Bharath
INSTITUTE OF HIGHER EDUCATION AND RESEARCH
(Declared as Deemed-to-be University under section 3 of UGC Act, 1956)
(Vide Notification No. F.9-5/2000 - U.3, Ministry of Human Resource Development, Govt. of India, dated 4th July 2002)

FACULTY OF ENGINEERING AND TECHNOLOGY

REGULATIONS 2015
&
CURRICULUM & SYLLABUS

CHOICE BASED CREDIT SYSTEM
(Applicable to the batches admitted from July 2015)

B. Tech – COMPUTER SCIENCE AND ENGINEERING
(FULL TIME)

I-VIII SEMESTERS

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BHARATH INSTITUTE OF SCIENCE AND TECHNOLOGY
CHENNAI -600 073, TAMIL NADU

FACULTY OF ENGINEERING AND TECHNOLOGY

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CHOICE BASED CREDIT SYSTEM

DEGREE OF BACHELOR OF TECHNOLOGY

(EIGHT SEMESTERS)

(Applicable to the batches admitted from July 2015)

1.0 PRELIMINARY DEFINITIONS AND NOMENCLATURE

In these Regulations, unless the context otherwise requires:

i. "**Programme**" means Degree Programme, that is B.Tech. Degree Programme.

ii. "**Discipline**" means specialization or discipline of B.Tech. Degree Programme, like Civil Engineering, Electrical and Electronics Engineering, information Technology, etc.

iii. "**Course**" means a theory or practical subject that is normally studied in a semester, like Mathematics, Physics, Engineering Graphics etc.

iv. **"Head of the Institution"** means the Dean of the Institution who is responsible for all academic activities of that College/Institution and for implementation of relevant rules of these Regulations.

v. **"University"** means Bharath Institute of Higher Education & Research (BIHER)

2.0 PREAMBLE

The 'Outcome Based Education (OBE)' Process is introduced to ensure that the required outcomes (knowledge, skills and attitude / behavior) are acquired by the learners of a programme. With the OBE process in mind, our educational system for the Faculty of Engineering and Technology has been framed to provide the needful scope for the learners through the Choice Based Credit System (CBCS) that will pave the path to strengthen their knowledge, skills and attitude / behavior. The CBCS offers flexibility to learners which include large number of electives, flexible pace for earning credits and audit courses.

2.1 THE OBJECTIVES OF CHOICE BASED CREDIT SYSTEM (CBCS) :

- To offer the right blend of Core, Humanities & Social Sciences, Engineering Sciences and Basic Science courses to facilitate the learners to acquire the needful outcomes.
- To facilitate students to choose open electives of their choice to acquire knowledge in the areas of their interest.
- To elevate the level of knowledge, skills and attitude/behavior on par with the students across the globe.
- To offer programmes in an open student centric environment with purpose, needful foundations, breadth (exposure for optimal learning) and professionalism.

- To learn at students' own pace
- To opt for additional courses and achieve more than the required credits
- To opt for interdisciplinary approach for learning
- To opt for Inter college/University migration within the country and outside with transfer of Credits.
- To have more scope to enhance students skills and more scope of taking up projects and assignments, vocational training, including entrepreneurship.
- To improve the job opportunities of students
- To enable potential employers assess the performance of students on a scientific scale.

The curriculum and syllabi for B.Tech programmes confirm to outcome based teaching-learning process based on the following Programme Educational Objectives.

2.2 PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: PREPARATION:
To provide strong foundation in mathematical, scientific and engineering fundamentals necessary to analyze, formulate and solve engineering problems in the chosen field of Engineering and Technology.

PEO2: CORE COMPETENCE:
To enhance the skills and experience in defining problems in the appropriate field of Engineering and Technology, designing, implementing, analyzing the experimental evaluations, and finally making appropriate decisions.

PEO3: PROFESSIONALISM:
To enhance their skills and embrace new thrust areas through self-directed professional development and post-graduate training or education.

PEO4: SKILL:
To provide Industry based training for developing professional skills and soft skills such as proficiency in languages, technical communication, verbal, logical, analytical, comprehension, team building, inter personal relationship, group discussion and leadership skill to become a better professional.

PEO5: ETHICS:
Apply the ethical and social aspects of modern Engineering and Technology innovations to the design, development, and usage of new products, machines, gadgets, devices, etc.

In general the following Program Outcomes have been identified and the curricula have been structured in such a way that each of the courses meets these outcomes. The Programme Educational Objectives and Programme Outcomes are well defined and aligned with the Vision and Mission of each of the Department and the University.

2.3 PROGRAMME OUTCOMES (POs)

Engineering Graduate will have

a) The ability to apply knowledge of mathematics, science, and engineering fundamentals.

b) The ability to identify, formulate, and solve engineering problems

c) The ability to design a system, component, or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

d) The ability to design and conduct experiments, as well as to analyze and interpret data

e) The ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

f) The ability to apply reasoning informed by the knowledge of contemporary issues

g) The ability to broaden the education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

h) The ability to understand professional and ethical responsibility and apply them in engineering practices

i) The ability to function on multidisciplinary teams

j) The ability to communicate effectively with the engineering community and with society at large

k) The ability in understanding of the engineering and management principles and apply them in project and finance management as a leader and a member in a team.

l) The ability to recognize the need for, and an ability to engage in life-long learning

3.0 ADMISSION

3.1 Candidates seeking admission to the first semester of the eight semester B.Tech. Degree Programme: shall have passed the Higher Secondary Examinations of (10+2) Curriculum (Academic Stream) prescribed by the Government of Tamil Nadu with Mathematics, Physics and Chemistry as three of the four subjects of study under Part-III for Engineering group of courses and Physics, Chemistry and Biology for Bio group of courses (Industrial Bio Tech, Bio-Informatics, Genetic Engg and Bio-Medical Engg) or any examination of any other University or authority accepted by the Board of Management of University as equivalent thereto.

3.2 The candidates who have passed the Higher Secondary Examination (Vocational groups in Engineering/Technology) of the Government of Tamil Nadu, shall also be eligible for admission to the first 1^{st} year programme.

3.3 The candidates who have passed the Diploma in Engineering / Technology, after passing 10^{th} standard of school education conducted by the State Board of Technical Education and training, shall be eligible for admission through Lateral entry system to the third semester of the B.Tech. Degree Programmes

3.4 The eligibility criteria such as marks, number of attempts and physical fitness shall be as prescribed by the Board of Management of University and UGC from time to time

4.0 STRUCTURE OF PROGRAMMES

4.1 Every Programme will have curricula with syllabi consisting of theory and practical courses.

The curriculum is structured to achieve the Programme Educational Objectives (PEOs) and the corresponding Programme Outcomes (POs).

4.2 The syllabus for each course is designed based on Course Objectives and Course Outcomes (COs). COs are mapped with the POs in order to ensure the respective PO

4.3 Outline of Choice Based Credit System:

a. **Humanity and Social Studies:** Generally a course in language, value education, Personality Development, Environmental Sciences and Ethics.

b. **Basic Sciences:** Foundation courses like Maths, Physics, Chemistry, and Biology required to understand the Engineering Courses.

c. **Engg Sciences:** Foundation courses like Basic Civil, Mechanical, Electrical, Electronics, Computer and Cell Biology to lay foundation to understand the core and other allied engineering & technology courses.

d. **Professional Core Courses:** Courses which should compulsorily be studied by a candidate as core requirement are termed as Professional Core courses.

e. **Core Elective Courses:** Generally a course which can be chosen from a pool of courses for specializing in a specific area within the discipline/domain of the core curriculum.

f. **Non Major Elective Courses:** a course which can be chosen from a pool of courses supportive to the discipline or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill.

g. **Open Elective Courses:** a course that would improve his/her employability such as advanced technology courses offered by the industries or a course which the student thinks that would add value for his/her career.

h. **Projects & Research:** Project work/Dissertation and Term paper, Internship, Technical Seminar and Comprehension.

