssertions** **Modules :** Introduction, ImportingModules, **AbstractDataTypes:**AbstractdatatypesandADT interfaceinPythonProgramming. **Classes:**Classdefinitionandotheroperationsintheclasses,SpecialMethods(suchas_init_, _str_,comparisonmethodsandArithmeticmethodsetc.),ClassExample,Inheritance,InheritanceandOOP.	**08**
V	**Iterators& Recursion:** Recursive Fibonacci ,TowerOfHanoi **Search:**SimpleSearchandEstimatingSearchTime,BinarySearchandEstimatingBinarySearchTime **Sorting&Merging:** Selection Sort,MergeList ,Merge Sort ,HigherOrder Sort	**08**

Textbooks:

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist‘‘, 2nd edition, Updated for Python 3,Shroff/O‘ReillyPublishers,2016 (http://greenteapress.com/wp/thinkpython/)

2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, NetworkTheoryLtd., 2011.

3.JohnV Guttag,―IntroductiontoComputationandProgrammingUsingPython‘‘,RevisedandexpandedEdition,MITPress, 2013

4.Robert Sedgewick, Kevin Wayne, Robert Dondero, ―Introduction to Programming in Python: An Inter-disciplinaryApproach,PearsonIndia Education Services Pvt. Ltd.,2016.

5.Timothy A. Budd, ―Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd.,, 2015.6.KennethA.Lambert,―FundamentalsofPython:FirstPrograms‖,CENGAGELearning,2012.

7.Charles Dierbach, ―Introduction to Computer Science using Python: A Computational ProblemSolving Focus, WileyIndiaEdition, 2013.

8.PaulGries,JenniferCampbellandJasonMontojo,―PracticalProgramming: AnIntroductiontoComputerScience usingPython3‖,Secondedition,PragmaticProgrammers,LLC,2013.

TheoryofAutomataandFormalLanguages

(BT-407)

	CourseOutcome(CO)	**Bloom'sKnowledgeLevel(KL)**
	Attheendofcourse,thestudentwillbeabletounderstand	
CO1	Analyseanddesignfiniteautomata,pushdownautomata,Turingmachines,formallanguages,and grammars	K4,K6
CO2	Analyseanddesign,Turingmachines,formallanguages,andgrammars	K4,K6
CO3	Demonstratetheunderstandingofkeynotions,suchasalgorithm,computability,decidability,and complexitythroughproblemsolving	K1,K5
CO4	ProvethebasicresultsoftheTheoryofComputation.	K2,K3
CO5	StateandexplaintherelevanceoftheChurch-Turingthesis.	K1,K5

DETAILED SYLLABUS		**3-1-0**
Unit	**Topic**	**Proposed Lecture**
I	**BasicConceptsandAutomataTheory:**IntroductiontoTheoryofComputation-Automata,Computability and Complexity, Alphabet, Symbol, String, Formal Languages, Deterministic FiniteAutomaton(DFA)-Definition,Representation,AcceptabilityofaStringandLanguage,NonDeterministic Finite Automaton (NFA), Equivalence of DFA and NFA,NFA with ε-Transition,EquivalenceofNFA'swithandwithoutε-Transition,FiniteAutomatawithoutput-MooreMachine,MealyMachine,EquivalenceofMooreandMealyMachine,MinimizationofFinite Automata,Myhill-NerodeTheorem,SimulationofDFAandNFA	**08**
II	**Regular Expressions and Languages:** Regular Expressions, Transition Graph, Kleen's Theorem,FiniteAutomataandRegularExpression-Arden'stheorem,AlgebraicMethodUsingArden'sTheorem,RegularandNon-RegularLanguages-ClosurepropertiesofRegularLanguages,Pigeonhole Principle, Pumping Lemma, Application of Pumping Lemma, Decidability-Decisionproperties,FiniteAutomataandRegularLanguages,RegularLanguagesandComputers, SimulationofTransitionGraphandRegularlanguage.	**08**
III	**RegularandNon-RegularGrammars**:ContextFreeGrammar(CFG)-Definition,Derivations,Languages,DerivationTreesandAmbiguity,RegularGrammars-RightLinearandLeftLineargrammars, Conversion of FA into CFG and Regular grammar into FA,Simplification of CFG,NormalForms-ChomskyNormalForm(CNF),GreibachNormalForm(GNF),Chomsky Hierarchy,Programmingproblemsbasedonthepropertiesof CFGs.	**08**
IV	**Push Down Automata and Properties of Context Free Languages**: Nondeterministic PushdownAutomata (NPDA)- Definition, Moves, A Language Accepted by NPDA, Deterministic PushdownAutomata(DPDA)andDeterministicContextfreeLanguages(DCFL),PushdownAutomataforContext Free Languages, Context Free grammars for Pushdown Automata, Two stack PushdownAutomata,PumpingLemmaforCFL,ClosurepropertiesofCFL,DecisionProblemsofCFL, Programmingproblemsbasedonthepropertiesof CFLs.	**08**

V	**TuringMachinesandRecursiveFunctionTheory**:BasicTuringMachineModel,Representation of Turing Machines, Language Acceptability of Turing Machines, Techniques forTuring Machine Construction, Modifications of Turing Machine, Turing Machine as Computer ofIntegerFunctions,UniversalTuringmachine,LinearBoundedAutomata,Church'sThesis,RecursiveandRecursivelyEnumerablelanguage,HaltingProblem,Post'sCorrespondance Problem,IntroductiontoRecursiveFunctionTheory.	**08**

Textbooks:

1. IntroductiontoAutomatatheory,LanguagesandComputation,J.E.Hopcraft,R.Motwani,andUllman.2ndedition,PearsonEducationAsia
2. Introductiontolanguagesandthetheoryofcomputation,JMartin,3rdEdition,TataMcGrawHill
3. ElementsandTheoryofComputation,CPapadimitrouandC.L.Lewis,PHI
4. MathematicalFoundationofComputerScience,Y.N.Singh,NewAgeInternationa

CompilerDesign(BT – 513)		
CourseOutcome(CO)		**Bloom'sKnowledgeLevel(KL)**
Attheend ofcourse ,thestudentwillbe able to:		
CO1	Acquireknowledgeofdifferentphasesandpassesofthecompilerandalsoabletousethe compilertoolslikeLEX,YACC,etc.Studentswillalsobeabletodesigndifferenttypesofcompi lertoolsto meet therequirements oftherealisticconstraintsofcompilers.	K_3,K_6
CO2	Understandtheparser anditstypesi.e.Top-Down andBottom-upparsersandconstructionof LL,SLR, CLR, and LALRparsingtable.	K_2,K_6
CO3	Implementthecompilerusingsyntax-directedtranslationmethodandgetknowledgeaboutthe synthesizedandinheritedattributes.	K_4,K_5
CO4	Acquireknowledgeaboutruntimedatastructurelikesymboltableorganizationanddifferent techniquesusedinthat.	K_2,K_3
CO5	Understandthetarget machine'sruntimeenvironment,itsinstructionset forcodegeneration andtechniquesusedforcodeoptimization.	K_2,K_4
DETAILED SYLLABUS		**3-0-0**

Unit	Topic	Proposed Lecture
I	**Introduction to Compiler**: Phases and passes, Bootstrapping, Finitestate machines and regularexpressions and their applications to lexical analysis, Optimization of DFA-Based Pattern Matchersimplementation of lexical analyzers, lexical-analyzer generator, LEX compiler, Formal grammarsandtheirapplicationtosyntaxanalysis,BNFnotation,ambiguity,YACC.Thesyntactic specificationofprogramminglanguages:Contextfreegrammars,derivationandparsetrees, capabilitiesofCFG.	**08**
II	**Basic Parsing Techniques:** Parsers, Shift reduce parsing, operator precedence parsing, top downparsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, the canonicalCollectionofLR(0)items,constructingSLRparsingtables,constructingCanonicalLR parsing tables,ConstructingLALRparsingtables,usingambiguousgrammars,anautomaticparsergener ator,implementationofLRparsingtables.	**08**
III	**Syntax-directed Translation:** Syntax-directed Translation schemes, Implementation of Syntax-directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three addresscode, quadruple & triples, translation of assignment statements, Boolean expressions, statementsthat alter the flow of control, postfix translation, translation with a top down parser. More about translation:Arrayreferencesinarithmeticexpressions,procedurescall,declarationsandcase statements.	**08**
IV	**SymbolTables**:Data structure for symbolstables, representing scope information.Run-TimeAdministration: Implementation of simple stack allocation scheme, storage allocation in blockstructuredlanguage.ErrorDetection&Recovery:LexicalPhaseerrors,syntacticphaseerror s semanticerrors.	**08**
V	**Code Generation:** Design Issues, the Target Language. Addresses in the Target Code, BasicBlocksandFlow Graphs, Optimization ofBasicBlocks,CodeGenerator. Codeoptimization:Machine-IndependentOptimizations,Loopoptimization,DAGrepresentationofbasicblocks, valuenumbersand algebraiclaws,Global Data-Flow analysis.	**08**

Textbooks:

1. Aho,Sethi&Ullman,"Compilers:Principles,TechniquesandTools",PearsonEducation
2. K.Muneeswaran,CompilerDesign,FirstEdition,OxfordUniversityPress
3. J.P.Bennet,"IntroductiontoCompilerTechniques",SecondEdition,McGraw-Hill,2003.
4. HenkAlblasandAlbertNymeyer,"PracticeandPrinciplesofCompilerBuildingwithC",PHI,2001.
5. VRaghvan,"PrinciplesofCompilerDesign",McGraw-Hill,
6. KennethLouden,"CompilerConstruction",CengageLearning.
7. CharlesFischerandRicardLeBlanc,"CraftingaCompilerwithC",PearsonEducation

CONSTITUTIONOFINDIA,LAWANDENGINEERING BT - 510

L:T:P:2:0:0

COURSEOUTCOME: Attheend ofthecourse,learnersshouldbeableto-

1. Identifyandexplorethebasicfeaturesandmodalitiesabout Indianconstitution.
2. Differentiateand relatethefunctioningofIndianparliamentarysystematthecenterandstate level.
3. DifferentiatedifferentaspectsofIndianLegalSystemanditsrelatedbodies.
4. Discoverandapplydifferentlawsandregulationsrelatedtoengineeringpractices.
5. Correlateroleofengineerswithdifferentorganizationsandgovernancemodels

Module1--IntroductionandBasicInformationaboutIndianConstitution:

Meaning of the constitution law and constitutionalism, Historical Background of the ConstituentAssembly, Government of India Act of 1935 and Indian Independence Act of 1947,EnforcementoftheConstitution,IndianConstitutionanditsSalientFeatures,ThePreambleofthe Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy,Parliamentary System, Federal System, Centre-State Relations, Amendment of the ConstitutionalPowers and Procedure, The historical perspectives of the constitutional amendments in India,Emergency Provisions: National Emergency, President Rule, Financial Emergency, and LocalSelfGovernment–ConstitutionalSchemeinIndia.

Module2-UnionExecutiveandStateExecutive:

Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers andFunctions of the President, Comparison of powers of Indian President with the United States,Powers and Functions of the Prime Minister, Judiciary – The Independence of the SupremeCourt, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism,LokPal, Lok Ayukta, The Lokpal and Lok ayuktas Act 2013, State Executives – Powers andFunctions of the Governor, Powers and Functions of the Chief Minister, Functions of StateCabinet,FunctionsofState Legislature,FunctionsofHighCourtandSubordinate Courts.

Module3- IntroductionandBasicInformationaboutLegalSystem:

TheLegalSystem: SourcesofLawandtheCourtStructure:Enactedlaw-ActsofParliamentare of primary legislation, Common Law or Case law, Principles taken from decisions of judgesconstitute binding legal rules. The Court System in India and Foreign Courtiers (District Court,DistrictConsumerForum,Tribunals,HighCourts,SupremeCourt).Arbitration:Asanalternative to resolving disputes in the normal courts, parties who are in dispute can agree thatthiswill instead bereferred toarbitration.Contract law,Tort,Lawatworkplace.

Module4-IntellectualPropertyLawsandRegulationtoInformation:

IntellectualPropertyLaws:Introduction,LegalAspectsofPatents,FilingofPatentApplications,Righ tsfromPatents,InfringementofPatents,CopyrightanditsOwnership,InfringementofCopyright,Civil RemediesforInfringement,RegulationtoInformation-Introduction, Right to Information Act, 2005, Information Technology Act, 2000, ElectronicGovernance,SecureElectronicRecordsandDigitalSignatures,DigitalSignatureCertificate s,CyberRegulationsAppellateTribunal,Offences,Limitationsof theInformationTechnologyAct.

Module5-BusinessOrganizationsandE-Governance:

Sole Traders, Partnerships: Companies: The Company's Act: Introduction, Formation of aCompany,MemorandumofAssociation,ArticlesofAssociation,Prospectus,Shares,Directors,GeneralMeetingsandProceedings,Auditor,Windingup.

E-Governance and role of engineers in E-Governance, Need for reformed engineering serving atthe Union and State level, Role of I.T. professionals in Judiciary, Problem of Alienation andSecessionismfew statescreatinghurdlesinIndustrialdevelopment.

COURSEOBJECTIVE:

- Toacquaintthestudentswithlegaciesofconstitutionaldevelopmentin India and help those to understand the most diversified legal document of India and philosophy behind it.
- To make students aware of the theoretical and functional aspects of the Indian Parliamentary System.
- To channelize students' thinking towards basic understanding of the legal concepts and its implications for engineers.
- To acquaint students with latest intellectual property rights and innovation environment with related regulatory framework.
- To make students learn about role of engineering in business organizations and e-governance.

Pedagogy: Lecture, Problem based learning, Group discussions, Visual media, Films, Documentaries, Debate forums.

SuggestedReadings:

- Brij Kishore Sharma: *Introduction to the Indian Constitution*, 8th Edition, PHI Learning Pvt. Ltd.
- Granville Austin: *The Indian Constitution: Cornerstone of a Nation (Classic Reissue)*, Oxford University Press.
- S. G Subramanian: *Indian Constitution and Indian Polity*, 2nd Edition, Pearson Education 2020.
- Subhash C. Kashyap: *Our Constitution: An Introduction to India's Constitution and constitutional Law*, NBT, 2018.
- Madhav Khosla: *The Indian Constitution*, Oxford University Press.
- PM Bakshi: *The Constitution of India*, Latest Edition, Universal Law Publishing.
- V.K. Ahuja: *Law Relating to Intellectual Property Rights* (2007)
- Suresh T. Viswanathan: *The Indian Cyber Laws, Bharat Law House*, New Delhi-88
- P. Narayan: Intellectual Property Law, Eastern Law House, New Delhi
- Prabudh Ganguli: *Gearing up for Patents: The Indian Scenario*, Orient Longman.
- BL Wadehra: Patents, Trademarks, *Designs and Geological Indications Universal Law* Publishing-Lexis Nexis.
- *Intellectual Property Rights: Law and Practice, Module III* by ICSI (only relevant sections)
- Executive programme study material Company Law, Module II, by ICSI (The Institute of Companies Secretaries of India) (Only relevant sections i.e., Study 1, 4 and 36). https://www.icsi.edu/media/webmodules/publications/Company%20Law.pdf
- Handbook on e-Governance Project Lifecycle, Department of Electronics & Information Technology, Government of India, https://www.meity.gov.in/writereaddata/files/e-Governance_Project_Lifecycle_Participant_Handbook-5Day_CourseV1_20412.pdf
- Companies Act, 2013 Key highlights and analysis by PWC. https://www.pwc.in/assets/pdfs/publications/2013/companies-act-2013-key-highlights-and-analysis.pdf

ReferredCaseStudies:

- Keshavanand BharatiV.StateofKerala,AIR1973SC1461.
- ManekaGandhiV.UnionofIndiaAIR,1978 SC597.
- S.R.BammaiV.UnionofIndia,AIR1994 SC1918.
- KuldipNayyar V. UnionofIndia,AIR2006SC312.
- A.D.M.JabalpurV.ShivkantShakla,AIR1976SC1207.
- Remshwar PrasadV. UnionofIndia,AIR2006SC980.
- KeshavSingh inre,AIR1965 SC745.
- UnionofIndiaV.Talsiram,AIR1985SC1416.
- AtiabariTea EstateCo.V.StateofAssam,AIR1961SC232.
- SBP&Co.Vs.PatelEngg.Ltd.2005(8)SCC618.
- KrishnaBhagyaJalaNigamLtd.Vs.G.ArischandraReddy(2007)2SCC720.
- Oil&NaturalGasCorporationVs.SawPipesLtd.2003 (4)SCALE92 – 185.

***** (Other relevant case studies can be consulted by the teacher as per the***

topic).PrescribedLegislations:

1. InformationTechnologyAct, 2000withlatestamendments.
2. RTIAct 2005withlatestamendments.
3. InformationTechnologyRules, 2000
4. Cyber RegulationAppellateTribunalRules,2000

DesignandAnalysisofAlgorithmBT – 512		
CourseOutcome(CO)		**Bloom'sKnowledgeLevel(KL)**
Attheend ofcourse ,thestudentwillbe able to:		
CO1	Designnewalgorithms,provethemcorrect,andanalyzetheirasymptoticandabsoluteruntime andmemorydemands.	K_4,K_6
CO2	Findanalgorithmtosolvetheproblem(create) and provethatthealgorithmsolvesthe problem correctly(validate).	K_5,K_6
CO3	Understand themathematicalcriterionfordeciding whetheranalgorithmisefficient,andknow manypracticallyimportantproblemsthatdonot admitanyefficient algorithms.	K_2,K_5
CO4	Applyclassicalsorting,searching,optimizationandgraphalgorithms.	K_2,K_4
CO5	Understandbasictechniquesfordesigningalgorithms,includingthetechniquesofrecursion, divide-and-conquer,andgreedy.	K_2,K_3