Course Work – Subject Area	Credits		Suggested Distribution of Credits
	Minimum	Maximum	
Humanities and Social Sciences(HSS): Soft skills, Value Education & Professional Ethics, Languages, Aptitude, Personality Development, NCC/NSS/NSO/ Yoga etc	16	20	18

Maths &Basic Sciences(BS): including Maths, Physics, Chemistry, Biology and Environmental Science	26	40	32
Engineering Sciences (ES): Basic Civil Engg, Electrical Engg, Mechanical Engg, Electronics Engg, Computer, etc.	17	20	18
Professional Core (PC) & Core Electives (CE): subjects under Core Engg, relevant to the chosen specialization/branch	89	105	97
Non Major and Open Electives (NE & OE): relevant to the chosen specialization/branch, other Technical, emerging subject areas, etc.	12	15	15
Project Work & Research (PR): includes Project work, Term Paper, Seminar and/or internship in industry or elsewhere, etc.	13	18	15
Total credits for whole programmes:	161	218	195 Credits

4.4 The details of credit allocation are given below in the **Table**

Nature of the Course	Periods / Hours per Week	Credits
Theory	3	3
	4	4
Laboratory	2 or 3	1
Theory + Laboratory	2 + 2	3
Tutorial	2	1
Mini Project1	2	1
Term Paper	4	2
Tech Seminar/Industrial Training (2 weeks)	2	1
Project Work (Eighth Semester)	18 (Minimum)	9

Mini project, Technical Seminar and Industrial Training are also given 1 to 2 credits depending on the amount of time allotted based on the specific requirement of the branch concerned.

4.5 Each semester curriculum shall normally have a blend of theory courses not exceeding **7** and practical courses not exceeding 4. The students are permitted to register for a minimum of 16 credits and maximum of 30 credits in a semester.

4.6 For the award of the degree, a student has to earn certain minimum total number of credits specified in the curriculum of the relevant branch of study. The minimum will be between 195-200 credits depending on the branch of study.

4.7 The medium of instruction, examinations and project report will be English, except for courses on language other than English.

5.0 DURATION OF THE PROGRAMME:

4.1 The minimum period for completion of the B.Tech Programmes for HSC (or equivalent) candidatesshall be eight (8) semesters/four (4) years and a maximum period of twelve (12) semesters/ six (6) years.

4.2 The minimum period for completion of the B.Tech Programmes (Lateral Entry) shall be eight (6) semesters/three (3) years and a maximum period of twelve (10) semesters/ five (5) years.

4.3. In exceptional circumstance a further extension of two more semesters/one year shall be granted. During the extended period the student shall be considered as a private candidate and also not be eligible for ranking.

4.4 Each semester shall normally consist of 90 working days with 450 hours. The Head of the Institution shall ensure that every teacher imparts instruction as per the number of periods specified in the syllabus and that the teacher teaches the full content of the specified syllabus for the course being taught. End –Semester Examination will ordinarily be at the end of each semester.

6.0 ATTENDANCE REQUIREMENTS FOR COMPLETION OF THE SEMESTER

6.1 A Candidate who has fulfilled the following conditions shall be deemed to have satisfied the requirements for completion of a semester:

6.1.1. Every student is expected to earn at least 75% attendance.

6.1.2 However, a candidate who could secure attendance between 65% and 74% only in one particular semester due to medical reasons (hospitalization / accident / specific illness) is given exemptions of 10% of attendance on production of Medical Certificate.

6.1.3 Students who go for participating in Seminar or Conference will be given on duty permission. The candidate shall submit the on duty participation certificate to the HOD who will in turn recommend and submit to the Head of the Institution for the approval. The approved certificates will be forwarded to the Controller of Examinations for record.

6.2 Candidates who do not satisfy the clauses 6.1.2 and 6.1.3 will not be permitted to write the End-Semester Examinations of the subject and are not permitted to go to the next semester, the detained semester should be repeated in the next academic year. When a student fulfills the requirement of overall attendance in a semester as per the clause 6.1.2 and 6.1.3 but fails to fulfill the attendance requirement for some of the courses, such courses should be repeated in the next academic year when offered.

7.0 CLASS ADVISOR AND STUDENT COUNSELOR

7.1 Class Advisor

Head of the Department will allot one faculty member to each class as class advisor. The role of the class advisor is to

i. Monitor the attendance of the class,

ii. Class work done by the faculty,

iii. Circulate the notices and circulars pertaining to the class, class time table, test schedule, examination time table, meeting schedule, minutes of the class committee meetings, etc.,

iv. Maintain all important documents of the students for reference/inspection by all committees

iv. Work closely with the student counselors on matters related to students attached to the student counselor and update the students record of the students of the class..

7.2 Student Counselor (Mentor)

HOD will assign a Student Counselor (Mentor) for every 15 students at the time of admission in the first semester who will continue to be the mentor for these students till they graduate. By guiding and counseling students, teachers can create a greater sense of belongingness amongst our student community. The student counselor will monitor the courses undertaken by the students, check attendance and progress of the students and counsel them periodically. The student counselors should ensure that each student is made aware of the various options for growth and are monitored and guided to become overall performers and help the students to select and work for career choices of their interest. The student counselors shall update and maintain the record of each student attached to them. The student counselors shall also help the class advisors to update the record card of students attached to them. The student counselor may also discuss with the class advisor and HOD and parents about the progress of the students.

8.0 CLASS COMMITTEE

There shall be a class committee for each class in a semester.

8.1 The class committee for a class under a particular branch is normally constituted by the Head of the Department. However, if the students of different branches are mixed in a class of the first semester (generally common to all branches), the class committee is to be constituted by the first year class coordinator.

8.2 The class committee shall be constituted on the first working day of any semester or earlier.

8.3 At least 4 student representatives (usually 2 boys and 2 girls) shall be included in the class committee.

8.4 A class committee will consists of teachers of the concerned class, student representatives, class advisor, student counselors and a chairperson who is not normally teaching the class,. The function of the class committee include

- Solving problems experienced by students in the class room and in the laboratories.
- Clarifying the regulations of the degree programme and the details of rules
- Informing the student representatives, the academic schedule including the dates of assessments and the syllabus coverage for each assessment.
- Analyzing the performance of the students of the class after each test and finding the ways and means of solving the problems, if any.
- The committee shall device suitable methods for improving the performance of slow learners identified.

8.5 The Head of the Institution may participate in any class committee of the institution.

8.6 The chairperson is required to prepare the minutes of every meeting, submit the same to Head of the Institution within two days of the meeting and arrange to circulate it among the concerned students and teachers. If there are some points in the minutes requiring action by the institution, the same shall be brought to the notice of the Head of the Institution by the chairperson of the class committee through respective HODs.

8.7 The first meeting of the class committee shall be held within one week from the date of commencement of the semester, in order to inform the students about the nature and weightage of assessments within the framework of the Regulations. Two or three subsequent meetings may be held at suitable intervals. During these meetings the student members representing the entire class, shall meaningfully interact and express the opinions and suggestions of the class students to improve the effectiveness of the teaching-learning process.

9.0 COURSE COMMITTEE FOR COMMON COURSES

Each common theory course offered to more than one discipline or group, shall have a "Course Committee" comprising all the teachers teaching the common course with one of them nominated as Course Coordinator. The nomination of the Course Coordinator shall be made by the Head of the Department / Head of the Institution depending upon whether all the teachers teaching the common course belong to a single department or to several departments. The 'Course committee' shall meet as often as possible and ensure uniform scheme of evaluation for the test. Wherever it is feasible, the course committee may also prepare a common question paper for the test(s).

10.0 PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

10.1 Every teacher is required to maintain an 'ATTENDANCE AND ASSESSMENT RECORD' which consists of attendance marked in each lecture or practical or project work class, the test marks and the record of class work (topic covered), separately for each course. This should be submitted to the Head of the department periodically (at least three times in a semester) for checking the syllabus coverage and the records of test marks and attendance. The Head of the department will put his/her signature and date after due verification. At the end of the semester, the record should be verified by the Head of the Institution who will keep this document in safe custody (for two years). Any inspection team appointed by the University may inspect the records of attendance and assessment of both current and previous semesters.

10.1.1 The marks allocated for attendance is given in **Table .**

% of Attendance	Marks
<75	Nil
76-80	1
81-85	2
86-90	3
91-95	4
96-100	5

10.2 Theory Courses

There will be two periodical tests, each carrying weightage of 5 marks and one model examination carrying weightage of 10 marks. The distribution of marks for various components for the Internal Assessment is shown below in the table:

S.No	Components for Internal Assessment	Syllabus Coverage for the test / exam	Duration of the test in Minutes.	Marks (max.)
01.	Internal Test – I	2 Units of the Syllabus	90	5
02.	Internal Test – II	Next 2 Units of the Syllabus	90	5
03	Model Test	Full Syllabus	180	10
04	Seminar/Assignment/ Online Test/Quiz	-	-	5
06.	Attendance (Refer Clause 10.1.1)	-	-	5
Total				**30**

10.3 Practical Courses:

Every practical exercise / experiment in all practical courses will be evaluated based on the conduct of exercise / experiment and records maintained by the students. There will be at least **one** model practical examination.

The criteria for awarding marks for internal assessment are given in **Table below.**

Items	Marks (Maximum)
Observation	**7.50**
Record	**7.50**
Model Practical	**20**
Attendance { Refer – 10.1.1 }	**5**
Total	**40**

10.4 Project Work

Project work may be assigned to a single student or to a group of students not exceeding 4 per group. For Project work out of 100 marks, the maximum marks for Continuous Assessment is fixed as 40. The Head of the Department shall constitute a review committee for each programme. There shall be a minimum of 3 members in the review committee. The project Guide will be one of the members of the Review Committee.

There shall be two assessments (each 100 marks) during the semester by a review committee. The student shall make presentation on the progress made before the committee. The total marks obtained in the two assessment shall be 40 marks

The continuous assessment marks for Project Work will be distributed as given below:

Continuous Assessment 40 Marks			
Review I (20 Marks)		Review II (20 Marks)	
Review Committee (excluding guide)	Guide	Review Committee (excluding guide)	Guide
14	6	14	6

10.5 Seminar / Professional Practices:

The seminar / Professional Practices shall carry 100 marks and shall be evaluated through continuous assessment only. Every student is expected to present a minimum of 2 seminars

per semester before the evaluation committee and for each seminar, marks can be equally apportioned. The three member committee appointed by the Head of the Department will evaluate the seminar and at the end of the semester the marks can be consolidated and taken as the final mark. The evaluation shall be based on the seminar paper / report (40%), presentation (40%) and response to the questions asked during presentation (20%).

10.6 Industrial / Practical Training / Internship / Mini Project

The Industrial / Practical Training shall carry 100 marks and shall be evaluated through continuous assessment only. At the end of Industrial / Practical training / internship / Summer Project, the student shall submit a brief report on the training undergone and a certificate from the organization concerned. The evaluation will be made based on this report and a Viva-Voce Examination, conducted internally by a three member Departmental Committee constituted by the Head of the Department. Certificates (issued by the Organization) submitted by the student shall be attached to the mark list and sent to the Controller of Examinations by the Head of the Department.

10.7 Term Paper

i. The students shall carry out this course under the guidance / supervision of a faculty. The "Term Paper" course is individual based.

ii. For the Term Paper course out of 100 marks, the maximum marks for Continuous Assessment is fixed as 40. The Head of the Department shall constitute a review committee for this course. There shall be two reviews and each review carries 20 marks. Every student is expected to identify a topic with substantial literature survey and the technological development of the topic and should submit a report by end of the semester and the students should also prepare a paper on the subject matter of the Term Paper and submit the same to some journal for publication or to a conference for presentation.

iii. At the end of the semester a viva-voce examination will be conducted by an external, internal examiners and the guide on the term paper report submitted by the students. The report evaluation and Viva Voce shall carry a max mark of 30 marks and the paper prepared for the publication shall carry a max mark of 30 based on the quality.

10.8 Comprehension

The comprehension course is offered as two different courses, one in the V semester and the other in the VIII semester, each carrying one credit. The comprehension courses are evaluated by Viva-Voce examination on the subjects studied till that semester of assessment.

10.9 Massive Open Online Course (MOOC)

The students are permitted to opt for Massive Open Online Course(s) listed in the UGC website or any other Organisation or Institution either within India or Abroad as Open Elective with 3 credits. The Assessment method if specified any for the respective course in

the web site or as standard procedure followed for any theory course as per the regulation shall be followed.

11.0 END SEMESTER EXAMINATIONS:

11.1. Theory Courses

The examinations shall ordinarily be conducted between October and December during the odd semesters and between April and June in the even semesters The End Semester Examination question paper pattern is given below:

Syllabus Coverage	Duration of the Exam in Hours	Question Pattern
Full Syllabus	3	**Part – A, 10x2 = 20** Short answer Type, 10 questions each carrying 2 marks. 2 questions from each unit. **Part – B, 5x6 = 30** Para /Analytical Type, 5 questions, one from each unit EITHER - OR type. **Part – C, 5x10 = 50** Essay/Design/Analytical Type, 5 questions out of 7 covering the full syllabus
		Max mark = 100

However, the question paper pattern for courses in engineering graphics and machine drawing may be designed differently to suit the specific needs of the courses.

11.2. Practical Courses

End Semester examination for practical courses will be conducted jointly by one internal examiner and one external examiner appointed by the Controller of Examinations with the recommendation of the Head of the Dept.

11.3. The maximum marks for each theory shall be 100 comprising of 30 marks for internal assessment and 70 marks for the end semester examinations conducted by the University. The maximum marks for each practical course (including the project Work and Viva Voce Examination in the Eighth Semester) shall be 100 comprising of 40 marks for internal assessment and 60 marks for the end semester examinations conducted by the University.

11.4 PROJECT WORK

The student(s) is expected to submit the project report on or before the last working day of the semester. The University examination for the project work shall consist of evaluation of the final project report submitted by the student or students of the project group by an external examiner followed by a viva-voce examination conducted separately for each student by a committee consisting of an external examiner and an internal examiner. The Controller of Examinations shall appoint Internal and External Examiners from the panel of examiners recommended by the Head of the Department for the End Semester Examinations of the Project Work.

The End Semester Examination marks for the Project Work and for the Viva-Voce Examination will be distributed as given below.

End Semester Examination 60 Marks		
Report Evaluation (20 Marks)	Viva – Voce (40 Marks)	
External Examiner	External Examiner	Internal Examiner
20	20	20

If the project report is not submitted on or before the specified deadline, an extension of time up to a maximum of 30 days may be given for the submission of project work with due approval obtained from the Head of the Department. If the project report is not submitted even beyond the extended time then the student(s) is deemed to have failed in the Project Work. The failed student(s) shall register for the same in the subsequent semester and repeat the project work again.

12.0 SUPPLEMENTRY EXAMINATIONS

After the publication of eighth semester results, supplementary examinations will be conducted to the students who have failed in any of theory courses in any of the semesters with no arrears in the practical Examinations. Interested students should register for the examinations required by them. Controller of examination will schedule supplementary examinations after the last date of registering for the supplementary examinations.