DETAILEDSYLLABUS		3-1-0
Unit	**Topic**	**Proposed Lecture**
I	**Introduction:**Algorithms,AnalyzingAlgorithms,ComplexityofAlgorithms,Growth o fFunctions,PerformanceMeasurements,SortingandOrder Statistics-ShellSort,QuickSort,Merge Sort,HeapSort,ComparisonofSortingAlgorithms,SortinginLinearTime.	**08**
II	**AdvancedDataStructures:**Red-BlackTrees,B–Trees,BinomialHeaps,FibonacciHeaps, Tries,SkipList	**08**
III	**DivideandConquer**withExamplesSuchasSorting,MatrixMultiplication,ConvexHullandSearching. **GreedyMethods**withExamplesSuchasOptimalReliabilityAllocation,Knapsack,Minimum SpanningTrees–Prim'sandKruskal'sAlgorithms,SingleSourceShortestPaths-Dijkstra'sandBellmanFord Algorithms.	**08**
IV	**Dynamic Programming** with Examples Such as Knapsack. All Pair Shortest Paths–Warshal'sand Floyd's Algorithms, Resource Allocation Problem.Backtracking,BranchandBoundwithExamplesSuchasTravellingSalesmanProblem,Graph Coloring,n-QueenProblem,HamiltonianCyclesandSumofSubsets.	**08**
V	**SelectedTopics:**AlgebraicComputation,FastFourierTransform,StringMatching,TheoryofNP-Completeness,ApproximationAlgorithmsandRandomizedAlgorithms	**08**

Textbooks:

1. ThomasH.Coreman,CharlesE.LeisersonandRonaldL.Rivest,“IntroductiontoAlgorithms”,PrinticeHallof India.
2. E.Horowitz&SSahni,"Fundamentalsof ComputerAlgorithms",
3. Aho,Hopcraft,Ullman,“TheDesignandAnalysisofComputerAlgorithms”PearsonEducation,2008.
4. LEE"Design&AnalysisofAlgorithms(POD)",McGrawHill
5. RichardE.Neapolitan"FoundationsofAlgorithms"Jones&BartlettLearning
6. JonKleinbergand ÉvaTardos, AlgorithmDesign, Pearson, 2005.
7. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples,SecondEdition,Wiley, 2006.
8. HarryR.LewisandLarryDenenberg,DataStructuresandTheirAlgorithms,Harper Collins,1997
9. RobertSedgewickandKevinWayne, Algorithms,fourthedition, AddisonWesley, 2011.
10. HarshBhasin,”AlgorithmDesignandAnalysis”,FirstEdition,OxfordUniversityPress.
11. GillesBrassardandPaulBratley,Algorithmics:TheoryandPractice,PrenticeHall,1995.

B.TECH.(CSE & CS)

FIFTHSEMESTER(DETAILEDSYLLABUS)

DatabaseManagementSystem(BT – 511 **)**

CourseOutcome(CO)		**Bloom'sKnowledgeLevel(KL)**
Attheend ofcourse ,thestudentwillbe able to:		
CO1	Applyknowledgeofdatabaseforreallifeapplications.	K_3
CO2	Applyqueryprocessingtechniquestoautomatethereal timeproblemsofdatabases.	K_3,K_4
CO3	Identifyandsolvetheredundancyproblemindatabasetables usingnormalization.	K_2,K_3
CO4	Understand theconcepts oftransactions, theirprocessingsothey willfamiliarwithbroad range ofdatabasemanagementissuesincludingdataintegrity,securityandrecovery.	K_2,K_4
CO5	Design,developandimplement asmall databaseproject usingdatabasetools.	K_3,K_6

DETAILEDSYLLABUS		**3-1-0**
Unit	**Topic**	**Proposed Lecture**
I	**Introduction:**Overview,DatabaseSystemvsFileSystem,DatabaseSystemConceptandArchitecture, Data Model Schema and Instances, Data Independence and Database Language andInterfaces, Data Definitions Language, DML, Overall Database Structure. Data Modeling Using theEntity Relationship Model: ER Model Concepts, Notation for ER Diagram, Mapping Constraints,Keys,ConceptsofSuperKey,CandidateKey,PrimaryKey,Generalization,Aggregation, ReductionofanERDiagramstoTables,ExtendedERModel,RelationshipofHigher Degree.	**08**
II	**Relational data Model and Language:** Relational Data Model Concepts, IntegrityConstraints,Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints, Relational Algebra,Relational Calculus, Tuple and Domain Calculus. Introduction on SQL: Characteristics of SQL,Advantage of SQL. SQl Data Type and Literals. Types of SQL Commands. SQL Operators andTheirProcedure.Tables, Views andIndexes.QueriesandSub Queries. AggregateFunctions.Insert,UpdateandDeleteOperations,Joins,Unions,Intersection,Minus,Cursors,Triggers, ProceduresinSQL/PLSQL	**08**
III	**Data Base Design & Normalization:** Functional dependencies, normal forms, first, second, 8 thirdnormalforms,BCNF,inclusiondependence,losslessjoindecompositions,normalizationusing FD,MVD,andJDs,alternativeapproachestodatabasedesign	**08**
IV	**Transaction Processing Concept:** Transaction System, Testing of Serializability, Serializability ofSchedules, Conflict & View Serializable Schedule, Recoverability, Recovery from TransactionFailures, LogBasedRecovery,Checkpoints,DeadlockHandling.DistributedDatabase:Distributed DataStorage,ConcurrencyControl,DirectorySystem.	**08**
V	**ConcurrencyControlTechniques:**ConcurrencyControl,LockingTechniquesforConcurrency Control, TimeStamping ProtocolsforConcurrency Control, ValidationBased Protocol, MultipleGranularity,MultiVersionSchemes,RecoverywithConcurrentTransaction,CaseStudy ofOracle.	**08**

Textbooks:

1. Korth,Silbertz,Sudarshan,"DatabaseConcepts",McGrawHill
2. DateCJ,"AnIntroductiontoDatabaseSystems",AddisionWesley
3. Elmasri,Navathe,"FundamentalsofDatabaseSystems",AddisionWesley
4. O'Neil,Databases,ElsevierPub.
5. RAMAKRISHNAN"DatabaseManagementSystems",McGrawHill
6. Leon&Leon,"DatabaseManagementSystems",VikasPublishingHouse
7. BipinC.Desai,"AnIntroductiontoDatabaseSystems",GagotiaPublications
8. Majumdar&Bhattacharya,"DatabaseManagementSystem",TMH

HumanComputerInterface(BT – 515

CourseOutcome(CO)		Bloom'sKnowledgeLevel(KL)
Attheend of course ,thestudentwillbe able to		
CO1	Understandandanalyzethecommonmethodsintheuser-centereddesignprocessandtheappropriatenessof individual methods foragivenproblem.	K_2,K_4
CO2	Apply,adaptandextend classic designstandards, guidelines,andpatterns.	K_3,K_5
CO3	Employselecteddesignmethodsandevaluationmethodsatabasiclevelof competence.	K_4,K_5
CO4	Buildprototypesatvaryinglevelsoffidelity,frompaperprototypestofunctional,interactiveprototypes.	K_4,K_5
CO5	Demonstrate sufficient theory of human computer interaction, experimental methodologyand inferential statistics to engage with the contemporary research literature in interfacetechnologyand design.	K_3,K_4

DETAILEDSYLLABUS		3-0-0
Unit	**Topic**	**Proposed Lecture**
I	**Introduction:** Importance of user Interface – definition, importance of 8 good design. Benefits ofgood design. A brief history of Screen design. The graphical user interface – popularity of graphics,theconceptofdirectmanipulation,graphicalsystem,Characteristics,Webuser–Interfacepopularity,characteristics-Principlesof userinterface	**08**
II	**Design process:** Human interaction with computers, importance of 8 human characteristics humanconsideration, Human interaction speeds, understanding business junctions. III Screen Designing :Designgoals– Scre	**08**
III	**Screen Designing :** Design goals – Screen planning and purpose, 8 organizing screen elements,ordering of screen data and content – screen navigation and flow – Visually pleasing composition –amount of information – focus and emphasis – presentation information simply and meaningfully –informationretrievalonweb–statisticalgraphics–Technologicalconsiderationininterfacedesign.	**08**
IV	**Windows :** New and Navigation schemes selection of window, 8 selection of devices based andscreen based controls. Components – text and messages, Icons and increases – Multimedia, colors,usesproblems, choosingcolors	**08**
V	**Softwaretools:**Specificationmethods,interface–BuildingTools.8InteractionDevices–Keyboard and function keys – pointing devices – speech recognition digitization and generation –imageand video displays–drivers.	**08**

Textbooks:

1. AlanDix,JanetFinlay,GregoryAbowd,RussellBealeHumanComputerInteraction,3rdEditionPrenticeHall,2004.

2. JonathanLazarJinjuanHeidi Feng,HarryHochheiser,ResearchMethodsinHumanComputer Interaction,Wiley,2010.

3. BenShneidermanandCatherinePlaisantDesigningtheUserInterface:StrategiesforEffectiveHuman-

ComputerInteraction(5th Edition, pp.672, ISBN0-321-53735-1, March 2009),Reading, MA: Addison-WesleyPublishingCo.