Pattern of evaluation will be the same as that of the end semester examinations. For non theory examinations supplementary examinations are not applicable.

13.0 MALPRACTICE

If a student indulges in malpractice in any internal test/model examination/end semester examination, he/she shall be liable for punitive action as recommended by the Malpractice committee.

14.0 REQUIREMENTS FOR APPEARING FOR UNIVERSITY EXAMINATIONS

A candidate shall normally be permitted to appear for the semester Examinations of the current semester if he/she has satisfied the semester completion requirements (Vide Clause 6.0) and has registered for examination in all courses of the semester

15.0 PASSING REQUIREMENTS

15.1 A candidate who secures not less than 50% of total marks earned in the internal and end semester examination put together in theory course or practical courses or project work shall be declared to have passed the examination in that course.

15.2 If a candidate fails to secure a pass in a particular course, it is mandatory that he/she shall register and reappear for the examination in that course during the subsequent semester when examination is conducted in that course; he/she should continue to register and reappear for the examinations till he / she secures a pass. However the internal assessment marks obtained by the candidate in the first attempt shall be retained and considered valid for all subsequent attempts. In exceptional cases, a candidate may be permitted by the Head of the Institution to redo the courses for improving the internal assessments marks.

16.0. METHODS FOR REDRESSAL OF GRIEVANCES IN EVALUATION

16.1. Students who are not satisfied with the grades awarded can seek redressal by the methods given in the Table below:

Redressal Sought	Methodology
Request for photocopy of the answer script and or request for revaluation	To apply to COE within 7 days of declaration of the result/within 7 days of obtaining the photocopy along with the payment of the prescribed fee.

These are applicable only for theory courses in regular and arrear end semester examinations.

16.2 Challenge of Evaluation

If one is not satisfied with the result, can make an appeal to the CoE for the review of answer scripts after paying the prescribed fee within 7 days after the declaration of the examination result/revaluation result.

17.0 AWARD OF LETTER GRADES

All assessments of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain number of points, will be awarded as per the range of total marks (out of 100) obtained by the candidate as detailed below:

Range of total marks	Letter Grade	Grade points
90-100	S	10

80-89	A	9
70-79	B	8
60-69	C	7
55-59	D	6
50-54	E	5
0 to 49	U	0
Incomplete	I	0
Withdrawal	W	0

"U" denotes failure in the course.

"I" denotes incomplete as per clause 6.0 and hence prevention from writing End-Semester examination.

"W" denotes withdrawal from the course.

After results are declared, Grade Sheets will be issued to each student which will contain the following details:

The list of courses enrolled during the semester and the grade scored.

The Cumulative Grade Point Average (CGPA) of all courses enrolled from first semester onwards.

GPA for a semester is the ratio of the sum of the products of the number of credits for courses acquired and the corresponding grade points to the grades scored in those courses taken for all the courses to the sum of the number of credits of all the courses in the semester.

GPA = Sum of (C*GP)/Sum of C

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester. "U", "I" and "W" grades will be excluded for calculating GPA and CGPA.

18.0 ELIGIBILITY FOR THE AWARD OF THE DEGREE

A student shall be declared to be eligible for the award of the B.Tech Degree provided the student has

18.1 Successfully completed the course requirement and has passed all the prescribed examinations in all the 8 semesters (6 semesters for lateral entry) within a maximum period of 7 years (6 years for lateral entry) reckoned from the commencement of the first semester to which the candidate was admitted.

18.2 No disciplinary action is pending against him/her.

18.3 The award of the degree must be approved by the Board of Management of the University.

19.0 CLASSIFICATION OF THE DEGREE AWARDED

19.1 A candidate who qualifies for the award of the degree (vide clause 18.0) having passed examination in all the courses of all the eight (8) semesters (six (6) semesters in the case of lateral entry) in his/her First Appearance within eight (8) consecutive semesters (six (6) consecutive semesters for lateral entry) and securing a CGPA of not less than 8.0 shall be declared to have passed the examination in **first class with distinction**. For this purpose the withdrawal from examination (vide clause 20.0) will not be construed as an appearance. Further authorized break of study (vide clause 21.3) will not be counted for the purpose of classification.

19.2 A candidate who qualifies for the award of the degree (vide clause 18.0) having passed the examination in all the courses within a maximum period of twelve (12) semesters (ten (10) semesters for lateral entry) and securing a CGPA of not less than 6.50 shall be declared to have passed the examination in **First Class**. For this purpose the authorized break of study (vide clause 21.3) will not be counted for the purpose of classification.

19.3 All other candidates (not covered in clauses 19.1 and 19.2) who qualify for the award of the degree (vide Clause 18.0) within a maximum period of twelve (12) semesters (ten (10) semesters for lateral entry) shall be declared to have passed the examination in **Second Class**.

19.4 All other candidates (not covered in clauses 19.1, 19.2 & 19.3) who qualify for the award of the degree during the extended period as per the clause 4.2 shall be considered as a private candidate and also not be eligible for ranking and they shall be eligible to get only a **pass** certificate.

19.5 A candidate who is absent in semester examination in a course / project work after having registered for the same shall be considered to have appeared in that examination for the purpose of classification.

20.0 PROVISION FOR WITHDRAWAL FROM END-SEMESTER EXAMINATION

20.1 A candidate may for valid reasons be granted permission to withdraw from appearing for the examination of only any one semester examination during the entire duration of the degree programme. Also only one application for withdrawal is permitted for that semester examination in which withdrawal is sought.

20.2 Withdrawal application shall be valid only if the candidate is otherwise eligible to write examination and if it is made within the prescribed number of days prior to the commencement of the examination in that course or courses and also recommended by the Head of the Department and the Head of the Institution.

20.3 A candidate for valid reasons like sudden illness or accident or unexpected natural calamities not able to be present in the examination hall in time or absent for the examination may seek post permission for the withdrawal from the examination.

20.4 Withdrawal shall not be construed as an appearance for the eligibility of a candidate for First Class with Distinction.

21.0 TEMPORARY BREAK OF STUDY FROM A PROGRAMME

21.1 A candidate is not normally permitted to temporarily break the study. However, if a candidate intends to temporarily discontinue the programme in the middle of the semester for valid reasons (such as accident or hospitalization due to prolonged ill health) and to rejoin the programme in a later semester he / she apply to the Head of the Institution in advance, in any case, not later than the last date for registering for the semester in question, through the Head of the Department stating the reasons thereof.

21.2 The candidates permitted to rejoin the programme after break of study shall be governed by the rules and regulation in force at the time of rejoining.

21.3 The duration specified for passing all the courses for the purpose of classification (vide clause 19.1 and 19.2) shall be increased by the period of such break of study permitted.

21.4 The total period for completion of the Programme reckoned from, the commencement of the first semester to which the candidate was admitted shall not exceed the maximum period specified in clause 5.0 irrespective of the period of break of study in order that he/she may be eligible for the award of the degree (vide clause 18.0).

21.5 If any student is detained for want of required attendance, progress and good conduct, the period spent in that semester shall be considered as permitted 'Break of study' and clause 21.3 is not applicable for this case.

22.0 INDUSTRIAL VISIT

Every student is required to undergo one Industrial visit in every semester starting from the third semester of the Programme arranged by the Head of the Department.

23.0 FAST TRACK PROGRAMME

Fast track programme is introduced as an option for the bright students enabling them to complete the course in a short duration.

23.1 Eligibility

Those students who have secured CGPA of 9 and above at the end of 2nd semester are eligible to opt for the fast track scheme.

23.2 Structure of the Fast Track Scheme

The curriculum is framed in such a way that the eligible students who opt for fast track scheme will be able to complete the degree course in a period of three years. There will be two summer terms conducted one after the 2nd semester and another after the 4th semester during the summer vacations. Each summer term will a have maximum of three theory courses and two laboratory practical courses. However, the total number of credits to be earned for the award of degree will remain the same as that of the concerned regular programme.

24.0 MIGRATION/TRANSFER OF CANDIDATES

24.1 Migration/Transfer of candidates from another University approved by UGC shall be granted.

24.2 All Migrations/Transfers are subject to the approval of the Vice Chancellor

25.0 DISCIPLINE

Every student is required to observe disciplined and decorous behavior both inside and outside the Institute and not to indulge in any activity which will tend to bring down the prestige of the University/Institute. The Dean shall constitute a disciplinary committee consisting of Dean, Head of the departments to which the student concerned belongs, and the Head of another department to enquire into acts of indiscipline and notify the University about the disciplinary action recommended for approval.

26.0 REVISION OF REGULATIONS AND CURRICULUM

The University may from time to time revise, amend or change the Regulations, Curricula, Syllabi and scheme of examinations through the Academic Council with the approval of Board of Management.

CURRICULUM AND SYLLABUS (R2015)
CHOICE BASED CREDIT SYSTEM
(Applicable to the batches admitted from July 2015)
B.TECH – COMPUTER SCIENCE AND ENGINEERING
I – VIII SEMESTERS

SEMESTER I						
Course Code	**Category**	**Course Title**	**L**	**T**	**P**	**C**
THEORY						
BEN101	HS	English – I	3	1	0	3
BMA101	BS	Mathematics – I	3	1	0	3
BPH101	BS	Engineering Physics - I	3	0	0	3
BCH101	BS	Engineering Chemistry – I	3	0	0	3
BCS101	ES	Fundamentals of Computing and Programming	3	0	0	3
BFI201 #	HS	Foreign/Indian Language	3	0	0	3
BME102	ES	Engineering Graphics – C	1	0	3	3
BEE101	ES	Basic Electrical and Electronics Engineering	2	0	0	2
PRACTICAL						
BCS1L1	ES	Computer Practice Laboratory –I	0	0	3	1
BEE1L1	ES	Basic Electrical and Electronics Engineering Practices Laboratory	0	0	3	1
BPC1L1/2L1	BS	Physics and Chemistry Laboratory@	0	0	3/3	0
BSS1L7	HS	Yoga	0	1	2	1

#Any one of the following courses:BFR201–French, BGM201–German, BJP201– **Japanese**, BKR201 – Korean, BCN201 – Chinese, BTM201 - Tamil

@Laboratory Classes on alternate weeks for Physics and Chemistry. The lab examinations will be held only in the second semester (including the first semester experiments also)

Total Number of Contact Hours = 38 **Total Number of Credits= 26**

SEMESTER II						
Code No.	**Category**	**Course Title**	**L**	**T**	**P**	**C**
THEORY						
BEN201	HS	English-II	3	1	0	3
BMA201	BS	Mathematics –II	3	1	0	3
BPH201	BS	Engineering Physics –II	3	0	0	3
BCH201	BS	Engineering Chemistry – II	3	0	0	3
BCS202	ES	Internet programming	2	0	0	2
BSS2L2	HS	Personality Development	2	0	0	2
BBT202	BS	Biology for Engineers	2	0	0	2
BME201	ES	Basic Mechanical Engineering	2	0	0	2
BCE201	ES	Basic Civil Engineering	2	0	0	2
PRACTICAL						
BCS2L1	ES	Internet Practices lab	0	0	3	1
BCM2L1	ES	Basic Civil & Mechanical Engg. Practices Lab	0	0	3	1
BPC2L1	BS	Physics and Chemistry Lab	0	0	3/3	1
BSS2L4/ BSS2L5/ BSS2L6	HS	NSS/NCC/NSO (to be conducted during weekends)	0	1	2	1
#Laboratory Classes on alternate weeks for Physics and Chemistry. The lab examinations will be held only in the second semester (including the first semester experiments also)						
Total No. of Contact Hours: 36				**Total Credits: 26**		

SEMESTER- III						
THEORY						
Sub. Code	**Category**	**Subject Name**	**L**	**T**	**P**	**C**
BMA 301	BS	Mathematics – III	3	2	0	4
BCS301	PC	Data Structures	3	0	0	3
BCS302	PC	System Modeling and Simulation	3	0	0	3
BCS303	PC	Computer Organization and Architecture	3	0	0	3
BCS304	PC	Digital Computer Fundamentals	3	0	0	3
BEC305	PC	Electronics Circuits	3	0	0	3
PRACTICAL						
BCS3L1	PC	Data Structures using C Laboratory	0	0	3	2
BCS3L2	PC	Object Oriented Programming using C++ Laboratory	0	0	3	2
BEC3L2	PC	Electronics Circuits Laboratory	0	0	3	2
BCS3S1	PR	Technical Seminar – I	0	0	2	1
Total No. of Contact Hours: 29 Total No. of Credits: 26						

Semester -IV						
THEORY						
Sub. Code	**Category**	**Subject Name**	**L**	**T**	**P**	**C**
BMA402	BS	Numerical Methods	3	2	0	4
BCS401	PC	Database Management System	3	0	0	3
BCS402	PC	Design and Analysis of Algorithm	3	0	0	3
BCS 403	PC	System Software	3	0	0	3
BCS405	PC	Operating Systems	3	0	0	3
BCE406	BS	Environmental Studies	3	0	0	3
PRACTICAL						
BCS4L1	PC	DBMS Laboratory	0	0	3	2
BCS4L2	PC	Operating Systems Laboratory	0	0	3	2
BCS4L3	PC	Computer Graphics and Multimedia Laboratory	0	0	3	2
BCS4S1	PR	Technical Seminar-II	0	0	2	1
Total No. of Contact Hours: 30 Total No. of Credits: 26						

SEMESTER-V						
THEORY						
Sub. Code	**Category**	**Subject Name**	**L**	**T**	**P**	**C**
BMA501	BS	Discrete Mathematics	4	0	0	4
BCS501	PC	Software Engineering	3	0	0	3
BEC501	PC	Microprocessors and its applications	3	0	0	3
BCS502	PC	Computer Networks	3	0	0	3
BCS5E1	CE	Core Elective-I	3	0	0	3
BCS5E2	OE	Open Elective-I	3	0	0	3
PRACTICAL						
BCS 5L1	PC	Networking Laboratory	0	0	3	2
BEC5L1	PC	Microprocessor Laboratory	0	0	3	2
BCS5L2	PC	Software Engineering Laboratory	0	0	3	2
BCS5C1	PR	Comprehension I	0	0	0	1
Total No. of Contact Hours: 27					**Total No. of Credits: 26**	

SEMESTER-VI						
THEORY						
Sub. Code	**Category**	**Subject Name**	**L**	**T**	**P**	**C**
BCS601	PC	Data Warehousing and Data Mining	3	0	0	3
BSS601	HS	Value Education and Professional Ethics	3	0	0	3
BCS602	PC	Distributed Computing	3	0	0	3
BCS603	PC	Principles of Compiler Design	3	0	0	3
BCS6E3	CE	Core Elective- II	3	0	0	3
BCS6E4	NE	Non Major Elective-I	3	0	0	3
PRACTICAL						
BCS6L1	PC	Data Warehousing and Data Mining Laboratory	0	0	3	2
BCS6L2	PC	C # and .Net Laboratory	0	0	3	2
BCS6L3	PC	Programming in Java Laboratory	0	0	3	2
BCS6P1	PR	Mini Project	0	0	3	1
Total No. of Contact Hours: 30					**Total No. of Credits: 25**	