WebDesigning(BT – 514)		
CourseOutcome(CO)		**Bloom'sKnowledgeLevel(KL)**
Attheend ofcourse ,thestudentwillbe able to:		
CO1	UnderstandprincipleofWebpagedesign andabouttypesofwebsites	K_3,K_4
CO2	VisualizeandRecognizethebasicconcept ofHTMLandapplicationinwebdesigning.	K_1,K_2
CO3	Recognize andapplytheelementsofCreatingStyleSheet(CSS).	K_2,K_4
CO4	Understandthebasicconcept ofJavaScript anditsapplication.	K_2,K_3
CO5	Introducebasicsconcept of WebHostingandapplytheconceptofSEO	K_2,K_3

DETAILEDSYLLABUS		3-0-0
Unit	**Topic**	**Proposed Lecture**
I	**Introduction :** Basic principles involved in developing a web site, Planning process , Domains andHosting, Responsive Web Designing ,Types of Websites (Static and Dynamic Websites),WebStandardsandW3C recommendations, **IntroductiontoHTML:**WhatisHTML,HTMLDocuments,BasicstructureofanHTML document ,Creatingan HTMLdocument ,MarkupTags, Heading-Paragraphs,LineBreaks	**08**
II	**ElementsofHTML:**HTMLTags.,WorkingwithText,WorkingwithLists,TablesandFrames, WorkingwithHyperlinks,ImagesandMultimedia,WorkingwithFormsandcontrols	**08**
III	**Concept of CSS:** Creating Style Sheet, CSS Properties , CSS Styling(Background, Text Format,Controlling Fonts) , Working with block elements and objects , Working with Lists and Tables ,CSSIdandClass,BoxModel(Introduction,Borderproperties,PaddingProperties,Marginproperties) CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudoclass,NavigationBar,ImageSprites,Attributesector),CSSColor,CreatingpageLayoutandSite Designs.	**08**
IV	Introduction to Client Side Scripting , Introduction to Java Script , Javascript Types , Variables inJS, Operators in JS , Conditions Statements , Java Script Loops, JS Popup Boxes , JS Events , JSArrays,WorkingwithArrays,JSObjects,JSFunctions,UsingJavaScriptinRealtime, ValidationofForms,RelatedExamples	**08**
V	**Web Hosting:** Web Hosting Basics , Types of Hosting Packages, Registering domains , DefiningName Servers , Using Control Panel, Creating Emails in Cpanel , Using FTP Client, Maintaining aWebsite **ConceptsofSEO:** BasicsofSEO,ImportanceofSEO,OnpageOptimizationBasics	**08**

TextBooks:

1. StevenM.Schafer,"HTML,XHTML,andCSSBible,5ed",WileyIndia
2. IanPouncey,RichardYork,"BeginningCSS:CascadingStyleSheetsforWebDesign",WileyIndia

ComputerNetworks(KCS-603)		
CourseOutcome (CO)		**Bloom'sKnowledgeLevel(KL)**
Attheend of course ,thestudentwill be able to		
CO1	Explainbasicconcepts,OSIreferencemodel,servicesandroleofeachlayer ofOSImodel and TCP/IP,networksdevicesandtransmissionmedia,Analoganddigital datatransmission	K_1,K_2
CO2	Applychannel allocation,framing,errorandflowcontroltechniques.	K_3
CO3	DescribethefunctionsofNetworkLayer i.e.Logical addressing,subnetting&Routing Mechanism.	K_2,K_3
CO4	ExplainthedifferentTransportLayerfunctioni.e.Portaddressing,ConnectionManagement, ErrorcontrolandFlowcontrolmechanism.	K_2,K_3
CO5	Explainthefunctionsofferedbysessionandpresentationlayerandtheir Implementation.	K_2,K_3
CO6	Explainthedifferentprotocolsusedat applicationlayeri.e.HTTP,SNMP,SMTP,FTP, TELNET andVPN.	K_2

DETAILEDSYLLABUS		**3-0-0**
Unit	**Topic**	**Proposed Lecture**
I	**IntroductoryConcepts**:Goalsandapplicationsofnetworks,Categoriesofnetworks,Organization of the Internet, ISP, Network structure and architecture (layering principles, services,protocols and standards), The OSI reference model, TCP/IP protocol suite, Network devices andcomponents. **Physical Layer:** Networktopologydesign,Typesofconnections,Transmissionmedia,Signaltransmissionand encoding,Networkperformanceandtransmissionimpairments,Switchingtechniquesandmultiplexing.	**08**
II	**Linklayer:**Framing,ErrorDetectionandCorrection,Flowcontrol(ElementaryDataLinkProtocols,SlidingWindowprotocols). MediumAccessControlandLocalAreaNetworks:Channelallocation,Multipleaccessprotocols, LANstandards, Linklayerswitches&bridges(learningbridge andspanningtreealgorithms).	**08**
III	**NetworkLayer:**Point-to-pointnetworks,Logicaladdressing,Basicinternetworking(IP,CIDR, ARP,RARP,DHCP,ICMP),Routing,forwardinganddelivery,Staticanddynamicrouting,Routingalgorithms andprotocols, Congestioncontrolalgorithms, IPv6.	**08**
IV	**TransportLayer:** Process-to-processdelivery,Transportlayerprotocols(UDPandTCP),Multiplexing,Connectionmanagement,Flowcontrolandretransmission,Windowmanagement, TCPCongestioncontrol,Qualityofservice.	**08**
V	**ApplicationLayer:**DomainNameSystem,WorldWideWebandHyperTextTransferProtocol, Electronicmail,FileTransferProtocol,Remotelogin,Networkmanagement,Datacompression,Cryptography– basic concepts.	**08**

TextbooksandReferences:

1. BehrouzForouzan,“DataCommunicationandNetworking”,McGrawHill
2. AndrewTanenbaum“Computer Networks”,PrenticeHall.
3. WilliamStallings,“DataandComputerCommunication”,Pearson.
4. KuroseandRoss,“ComputerNetworking-ATop-DownApproach”,Pearson.
5. PetersonandDavie,“ComputerNetworks:ASystemsApproach”,MorganKaufmann
6. W.A.Shay,“UnderstandingCommunicationsandNetworks”,CengageLearning.
7. D.Comer,“ComputerNetworksandInternets”,Pearson.
8. BehrouzForouzan,“TCP/IPProtocolSuite”,McGrawHill.

Subject: IndianTraditions, Culturaland Society

Subject CodeBT – 509

COURSE OUTCOMES:

Ability to understand, connect up and explain basics of Indian Traditional knowledge modern scientificperspective.

SuggestedPedagogyforTeachers

- Project basedlearning
- Casestudies
- Group discussion
- Presentations

Module 1- Society State and Polity in India

State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory,StagesofStateFormationinAncientIndia,Kingship,CouncilofMinistersAdministrationPolitical IdealsinAncient IndiaConditions'ofthe WelfareofSocieties, TheSevenLimbsof theState, Society in Ancient India, Purusārtha, Varnāshrama System, Āshramaor the Stages of Life,Marriage, Understanding Gender as a social category, The representation of Women in Historicaltraditions,ChallengesfacedbyWomen.Four-classClassification,Slavery.

Module2-IndianLiterature,Culture,Tradition,andPractices

Evolution of script and languages inIndia: Harappan Script and Brahmi Script.The Vedas, theUpanishads,theRamayanaandtheMahabharata,Puranas,BuddhistAndJainLiteratureinPali,PrakritAndSanskrit,Kautilya'sArthashastra,FamousSanskritAuthors,TeluguLiterature,KannadaLiterature,Malayalam Literature,SangamaLiteratureNorthernIndianLanguages&Literature,PersianAndUrdu,HindiLiterature

Module3-IndianReligion,Philosophy,andPracticesModule

Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy,Shankaracharya, Various Philosophical Doctrines , Other Heterodox Sects, Bhakti Movement,Sufimovement, Socioreligious reform movementof 19th century,Modern religious practices

Module 4 -Science, Management and Indian Knowledge System Module

Astronomy inIndia, Chemistryin India,Mathematics inIndia, Physicsin India,Agriculture inIndia, Medicine in India ,Metallurgy in India, Geography, Biology, Harappan Technologies,Water Management in India, Textile Technology in India ,Writing Technology in IndiaPyrotechnicsin IndiaTrade in AncientIndia/,India's Dominanceup to Pre-colonialTimes

Module 5- Cultural Heritage and Performing Arts

IndianArchitect,EngineeringandArchitectureinAncientIndia,Sculptures,Seals,coins,Pottery,Puppetry, Dance,Music,Theatre,drama,Painting,MartialArtsTraditions,FairsandFestivals, CurrentdevelopmentsinArts andCultural,Indian'sCultural ContributiontotheWorld.IndianCinema

COURSE OBJECTIVES

*The courseaimsatimpartingbasicprinciplesofthoughtprocess,reasoningandinferencetoidentifytherootsand detailsofsomeofthecontemporaryissuesfacedbyournationandtrytolocatepossiblesolutionstothesechall engesbydiggingdeepintoourpast.

*To enable the students to understand the importance of our surroundings and encouragethestudentstocontributetowardssustainabledevelopment.