Semester-VII						
THEORY						
Sub. Code	**Category**	**Subject Name**	**L**	**T**	**P**	**C**
BCS701	PC	Grid and Cloud Computing	3	0	0	3
BCS702	PC	Mobile and Pervasive Computing	3	0	0	3
BCS703	PC	Web Technology	3	0	0	3
BCS704	PC	Artificial Intelligence and Expert System	4	0	0	4
BCS7E5	OE	Open Elective -II	3	0	0	3
BCS7E6	NE	Non Major Elective- II	3	0	0	3
PRACTICAL						
BCS7L1	PC	Grid and Cloud Computing Laboratory	0	0	3	2
BCS7L2	PC	Web Technology Laboratory	0	0	3	2
BCS7P1	PR	Term Paper	0	0	4	2
Total No. of Contact Hours: 29		**Total No. of Credits: 25**				

Semester-VIII						
THEORY						
Sub. Code	**Category**	**Subject Name**	**L**	**T**	**P**	**C**
BCS8E7	CE	Core Elective-III	3	0	0	3
BCS8E8	NE	Non Major Elective-III	3	0	0	3
PRACTICAL						
BCS8C1	PR	Comprehension II	0	0	0	1
BCS8P1	PR	Project Work	0	0	18	9
Total No. of Contact Hours: 24		**Total No. of Credits: 16**				

OVERALL CREDITS FOR THE PROGRAMME : 196

SUMMARY OF CURRICULUM STRUCTURE AND CREDIT & CONTACT HOUR DISTRIBUTION

S.No	Sub Area	Credit As per Semester								No. of Credit	% of credit
		I	II	III	IV	V	VI	VII	VIII		
1	Humanities & Social Sciences (HS)	7	6	-	-	-	3		-	16	08.63
2	Maths &Basic Sciences (BS)	9	12	4	7	4	-	-	-	36	18.37
3	Engineering Sciences (ES)	10	8	-	-	-	-	-	-	18	09.18
4	Professional Core (PC)	-	-	21	15	15	15	17	-	83	42.35
5	Core Electives (CE)	-	-	-	-	3	3		3	9	04.59
6	Non major Electives (NE)	-	-	-	-	-	3	3	3	9	04.59
7	Open Electives (OE)	-	-	-	-	3	-	3	-	6	03.06
8	Project Work, Seminar, Internship, Term Paper, etc. (PR)	-	-	1	1	1	1	2	10	16	08.17
	Total Credit	26	26	26	26	26	25	25	16	196	100%
	Total Contact Hour	38	36	29	30	27	30	28	25	244 Hrs	

LIST OFELECTIVES

CORE ELECTIVE(CE)- I					
SUB.CODE	**SUBJECT NAME**	**L**	**T**	**P**	**C**
BCS001	Parallel Computing	3	0	0	3
BCS002	Data Science	3	0	0	3
BCS003	Software Reliability	3	0	0	3
CORE ELECTIVE (CE)-II					
BCS004	VHDL	3	0	0	3
BCS005	Big Data Analytics	3	0	0	3
BCS006	Software Quality Assurance	3	0	0	3
CORE ELECTIVE(CE)- III					
BCS007	Computer Vision	3	0	0	3
BCS008	Bio Inspired Computing	3	0	0	3
BCS009	Real Time Software Testing	3	0	0	3
NON MAJOR ELECTIVE(NE)- I					
SUB.CODE	**SUBJECT NAME**	**L**	**T**	**P**	**C**
BET407	Digital Signal Processing	3	0	0	3
BET702	Cellular Mobile Communication	3	0	0	3
BBR701	Bio Safety, Bio Ethics, IPR Patents	3	0	0	3
BBM405	Biosensors and Transducer	3	0	0	3
BBM054	Bio Informatics	3	0	0	3
NON MAJOR ELECTIVE(NE)- II					
BET603	Telecommunication Switching Networks	3	0	0	3
BET605	Telecommunication Switching and System Modelling	3	0	0	3
BBA001	Principles of Management and Organizational Behaviour	3	0	0	3
BBM701	Digital and Medical Image Processing	3	0	0	3
BBM604	Medical Informatics	3	0	0	3
NON MAJOR ELECTIVE(NE)- III					
BET301	Principles of Analog and Digital System	3	0	0	3
BEC405	Linear Integrated Circuits	3	0	0	3
BET703	Satellite Communication	3	0	0	3
BBM055	Telemedicine	3	0	0	3
BBR 404	Genomics and Proteomics	3	0	0	3
OPEN ELECTIVE(OE) –I					
SUB.CODE	**SUBJECT NAME**	**L**	**T**	**P**	**C**
BCS010	TCP / IP Principles and Architecture	3	0	0	3
BCS011	Performance Evaluation in Computer Systems	3	0	0	3
BCS012	Advanced Computer Networks	3	0	0	3
BCS013	Mobile Communication	3	0	0	3
BCS014	High Speed Networks	3	0	0	3
BBA009	Intellectual Property Rights	3	0	0	3
BSS001	NSS Paper I	2	0	2	3
OPEN ELECTIVE(OE) –II					
BCS015	PHP Programming	3	0	0	3
BCS016	Virtual Reality	3	0	0	3
BCS017	E Commerce	3	0	0	3
BCS018	Advanced Web Design	3	0	0	3

BCS019	Object Oriented Database Design	3	0	0	3
BSS002	NSS Paper II	2	0	2	3
BMO001	Massive Open Online Course	3	0	0	3

BEN101	ENGLISH - I	L	T	P	C
	Total Contact Hours – 60	3	1	0	3
	Prerequisite – +2 Level English				
	Course Designed by – Dept of English				

OBJECTIVES

To make the students learn the basic modes of communication for fluency and attainment of confidence in speech, reading and writing.

COURSE OUTCOMES (COs)

CO1	Understand the importance of being responsible, logical, and thorough.
CO2	Respond to the situations where short reports and instructions are required.
CO3	Explain "how things work", and what to suggest when "things don't work
CO4	Develop our confidence and authority in the practical use of language.
CO5	Understand the importance of being responsible, logical, and thorough.
CO6	e to Face interviews and competitive examinations

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	H	H	H	H	M	L	L	H	H	H	H
	CO2							L					
	CO3	H						H		H			H
	CO4	H	M				M	L	H	H			H
	CO5							L					
	CO6	H		H	H	H	H	L		H	H	M	H

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I STRUCTURES 12

Parts of speech - Active and passive voices - Subject verb agreement. - Writing about School life, Hobbies, Family and friends – Word formation with prefixes and suffixes - Tenses - Concord - Summarizing - Note-making

UNIT II TRANSCODING 12

Cause and effect relations – Punctuations –Differences between verbal and nonverbal communication -E - mail communication – Homophones - Etiquettes of E mail communication. Interpreting graphic representation - Flow chart and Bar chart.

UNIT III REPORTING 12

Degrees of comparison – Positive, Comparative, Superlative - questions- SI units -Lab reports - Physics chemistry, workshop and Survey report for introducing new product in the market.

UNIT IV FORMAL DOCUMENTATION 12

Writing project proposals - Presentation skills - Prefixes and suffixes - If conditions - Writing a review-Preparing minutes of the meeting, Agenda, official circulars.

UNIT V METHODOLOGY 12

Accident reports (due to flood and fire) - Hints development - Imperatives - Marking the stress Connectives , prepositional relatives.

TEXT BOOK:

1. Department Of Humanities and Social Sciences Division, Anna University, Oxford University Press, 2013.

REFERENCES:

1. S.P.Danavel, English and Communication for Students of Science and Engineering, Orient Blackswan, Chennai, 2011.
2. Rizvi, M.Asharaf, Effective Technical Communication, New Delhi, Tata McGraw Hill Publishibg Company, 2007.
3. Murali Krishna and Sunitha Moishra, Communication Skills for Engineers . Pearson, New Delhi, 2011.

BMA101	**MATHEMATICS I**	**L**	**T**	**P**	**C**
	Total Contact Hours - 60	3	1	0	3
	Prerequisite – + 2 Level Mathematics				
	Course Designed by – Dept of Mathematics				

OBJECTIVES

To make the students learn Mathematics in order to formulate and solve problems effectively in their respective fields of engineering.

COURSE OUTCOMES (COs)

CO1	Study the fundamentals of mathematics
CO2	Students learn multiple integral techniques
CO3	Students gain knowledge in application of variables
CO4	Find area and volume based on a function with one or more variables.
CO5	Apply matrix operations to solve relevant real life problems in engineering.
CO6	Formulate a mathematical model for three dimensional objects and solve

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	D	e	f	g	h	i	j	k	l
2	CO1	H											
	CO2			M		H							
	CO3		H				M						
	CO4								L				
	CO5							H			L		
	CO6											L	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/ Term Paper Seminar/ Internship (PR)
			√						

4	Approval	37th Meeting of Academic Council, May 2015

UNIT 1 MATRICES 12

Characteristic equations- Eigen values and eigen vectors of the real matrix- Properties- Cayley-Hamilton theorem(Excluding proof)- Orthogonal transformation of a symmetric matrix to diagonal form- Quadratic form- Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II THREE DIMENSIONAL ANALYTICAL GEOMETRY 12

Equation of a Sphere- Plane section of a sphere- Tangent plane- Equation of cone- Right circular cone- Equation of a cylinder- Right circular cylinder.

UNIT III DIFFERENTIAL CALCULUS 12

Curvature in Cartesian coordinates- Centre and radius of curvature- Circle of curvature- Evolutes- Envelopes- Applications of Evolutes and Envelopes.

UNIT 1V FUNCTIONS OF SEVERAL VARIABLES 12

Partial derivatives- Euler's theorem for homogeneous functions- Total derivatives- Differentiation of implicit functions- Jacobians- Taylor's expansion- Maxima and Minima- Method of Lagrangian multipliers.

UNIT V MULTIPLE INTEGRALS 12

Double integration- Cartesian and Polar coordinates- Change of order of integration- Change of variables between Cartesian and Polar coordinates- Triple integration in Cartesian coordinates-Area as double integral- Volume as triple integral.

TEXT BOOK:

1. Ravish R.Singh and Mukkul Bhatt, "Engineering Mathematics-I" First Reprint, Tata McGraw Hill Pub Co., New Delhi. 2011.
2. Grewal.B.S, "Higher Engineering Mathematics", 40th Edition, Khanna Publications, Delhi. 2007.

REFERENCES:

1. Ramana.B.V. "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2007.
2. Glyn James, "Advanced Engineering Mathematics", 7th Edition, Pearson Education, 2007.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley and Sons, New York, 2003.
4. Murray R.Spiegel, "Advanced Calculus", Schaum's Outline Series, First Edn, McGraw Hill Intl Book Co.,New Delhi, 1981.

PH101	**ENGINEERING PHYSICS I**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite – +2 level Physics				
	Course Designed by – Department of Physics				

OBJECTIVES:

To enhance the fundamental knowledge in Physics and its applications relevant to various stream Engineering and Technology

COURSE OUTCOMES (COs)

CO1	Understand the Principles and Laws of Physics
CO2	To understand the impact of Crystal Physics
CO3	Learn the Properties of Elasticity and Heat transfer.
CO4	Acquire Knowledge on Quantum Physics.
CO5	Understand the concepts on Laser & Ultrasonic's and its Applications
CO6	Understand the Principle of Laser and its Applications in Engineering and Medicine.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	A	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H						M			H		
	CO2		L	H		M				M		L	H
	CO3												
	CO4	H		M	L						L		M
	CO5		L	L								L	L
	CO6												

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I CRYSTAL PHYSICS 9

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Diamond and graphite structures (qualitative treatment)-

Crystal growth techniques –solution, melt (Bridgman and Czochralski) and vapour growth techniques (qualitative)

UNIT II PROPERTIES OF MATTER AND THERMAL PHYSICS 9

Elasticity-Hooke's law - Relationship between three modulii of elasticity (qualitative) – stress -strain diagram – Poisson's ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever –Young's modulus by uniform bending- I-shaped girders Modes of heat transfer- thermal conductivity- Newton's law of cooling - Linear heat flow – Lee's disc method – Radial heat flow – Rubber tube method – conduction through compound media (series and parallel).

UNIT III QUANTUM PHYSICS 9

Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory – Compton effect. Theory and experimental verification – Properties of Matter waves – G.P Thomson experiment-Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box - Electron microscope - Scanning electron microscope - Transmission electron microscope.

UNIT IV ACOUSTICS AND ULTRASONICS 9

Classification of Sound- decibel- Weber–Fechner law – Sabine's formula- derivation using growth and decay method – Absorption Coefficient and its determination –factors affecting acoustics of buildings and their remedies. Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications – Sonogram.

UNIT V PHOTONICS AND FIBRE OPTICS 9

Spontaneous and stimulated emission- Population inversion –Einstein's A and B coefficients - derivation. Types of lasers – Nd:YAG, CO2, Semiconductor lasers (homo junction & hetero junction)- Industrial and Medical Applications. Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – attenuation, dispersion, bending - Fibre Optical Communication system (Block diagram) - Active and passive fibre sensors- Endoscope.

TEXT BOOKS:

1. Jayaraman D Engineering Physics I. Global Publishing House, 2014.
2. Arumugam M. Engineering Physics. Anuradha publishers, 2010.
3. Gaur R.K. and Gupta S.L. Engineering Physics. Dhanpat Rai Publishers, 2009.
4. Mani Naidu S. Engineering Physics, Second Edition, PEARSON Publishing, 2011.

REFERENCES:

1. Searls and Zemansky. University Physics, 2009
2. Marikani A. Engineering Physics. PHI Learning Pvt., India, 2009.
3. Palanisamy P.K. Engineering Physics. SCITECH Publications, 2011.
4. http://ocw.mit.edu/courses/find-by-topic
5. http://nptel.ac.in/course.php?disciplineId=122
6. https://en.wikipedia.org/wiki/Engineering_physics

BCH101	ENGINEERING CHEMISTRY - I	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – +2 Level Chemistry				
	Course Designed by – Department of Chemistry				

OBJECTIVES

To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

COURSE OUTCOMES (COs)

CO1	Understand the principles of water characterization and treatment for portable and industrial purposes.
CO2	To impart knowledge on the essential aspects of Principles of polymer chemistry and engineering applications of polymers
CO3	Having a sound knowledge in the Field of the Conventional and non-Conventional energy
CO4	To impart knowledge on the essential aspects of electrochemical cells, emf and applications of EMF measurements
CO5	To make the students understand the Principles of corrosion and corrosion control .
CO6	To impart knowledge about the Conventional and non-conventional energy sources and energy storage devices

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	J	k	l
2	CO1	H						H					
	CO2		L	H		M							
	CO3		M		H								
	CO4	H		M	L			H					
	CO5		L	L									
	CO6	H						H					

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I WATER TECHNOLOGY 9

Introduction-Characteristics : Hardness of water – types - temporary and permanent hardness - estimation by EDTA method Alkalinity – types of alkalinity - Phenolphthalein and Methyl orange alkalinity - determination –Domestic water treatment – disinfection methods (Chlorination, Ozonation

, UV treatment) Boiler feed water – requirements – disadvantages of using hard water in boilers Internal conditioning (Calgon Conditioning method) – External conditioning – Demineralization process – Desalination and Reverse osmosis.