*Tosensitizestudentstowardsissuesrelatedto'Indian'culture,traditionanditscompositecha racter.

*TomakestudentsawareofholisticlifestylesofYogic-scienceandwisdomcapsulesinSanskritliteraturethatareimportantinmodernsocietywithrapidtechno logicaladvancementsandsocietaldisruptions.

*ToacquaintstudentswithIndianKnowledgeSystem,Indianperspectiveofmodernscientificworl d-viewandbasic principlesofYoga andholistichealth caresystem.

REALTIMESYSTEMS BT – 615

Unit	Topics	Lectures
I	**Introduction** Definition, Typical Real Time Applications: Digital Control, High LevelControls, Signal Processing etc., Release Times, Dead-lines, and TimingConstraints,HardRealTimeSystemsandSoftRealTimeSystems ,ReferenceModelsforRealTimeSystems: ProcessorsandResources, Temporal Parameters of Real Time Workload, Periodic Task Model,PrecedenceConstraintsandDataDependency.	8
II	**RealTimeScheduling** Common Approaches to Real Time Scheduling: Clock Driven Approach,Weighted Round Robin Approach, Priority Driven Approach, DynamicVersus Static Systems, Optimality of Effective-Deadline-First (EDF) andLeast-Slack-Time-First(LST)Algorithms,RateMonotonicAlgorithm, OfflineVersusOnlineScheduling,SchedulingAperiodicandSporadicjobsinPriorityDrivenandClockDrivenSystems.	8
III	**ResourcesSharing** Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-CeilingProtocols, Stack Based Priority- Ceiling Protocol, Use of Priority-CeilingProtocolinDynamicPrioritySystems,PreemptionCeilingProtocol,Access Control in Multiple-Module Resources, Controlling Concurrent Accesses toDataObjects.	8
IV	**RealTimeCommunication** BasicConceptsinRealtimeCommunication,SoftandHardRTCommunication systems, Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines for SwitchedNetworks,MediumAccessControlProtocolsforBroadcastNetworks, InternetandResourceReservationProtocols.	
V	**RealTimeOperatingSystemsandDatabases** FeaturesofRTOS,TimeServices,UNIXasRTOS,POSIXIssues, Characteristicof Temporal data,TemporalConsistency,Con-currencyControl,OverviewofCommercialRealTimedatabases.	8

TextBooks:

1. Real TimeSystems–JaneW.S.Liu,PearsonEducationPublication.

ReferenceBooks:

1. RealTimeSystems–MallRajib,PearsonEducation
2. Real-TimeSystems:Scheduling,Analysis,andVerification–AlbertM.K.Cheng,Wiley.

B.TECH.(CSE&CS)

SIXTHSEMESTER(DETAILEDSYLLABUS)

SoftwareEngineering(BT-612)		
CourseOutcome(CO)		**Bloom'sKnowledgeLevel(KL)**
Attheend ofcourse, the studentwillbe ableto		
CO1	Explainvarioussoftwarecharacteristicsandanalyzedifferentsoftware DevelopmentModels.	K_1,K_2
CO2	Demonstrate the contents of a SRS and apply basic software quality assurance practices toensurethatdesign, developmentmeetorexceed applicablestandards.	K_1,K_2
CO3	Compareandcontrast variousmethodsforsoftwaredesign	K_2,K_3
CO4	Formulatetestingstrategyforsoftwaresystems, employtechniquessuchasunittesting,Testdrivendevelopmentandfunctionaltesting.	K_3
CO5	Managesoftwaredevelopment processindependentlyaswell asinteamsandmakeuseofVarioussoftwaremanagementtoolsfordevelopment,maintenanceandanalysis.	K_5

DETAILEDSYLLABUS		**3-1-0**
Unit	**Topic**	**Proposed Lecture**
I	**Introduction:**IntroductiontoSoftwareEngineering,SoftwareComponents,SoftwareCharacteristics, Software Crisis, Software Engineering Processes, Similarity and Differences fromConventionalEngineeringProcesses,SoftwareQualityAttributes.Software DevelopmentLifeCycle(SDLC)Models:WaterFallModel,PrototypeModel,SpiralModel,EvolutionaryDevelopment Models, Iterative EnhancementModels.	**08**
II	**SoftwareRequirementSpecifications(SRS):**RequirementEngineeringProcess:Elicitation,Analysis, Documentation, Review and Management of User Needs, Feasibility Study, InformationModelling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document,IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQAPlans,Software QualityFrameworks,ISO9000Models, SEI-CMMModel.	**08**
III	**Software Design:** Basic Concept of Software Design, Architectural Design, Low Level Design:Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and CohesionMeasures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down andBottom-UpDesign.SoftwareMeasurementandMetrics:VariousSizeOrientedMeasures:Halestead'sSoftwareScience,FunctionPoint(FP)BasedMeasures,CyclomaticComplexityMeasures: ControlFlowGraphs.	**08**
IV	**SoftwareTesting:** TestingObjectives,Unit Testing,IntegrationTesting,Acceptance Testing,Regression Testing, Testing for Functionality and Testing for Performance, TopDown and Bottom-UpTestingStrategies:TestDriversandTestStubs,StructuralTesting(WhiteBoxTesting),Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing ofProducts. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through,CodeInspection, Compliance with Design andCodingStandards.	**08**

V	**Software Maintenance and Software Project Management:** Software as an Evolutionary Entity,NeedforMaintenance,CategoriesofMaintenance:Preventive,CorrectiveandPerfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering. SoftwareConfigurationManagementActivities,ChangeControlProcess,SoftwareVersionControl,An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts,	**08**

SOFTWAREPROJECTMANAGEMENT BT – 618 (N		
CourseOutcome(CO)		**Bloom'sKnowledgeLevel(KL)**
Attheendofcourse,thestudentwillbeable:		
CO1	Identifyprojectplanningobjectives,alongwithvariouscost/effortestimationmodels.	K_3
CO2	Organize&scheduleprojectactivitiestocomputecriticalpathforriskanalysis.	K_3
CO3	Monitorandcontrolprojectactivities.	K_4,K_5
CO4	FormulatetestingobjectivesandtestplantoensuregoodsoftwarequalityunderSEI-CMM.	K_6
CO5	Configurechangesandmanagerisksusingprojectmanagementtools.	K_2,K_4

DETAILED SYLLABUS		3-0-0
Unit		**Lecture**
I	**ProjectEvaluationandProjectPlanning:** Importance of Software Project Management – Activities – Methodologies – Categorization ofSoftware Projects – Setting objectives – Management Principles – Management Control–ProjectportfolioManagement–Cost-benefitevaluationtechnology–Riskevaluation– StrategicprogramManagement–StepwiseProjectPlanning.	**08**
II	**ProjectLifeCycleandEffortEstimation:** SoftwareprocessandProcessModels–ChoiceofProcessmodels– RapidApplicationdevelopment–Agilemethods– DynamicSystemDevelopmentMethod–ExtremeProgramming– Managing interactive processes – Basics of Software estimation– Effort andCostestimationtechniques–COSMICFullfunctionpoints–COCOMOII– aParametric ProductivityModel.	**08**
III	**ActivityPlanningandRiskManagement:** Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling –Network Planning models – Formulating Network Model – Forward Pass & Backward Passtechniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning –Risk Management – – PERT technique – Monte Carlo simulation – Resource Allocation –Creationofcriticalpaths–Costschedules.	**08**
IV	**ProjectManagementandControl:** Framework for Management and control Collection of data Visualizing progress – CostmonitoringEarnedValueAnalysis–PrioritizingMonitoring– Projecttracking–ChangecontrolSoftwareConfigurationManagement– Managingcontracts–ContractManagement.	**08**
V	**StaffinginSoftwareProjects:** Managing people – Organizational behavior – Best methods of staff selection Motivation – TheOldhamHackmanjobcharacteristicmodel–Stress– HealthandSafety–EthicalandProfessionalconcerns– WorkinginteamsDecisionmakingOrganizationalstructuresDispersedandVirtualteams–CommunicationsgenresCommunicationplansLeadership.	**08**

Textbooks:

1. BobHughes,MikeCotterellandRajibMall:SoftwareProjectManagement– FifthEdition,McGrawHill,NewDelhi,2012.
2. RobertK.Wysocki—EffectiveSoftwareProjectManagement–WileyPublication,2011.
3. WalkerRoyce:—SoftwareProjectManagement-Addison-Wesley,1998.
4. GopalaswamyRamesh,—ManagingGlobalSoftwareProjects– McGrawHillEducation(India),Fourteenth Reprint2013.

WebTechnology(BT – 614)		
CourseOutcome(CO)		**Bloom'sKnowledgeLevel(KL)**
Attheend of course ,thestudentwill be able to		
CO1	ExplainwebdevelopmentStrategiesand ProtocolsgoverningWeb.	K_1,K_2
CO2	DevelopJavaprogramsforwindow/web-basedapplications.	K_2,K_3
CO3	DesignwebpagesusingHTML,XML, CSSandJavaScript.	K_2,K_3
CO4	Creationofclient-serverenvironmentusingsocketprogramming	K_1,K_2,
CO5	Buildingenterpriselevel applicationsandmanipulatewebdatabasesusingJDBC	K3,K4
CO6	DesigninteractivewebapplicationsusingServletsandJSP	K_2,K_3

DETAILED SYLLABUS		**3-0-0**
Unit	**Topic**	**Proposed Lecture**
I	I**ntroduction:**Introduction and Web Development Strategies, History of Web and Internet, ProtocolsGoverning Web, Writing Web Projects, Connecting to Internet, Introduction to Internet services andtools, Introduction to client-server computing. Core Java: Introduction, Operator, Data type, Variable,Arrays, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithreadprogramming,I/O,JavaApplet,Stringhandling,Eventhandling,IntroductiontoAWT, AWT controls,Layout managers	**08**
II	**WebPageDesigning:**HTML:List,Table,Images,Frames,forms,CSS,Documenttypedefinition,XML:DTD,XMLschemes,ObjectModels,presentingandusingXML,UsingXMLProcessors: DOMandSAX,DynamicHTML	**08**
III	**Scripting:**Javascript:Introduction,documents,forms,statements,functions,objects;introductiontoAJAX,**Networking:** InternetAddressing,InetAddress,FactoryMethods,InstanceMethods,TCP/IPClientSockets,URL, URLConnection,TCP/IPServerSockets,Datagram.	**08**
IV	**EnterpriseJavaBean:** PreparingaClasstobeaJavaBeans,CreatingaJavaBeans,JavaBeansProperties,Typesof beans,StatefulSession bean,StatelessSessionbean,Entitybean **JavaDatabaseConnectivity(JDBC):** MergingDatafromMultipleTables:Joining,Manipulating,DatabaseswithJDBC,PreparedStatements,TransactionProcessing,StoredProcedures.	**08**
V	**Servlets:**ServletOverviewandArchitecture,InterfaceServletandtheServletLifeCycle,Handling HTTPgetRequests,HandlingHTTPpostRequests,RedirectingRequeststoOtherResources,SessionTracking, Cookies, SessionTrackingwith Http Session **Java ServerPages(JSP):** Introduction,Java ServerPagesOverview, AFirstJava ServerPageExample,Implicit Objects,Scripting,StandardActions, Directives,CustomTagLibraries..	**08**

Textbooks:

1. Burdman,Jessica, “Collaborative WebDevelopment” Addison Wesley
2. Xavier, C,“WebTechnologyandDesign” ,NewAgeInternational
3. IvanBayross,”HTML,DHTML,JavaScript, Perl&CGI”,BPBPublication
4. Bhave, “ProgrammingwithJava”, Pearson Education
5. Herbert Schieldt,“The CompleteReference:Java”,McGrawHill.
6. HansBergsten,“JavaServer Pages”, SPDO’Reilly
7. MargaretLevine Young,“The CompleteReference Internet”,McGraw Hill.
8. Naughton,Schildt,“TheCompleteReferenceJAVA2”,McGrawHill.
9. BalagurusamyE, “Programmingin JAVA”,McGrawHill.

COMPUTERSCIENCEANDENGINEERING/CS

B.TECH.(CSE/CS)

SEVENTSEMESTER(DETAILEDSYLLABUS)

ArtificialIntelligence(BT – 714 **)**

	CourseOutcome(CO)	**Bloom'sKnowledgeLevel(KL)**
	Attheendofcourse,the studentwillbeabletounderstand	
CO1	Understandthebasicsofthetheoryandpracticeof ArtificialIntelligenceasadisciplineand aboutintelligentagents.	K_2
CO2	Understandsearchtechniquesandgamingtheory.	K_2,K_3
CO3	Thestudentwilllearntoapplyknowledgerepresentationtechniquesandproblemsolving strategiestocommonAIapplications.	K_3,K_4
CO4	Studentshouldbeawareoftechniquesusedforclassificationandclustering.	K_2,K_3
CO5	Studentshouldawareofbasicsofpatternrecognitionandstepsrequiredforit.	K_2,K_4

DETAILED SYLLABUS		**3-0-0**
Unit	**Topic**	**Proposed Lecture**
I	**INTRODUCTION:** Introduction–Definition–FutureofArtificialIntelligence–CharacteristicsofIntelligentAgents– TypicalIntelligent Agents– ProblemSolvingApproach to TypicalAI problems.	**08**
II	**PROBLEMSOLVINGMETHODS:** Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local SearchAlgorithmsandOptimizationProblems–SearchingwithPartialObservations– ConstraintSatisfactionProblems–ConstraintPropagation–BacktrackingSearch– GamePlaying–Optimal DecisionsinGames–Alpha–BetaPruning–StochasticGames	**08**
III	**KNOWLEDGEREPRESENTATION:** First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-BackwardChaining – Resolution – Knowledge Representation – Ontological Engineering-Categories andObjects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories –Reasoningwith Default Information	**08**
IV	**SOFTWAREAGENTS:** ArchitectureforIntelligentAgents–Agentcommunication–NegotiationandBargaining– Argumentationamong Agents –Trust and Reputationin Multi-agent systems.	**08**
V	**APPLICATIONS:** AI applications – Language Models – Information Retrieval- Information Extraction – NaturalLanguageProcessing–MachineTranslation–SpeechRecognition–Robot–Hardware– Perception–Planning– Moving	**08**

Textbooks:

1. S.RussellandP.Norvig,"ArtificialIntelligence:AModernApproach‖,PrenticeHall,ThirdEdition,2009.
2. I.Bratko,"Prolog:ProgrammingforArtificialIntelligence",Fourthedition,Addison-WesleyEducationalPublishersInc.,2011.
3. M.TimJones,―ArtificialIntelligence:ASystemsApproach(ComputerScience)‖,JonesandBartlettPublishers,Inc.FirstEdition,2008
4. NilsJ.Nilsson,―TheQuestforArtificialIntelligence‖,CambridgeUniversityPress,2009.
5. WilliamF.ClocksinandChristopherS.Mellish,‖ProgramminginProlog:UsingtheISOStandard‖,FifthEdition,Springer,2003.
6. GerhardWeiss,―MultiAgentSystems‖,SecondEdition,MITPress,2013.
7. David L. Poole and Alan K. Mackworth, ―Artificial Intelligence: Foundations of Computational Agents‖, CambridgeUniversityPress,2010.

BIGDATA (BT-812)		
	DETAILED SYLLABUS	**3-1-0**
Unit	**Topics**	**Proposed Lecture**
I	**Introduction to Big Data**: Types of digital data, history of Big Data innovation,introduction to Big Data platform, drivers for Big Data, Big Data architecture andcharacteristics, 5 Vs of Big Data, Big Data technology components, Big Dataimportanceandapplications,BigDatafeatures– security,compliance,auditingandprotection,BigDataprivacyandethics,BigDataAnalytics,Challengesofconventionalsystems,intelligentdataanalysis,natureofdata,analyticprocesses andtools,analysisvsreporting,moderndataanalytictools.	**08**
II	**Hadoop:**HistoryofHadoop,ApacheHadoop,theHadoopDistributedFileSystem,components of Hadoop, data format, analyzing data with Hadoop, scaling out,Hadoopstreaming,Hadooppipes,HadoopEchoSystem. **Map-Reduce:**Map-Reduceframeworkandbasics,howMapReduceworks,developing a Map Reduce application, unit tests with MR unit, test data and localtests, anatomy of a Map Reduce job run, failures, job scheduling, shuffle and sort,taskexecution,MapReducetypes,inputformats,outputformats,MapReduce features,Real-worldMapReduce	**08**
III	**HDFS (Hadoop Distributed File System):** Design of HDFS, HDFS concepts,benefits and challenges, file sizes, block sizes and block abstraction in HDFS, datareplication, how does HDFS store, read, and write files, Java interfaces to HDFS,command line interface, Hadoop file system interfaces, data flow, data ingest withFlume and Scoop, Hadoop archives, Hadoop I/O: Compression, serialization, Avroand file-based data structures. Hadoop Environment: Setting up a Hadoop cluster,cluster specification, cluster setup and installation, Hadoop configuration, securityinHadoop,administeringHadoop,HDFSmonitoring&maintenance,Hadoop benchmarks,Hadoopinthecloud	**08**
IV	**HadoopEcoSystemandYARN:**Hadoopecosystemcomponents,schedulers,fairand capacity, Hadoop 2.0 New Features – Name Node high availability, HDFSfederation,MRv2,YARN,RunningMRv1inYARN. **NoSQL** Databases: Introduction to NoSQL MongoDB: Introduction, data types,creating,updatinganddeleingdocuments,querying,introductiontoindexing,cappedcollections **Spark**:Installingspark,sparkapplications,jobs,stagesandtasks,ResilientDistributedDatabases,anatomyofaSparkjobrun,SparkonYARN **SCALA:**Introduction, classesand objects,basic types andoperators, built-in controlstructures,functionsandclosures,inheritance.	**08**

V	**HadoopEcoSystem Frameworks**:ApplicationsonBig DatausingPig,HiveandHBase **Pig**:IntroductiontoPIG,ExecutionModesofPig,ComparisonofPigwith Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators,**Hive**-ApacheHivearchitectureandinstallation,Hiveshell,Hiveservices,Hive metastore,comparisonwithtraditionaldatabases,HiveQL,tables,queryingdataanduserdefinedfunctions,sortingandaggregating,MapReducescripts,joins&subqueries. **HBase** – Hbase concepts, clients, example, Hbase vs RDBMS, advanced usage,schemadesign,advanceindexing,Zookeeper–howithelpsinmonitoringacluster,howtobuildapplicationswithZookeeper.IBMBigDatastrategy,introductionto Infosphere,BigInsightsandBigSheets,introductiontoBigSQL.	**08**

SuggestedReadings:

1. MichaelMinelli,MichelleChambers,andAmbigaDhiraj,"BigData,BigAnalytics:EmergingBusinessIntelligenceand AnalyticTrendsforToday'sBusinesses",Wiley.
2. Big-DataBlackBook,DTEditorialServices,Wiley.
3. DirkdeRoos,ChrisEaton,GeorgeLapis,PaulZikopoulos,TomDeutsch,“Understanding BigDataAnalyticsforEnterpriseClassHadoopandStreamingData”,McGrawHill.
4. ThomasErl,WajidKhattak,PaulBuhler,“BigDataFundamentals:Concepts,DriversandTechniques”,PrenticeHall.

CLOUDCOMPUTING BT – 713		
DETAILEDSYLLABUS		**3-1-0**
Unit	**Topic**	**Proposed Lecture**
I	**Introduction:** Cloud Computing – Definition of Cloud – Evolution ofCloudComputing –Underlying Principlesof Parallel and Distributed,History of Cloud Computing - Cloud Architecture - Types of Clouds -BusinessmodelsaroundClouds– MajorPlayersinCloudComputing- issuesinClouds-Eucalyptus-Nimbus-OpenNebula,CloudSim.	08
II	**CloudServices:**TypesofCloudservices:SoftwareasaService-PlatformasaService–InfrastructureasaService-DatabaseasaService-MonitoringasaService– Communicationasservices.Service providers-Google,Amazon,MicrosoftAzure,IBM,Salesforce.	08
III	**CollaboratingUsingCloudServices:**EmailCommunicationoverthe Cloud- CRM Management –Project Management-EventManagement -TaskManagement–Calendar-Schedules-WordProcessing–Presentation–Spreadsheet-Databases–Desktop-SocialNetworksand Groupware.	08
IV	**VirtualizationforCloud:**NeedforVirtualization–ProsandconsofVirtualization–TypesofVirtualization–SystemVM,ProcessVM,Virtual Machinemonitor –Virtual machineproperties - Interpretationandbinarytranslation,HLLVM-supervisors–Xen,KVM,VMware, VirtualBox,Hyper-V.	08
V	**Security,StandardsandApplications:**SecurityinClouds:Cloudsecuritychallenges–SoftwareasaServiceSecurity,CommonStandards: The Open Cloud Consortium – The Distributed managementTaskForce–StandardsforapplicationDevelopers– StandardsforMessaging– StandardsforSecurity,Enduseraccesstocloudcomputing,MobileInternetdevicesandthecloud. Hadoop–MapReduce–VirtualBox—GoogleAppEngine– ProgrammingEnvironmentforGoogleAppEngine	08

TextBooks:

1. DavidE.Y.Sarna,"ImplementingandDevelopingCloudApplication",CRCpress2011.
2. Lee Badger, Tim Grance, Robert Patt-Corner, Jeff Voas, NIST, Draft cloud computingsynopsisand recommendation,May2011.
3. AnthonyTVelte,TobyJVelte,RobertElsenpeter,"Cloud Computing:A

PracticalApproach",McGrawHill2010.

4. Haley Beard, "Best Practices for Managing and Measuring Processes for On-demandComputing,ApplicationsandDataCentersintheCloudwithSLAs",EmereoPty Limited,July2008.

HSMC & OPEN ELECTIVES II LIST 2020-21

BT – 711	MACHINELEARNING	**3L:0T:0P**	**3Credits**

Unit	Topics	Lectures
I	INTRODUCTION– Well defined learning problems, Designing a LearningSystem,IssuesinMachineLearning; THE CONCEPT LEARNINGTASK- General-to-specificorderingofhypotheses,Find-S,Listtheneliminatealgorithm,Candidateeliminationalgorithm,Inductivebias.	8
II	DECISIONTREELEARNING-Decisiontreelearningalgorithm-Inductivebias-IssuesinDecisiontreelearning;ARTIFICIALNEURALNETWORKS–Perceptrons,Gradientdescentand theDeltarule,Adaline,Multilayernetworks,Derivationofbackpropagationrule Backpropagation AlgorithmConvergence,Generalization.	8
III	EvaluatingHypotheses:EstimatingHypothesesAccuracy,BasicsofsamplingTheory,ComparingLearningAlgorithms;BayesianLearning:Bayes theorem, Conceptlearning,BayesOptimalClassifier,NaïveBayesclassifier,Bayesian beliefnetworks,EMalgorithm.	8
IV	ComputationalLearningTheory: SampleComplexityforFiniteHypothesisspaces,SampleComplexityforInfiniteHypothesisspaces,TheMistakeBound ModelofLearning;INSTANCE-BASEDLEARNING–k-NearestNeighbor Learning,LocallyWeightedRegression,Radialbasisfunctionnetworks,Case-basedlearning.	8
V	GeneticAlgorithms:anillustrativeexample,Hypothesisspacesearch,GeneticProgramming,ModelsofEvolutionandLearning;Learningfirstorderrules-sequentialcoveringalgorithms-Generaltospecificbeamsearch-FOIL;REINFORCEMENTLEARNING-TheLearningTask,Qlearning.	8

TextBook:

1. TomM. Mitchell,―Machine Learning, McGraw-Hill Education (India)PrivateLimited,2013.
2. Ethem Alpaydin,―Introduction to Machine Learning (Adaptive Computationand MachineLearning),TheMITPress2004.
3. Stephen Marsland, ―Machine Learning: AnAlgorithmic Perspective, CRCPress, 2009.
4. Bishop, C.,PatternRecognitionandMachineLearning.Berlin:Springer-Verlag.

COMPUTERSCIENCEANDENGINEERING/CS

NaturalLanguageProcessing(B T - 8 1 1)

CourseOutcome(CO)		Bloom'sKnowledgeLevel(KL)
Attheend ofcourse ,thestudentwillbeable:		
CO1	Tolearnthefundamentalsofnaturallanguageprocessing	K_1,K_2
CO2	TounderstandtheuseofCFGandPCFGinNLP	K_1,K_2
CO3	Tounderstandtheroleofsemanticsofsentencesandpragmatic	K_2
CO4	ToIntroduceSpeechProductionAndRelatedParametersOfSpeech.	K_1,K_2
CO5	ToShowTheComputationAndUseOfTechniquesSuchAsShortTimeFourierTransform,LinearPredictive CoefficientsAnd OtherCoefficients In The AnalysisOf Speech.	K3,K4

DETAILED SYLLABUS		**3-0-0**
Unit	**Topic**	**Proposed Lecture**
I	**INTRODUCTION:** Origins and challenges of NLP – Language Modeling: Grammar-based LM,Statistical LM – Regular Expressions, Finite-State Automata – English Morphology, Transducersfor lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum EditDistance **WORDLEVELANALYSIS:**UnsmoothedN-grams,EvaluatingN-grams,Smoothing,Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic andTransformation-basedtagging,IssuesinPoStagging– HiddenMarkovandMaximumEntropy models.	**08**
II	**SYNTACTICANALYSIS:**ContextFreeGrammars,GrammarrulesforEnglish,Treebanks,Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, DynamicProgramming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, ProbabilisticLexicalizedCFGs – Feature structures,Unificationof feature structures.	**08**
III	**SEMANTICSANDPRAGMATICS:** Requirements for representation, First-Order Logic, Description Logics – Syntax-Driven Semanticanalysis,Semanticattachments– WordSenses,RelationsbetweenSenses,ThematicRoles,selectionalrestrictions– WordSenseDisambiguation,WSDusingSupervised,Dictionary& Thesaurus,Bootstrappingmethods– WordSimilarityusingThesaurusandDistributionalmethods.	**08**
IV	**BASIC CONCEPTS of Speech Processing :** Speech Fundamentals: Articulatory Phonetics –Production AndClassificationOfSpeechSounds;AcousticPhonetics– AcousticsOfSpeechProduction; Review Of Digital Signal Processing Concepts; Short-Time Fourier Transform, Filter-BankAnd LPC Methods.	**08**
V	**SPEECH-ANALYSIS**: Features, Feature Extraction And Pattern Comparison Techniques: SpeechDistortion Measures– Mathematical And Perceptual – Log–Spectral Distance, Cepstral Distances,Weighted Cepstral Distances And Filtering, Likelihood Distortions, Spectral Distortion Using AWarped FrequencyScale,LPC,PLP AndMFCCCoefficients,TimeAlignment AndNormalization –DynamicTimeWarping,MultipleTime–AlignmentPaths. **SPEECHMODELING**:HiddenMarkovModels:MarkovProcesses,HMMs–Evaluation, Optimal State Sequence – Viterbi Search, Baum-Welch Parameter Re-Estimation, ImplementationIssues.	**08**

BT – 701	**PROJECTMANAGEMENT&ENTREPRENEURSHIP**	**3L:0T:0P**	**3Credits**

Unit	**Topics**	**Lectures**
I	**Entrepreneurship:** Entrepreneurship: need, scope , Entrepreneurial competencies&traits,Factors affectingentrepreneurialdevelopment, Entrepreneurialmotivation(Mc Clellend's Achievement motivation theory), conceptual model ofentrepreneurship , entrepreneur vs. intrapreneur; Classification of entrepreneurs;EntrepreneurialDevelopmentProgrammes	8
II	**EntrepreneurialIdeaandInnovation:**IntroductiontoInnovation,Entrepreneurial Idea Generation and Identifying Business Opportunities,Management skills forEntrepreneursandmanagingforValueCreation,CreatingandSustainingEnterprising Model&OrganizationalEffectiveness	8
III	**Project Management:** Project management: meaning, scope & importance, role ofproject manager; project life-cycle Project appraisal: Preparation of a real timeproject feasibility report containing Technical appraisal,; Environmental appraisal,Marketappraisal(includingmarketsurveyforforecastingfuturedemandandsales)andManagerialappraisal.	8
IV	**Project Financing:** Project cost estimation & working capital requirements,sources of funds, capital budgeting, Risk & uncertainty in project evaluation ,preparationofprojectedfinancialstatementsviz.Projectedbalancesheet, projectedincome statement, projected funds & cash flow statements, Preparation of detailedprojectreport,Projectfinance.	8
V	**SocialEntrepreneurship:**SocialSectorPerspectivesandSocialEntrepreneurship,Social Entrepreneurship Opportunities and Successful Models, Social Innovationsand Sustainability, Marketing Management for Social Ventures, Risk ManagementinSocialEnterprises,LegalFrameworkforSocialVentures.	8

TextBook:

1. InnovationandEntrepreneurshipbyDrucker,P.F.;HarperandRow
2. Business,EntrepreneurshipandManagement:Rao,V.S.P.;Vikas
3. Entrepreneurship:RoyRajeev;OUP.
4. TextBookofProjectManagement:Gopalkrishnan,P.andRamamoorthy,V.E.;McMillan
5. ProjectManagementforEngineering, BusinessandTechnology:Nicholas,J.M.,andSteyn,H.;PHI
6. ProjectManagement:TheManagerialProcess:Gray,C.F.,Larson,E.W.andDesai,G.V.;MGH

BT-801	**RURALDEVELOPMENT:ADMINISTRATIONANDPLANNING**	**3L:0T:0P**	**3Credits**

COURSEOUTCOME: Aftercompletionofthecoursestudentwillbeableto:

1. Studentscanunderstandthedefinitions,conceptsandcomponentsofRuralDevelopment
2. Studentswillknowtheimportance,structure,significance,resourcesofIndianruraleconomy.
3. Students willhaveaclearideaaboutthereadevelopmentprogrammesanditsimpact.
4. Students willbeabletoacquireknowledgeaboutruralentrepreneurship.
5. Studentswillbeabletounderstandabouttheusingofdifferentmethodsforhumanresourceplanning

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Unit	Topics	Lectures
I	**RuralPlanning&Development:** ConceptsofRuralDevelopment,BasicelementsofruralDevelopment,andImportanceofRuralDevelopmentforcreationofSustainableLivelihoods,AnoverviewofPoliciesandProgrammesfor Rural Development- Programmes in the agricultural sector, Programmes in theSocialSecurity,ProgrammesinareaofSocialSector.	8
II	**Rural Development Programmes:** Sriniketan experiment, Gurgaon experiment,marthandam experiment, Baroda experiment, Firkha development scheme, Etawapilotproject,Nilokheriexperiment,approachestoruralcommunitydevelopment : Tagore,Gandhietc	8
III	**PanchayatiRaj&RuralAdministration:** AdministrativeStructure:bureaucracy, structure of administration; Panchayati Raj Institutions Emergenceand Growth of Panchayati Raj Institutions in India; People and Panchayati Raj;FinancialOrganizationsinPanchayatiRajInstitutions,Structureofruralfinance, Government&Non-GovernmentOrganizations/CommunityBasedOrganizations,ConceptofSelfhelpgroup.	8
IV	**Human Resource Development in Rural Sector:** Need for Human ResourceDevelopment,ElementsofHumanResourceDevelopmentinRuralSectorDimensionsofHRDforruraldevelopment-Health,Education,Energy,Skill Development, Training, Nutritional Status access to basic amenities - Populationcomposition.	8
V	**RuralIndustrializationandEntrepreneurship:** ConceptofRuralIndustrialization, GandhianapproachtoRuralIndustrialization,AppropriateTechnology for Rural Industries, Entrepreneurship and Rural Industrialization-Problems and diagnosis of Rural Entrepreneurship in India, with special referencetoWomenEntrepreneurship;DevelopmentofSmallEntrepreneursinIndia,need forandscope ofentrepreneurshipinRuralarea.	8

TextBook:

1. CorporateSocialResponsibility:AnEthical Approach-MarkS.Schwartz
2. KatarSingh:RuralDevelopmentinIndia–TheoryHistoryandPolicy
3. TodaroM.P.EconomicDevelopmentinIIIWorldwar
4. AroraR.C–IntegratedRuralDevelopmentinIndia
5. DhandekarV.M andRathNpovertyinIndia
6. A.N.Agarwaland KundanaLal:RuralEconomyofIndia

SoftwareTestingBT – 712		
CourseOutcome (CO)		**Bloom'sKnowledgeLevel(KL)**
Attheend ofcourse,thestudentwill be abletounderstand		
CO1	Haveanabilitytoapply softwaretestingknowledgeandengineeringmethods.	K2, K3
CO2	Haveanabilitytodesignandconductasoftwaretestprocessfora softwaretestingproject.	K3,K4
CO3	Haveanabilitytoidentifytheneedsofsoftwaretestautomation,anddefineanddevelopatesttooltosupport test automation.	K1, K2
CO4	Haveanabilityunderstandandidentify varioussoftwaretestingproblems,andsolvethese problemsbydesigningandselectingsoftwaretest models,criteria,strategies,andmethods.	K1, K2
CO5	Havebasicunderstandingandknowledgeofcontemporaryissuesinsoftwaretesting,such ascomponent-basedsoftwaretesting problems.	K2
DETAILED SYLLABUS		**3-0-0**
Unit	**Topic**	**Proposed Lecture**
I	Review of Software Engineering: Overview of Software Evolution, SDLC, Testing Process,Terminologies in Testing: Error, Fault, Failure, Verification, Validation, Difference BetweenVerification and Validation, Test Cases, Testing Suite, Test ,Oracles, Impracticality of TestingAllData;ImpracticalityofTestingAllPaths.Verification:VerificationMethods,SRSVerification, Source Code Reviews, User Documentation Verification, Software, Project Audit,TailoringSoftwareQualityAssuranceProgrambyReviews,Walkthrough,Inspectionand ConfigurationAudits	**08**
II	FunctionalTesting:BoundaryValueAnalysis,EquivalenceClassTesting,DecisionTableBased Testing, Cause Effect Graphing Technique. Structural Testing: Control Flow Testing,PathTesting,IndependentPaths,GenerationofGraphfromProgram,IdentificationofIndependentPaths, CyclomaticComplexity, DataFlow Testing,Mutation Testing	**08**
III	Regression Testing:WhatisRegression Testing?RegressionTestcasesselection,Reducingthenumberoftestcases,Codecoverageprioritizationtechnique.Reducingthenumberoftest cases:Prioritizationguidelines,Prioritycategory,Scheme,RiskAnalysis	**08**
IV	SoftwareTestingActivities:LevelsofTesting,Debugging,Testingtechniquesandtheir applicability,ExploratoryTestingAutomatedTestDataGeneration:TestData,Approachesto testdatageneration,testdatagenerationusinggeneticalgorithm,TestDataGenerationTools,SoftwareTesting Tools, and Software test Plan.	**08**
V	ObjectOrientedTesting:Definition,Issues,ClassTesting,ObjectOrientedIntegrationandSystemTesting.TestingWebApplications:WebTesting,UserInterfaceTesting,Usability Testing,SecurityTesting,PerformanceTesting,Databasetesting,PostDeploymentTesting	**08**

Textbooks:

1. YogeshSingh,"SoftwareTesting",CambridgeUniversityPress,NewYork,2012
2. K..K.Aggarwal&YogeshSingh,"SoftwareEngineering",NewAgeInternationalPublishers,NewDelhi,2003.
3. RogerS.Pressman,"SoftwareEngineering–APractitioner'sApproach",FifthEdition,McGraw-HillInternationalEdition,NewDelhi,2001.
4. MarcRoper,"SoftwareTesting",McGraw-HillBookCo.,London,1994.
5. M.C.Trivedi,SoftwareTesting&Audit,KhannaPublishingHouse6.BorisBeizer,"SoftwareSystemTestingandQualityAssurance",VanNostrand Reinhold, NewYork,1984