UNIT II POLYMERS 9

Introduction-Polymers- definition – polymerization – degree of polymerization - types of polymerization– Addition polymerization and Condensation polymerization – Mechanism of Polymerization - free radical polymerization mechanism only, Plastics: Classification – thermoplastics and thermosetting plastics – difference between thermoplastics and thermosetting plastics - preparation, properties and uses of PVC, Teflon, nylon-6,6, PET, Rubber :Types – drawbacks of natural rubber -vulcanization of rubber - properties and uses of vulcanized rubber Synthetic rubbers – butyl rubber and SBR

UNIT III ELECTRO CHEMISTRY 9

Introduction CELLS: types of Electrochemical cells , Electrolytic cells – Reversible and irreversible cells EMF – measurement of EMF– Single electrode potential – Nernst equation Reference electrodes : Standard Hydrogen electrode -Calomel electrode Ion selective electrode :Glass electrode and measurement of pH using Glass electrode Electrochemical series – significance Titrations :Potentiometer titrations (redox - Fe^{2+}vs dichromate titrations) Conduct metric titrations (acid-base – HCI vs, NaOH titrations)

UNIT IV CORROSION AND CORROSION CONTROL 9

Introduction: Chemical corrosion Definition - Chemical Corrosion - Electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – mechanism of Chemical and Electrochemical corrosion factors influencing corrosion control – sacrificial anode and impressed cathodic current methods – Protective coatings :Paints– constituents of the paint and their functions Metallic coatings – electroplating of Gold and electro less plating of Nickel.

UNIT V NON-CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES9

Introduction : Nuclear fission and nuclear fusion reactions – differences between nuclear fission and nuclear fusion reactions – nuclear chain Reactions – nuclear energy critical mass - super critical mass - sub - critical mass Light water nuclear reactor for power generation (block diagram only) – breeder reactor Solar energy conversion – solar cells – wind energy Fuel cells – hydrogen – oxygen fuel cell Batteries :Primary and secondary Batteries – differences between Primary and secondary Batteries Secondary batteries :Lead–acid storage battery –working –uses Nickel–cadmium battery - working – uses Solid – state battery : Lithium battery

TEXT BOOKS:

1. P.C.Jain and Monica Jain, “Engineering Chemistry” Dhanpat Rai Pub, Co., New Delhi (2002).
2. S.S. Dara “A text book of engineering chemistry” S.Chand & Co.Ltd., New Delhi (2006).
3. P. J. Lucia, M. Subhashini, “Engineering Chemistry, Volume 1”, Crystal Publications, Chennai, (2007).

REFERENCES :

1. B.K.Sharma “Engineering chemistry” Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. B. Sivasankar “Engineering Chemistry” Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).
3. http://ocw.mit.edu/courses/find-by-topic
4. http://nptel.ac.in/course.php?disciplineId=122
5. https://en.wikipedia.org/wiki/Electrochemistry

BCS101	FUNDAMENTALS OF COMPUTING AND PROGRAMMING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – +2 level Physics				
	Course Designed by – Department of Physics				

OBJECTIVES

Students will understand the basics of computers and solve computer oriented problems using various computing tools.

COURSE OUTCOMES (COs)

CO1	Learn the fundamental principles in computing.
CO2	Learn to write simple programs using computer language
CO3	To enable the student to learn the major components of a computer system.
CO4	Computing problems
CO5	To learn to use office automation tools.
CO6	To interpret and relate programs

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	J	k	l
2	CO1	H					H						
	CO2		L	H		M							
	CO3		L		S								
	CO4	M		M	W		M						
	CO5		L	L									
	CO6	H					H						

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
				√					
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION TO COMPUTER 9

Introduction- Characteristics of computer-Evolution of Computers-Computer Generations - Classification of Computers- Basic Computer Organization-Number system. Computer Software: Types of Software—System software-Application software-Software Development Steps

UNIT II PROBLEM SOLVING AND OFFICE AUTOMATION 9

Planning the Computer Program – Purpose – Algorithm – Flowcharts– Pseudo code Introduction to Office Packages: MS Word, Spread Sheet, Power Point, MS Access, Outlook.

UNIT III INTRODUCTION TO C 9

Overview of C-Constants-Variables-Keywords-Data types-Operators and Expressions. Managing Input and Output statements-Decision making-Branching and Looping statements.

UNIT IV ARRAYS AND STRUCTURES 9

Arrays - Handling of Character Strings - Pointers – Structures-Union -Functions – Recursion-Call by value and Call by reference.

UNIT V INTRODUCTION TO C++ 9

Overview of C++ - Applications of C++-Classes and objects-OOPS concepts -Constructor and Destructor- A simple C++ program –Friend classes and Friend Function.

TEXT BOOKS:

1. Ashok, N.Kamthane,"Computer Programming", Pearson Education (2012).
2. Anita Goel and Ajay Mittal,"Computer Fundamentals and Programming in C", Dorling V Kindersley (India Pvt Ltd).,Pearson Education in South Asia,(2011).
3. Yashavant P. Kanetkar, "Let us C",13th Edition,BPB Publications(2013).
4. Yashavant P. Kanetkar,"Let us C++"10th Edition, BPB Publications (2013**).**

REFERENCES:

1. Pradeep K.Sinha, Priti Sinha "Foundations of Computing", BPB Publications (2013).
2. Byron Gottfried, "Programming with C", 2nd edition, (Indian Adapted Edition), TMH Publication.
3. Pradip Dey, Manas Ghosh, Fundamentals of Computing and Programming in 'C' First Edition, Oxford University Press(2009).
4. The C++ Programming Language , 4th Edition, Bjarne Stroustrop, Addison-Wesley Publishing Company (2013).

BFR 101	**FRENCH**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	3	0	0	3
	Prerequisite – +2 Level English				
	Course Designed by – Department of English				

OBJECTIVES

Language gives access and insights into another culture. It is a fundamental truth that cultures define themselves through languages.

COURSE OUTCOMES (COs)	
CO1	Introduce the basics of the language to beginners
CO2	Understand a dialogue and dialogue presentation
CO3	To develop their knowledge as well as their communicative skills so as to be able to respond in simple everyday contexts.

CO4	Synchronies I includes documents which initiate the learners to another world, another culture and which acclimatize them to the authentic use of the French language through the exploitation of written and iconographic documents. The Indian context has been used.
CO5	Grammatical and lexical notions as well as activities required for communication are learnt by the students.
CO6	Interpreting skills and confidence in the language.
CO6	Interpreting skills and confidence in the language.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	L										
	CO2			H	L				H	H	M	L	L
	CO3			H	L				H	H	M	L	L
	CO4			H					H	H	M	L	L
	CO5			H	L				H	H	M		L
	CO6			H					H	H	M		L

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I INTRODUCTION 8

At the airport: Savoir– faire: exchanging greetings, self introduction, introducing another, welcoming someone, identifying someone - Grammar: verbs 'to be', 'to call oneself', subject pronouns, interrogation

UNIT II GRAMMAR 8

At the University: Savoir-faire: enquiring after one's welfare, taking leave, expressing appreciation - Grammar: definite & indefinite articles, gender of nouns, adjectives, present tense of regular 'er' verbs, 'to have', 'to learn', negation, irregular verbs

UNIT III CONVERSATION 8

At the café: Savoir –faire: speaking about one's likes, giving information, expressing admiration, asking information about someone - Grammar: Interrogative adjectives, irregular verbs, possessive and interrogative adjectives

UNIT IV PROPOSAL WRITING 7

At the beach: Savoir faire: proposing an outing, accepting/ refusing the proposal - Grammar: singular & plural, indefinite pronoun, demonstrative adjectives, negation, irregular verbs

UNIT V FORMAL LETTERS **7**

A concert: Savoir –faire: inviting, accepting, expressing one's inability to accept an invitation

UNIT VI REGULAR & IRREGULAR VERBS **7**

Grammar: Present tense of more irregular verbs, contracted articles, future tense, interrogative adverbs, **At Nalli's** Savoir- faire: asking the price of an article, protesting against the price, Grammar: possessive adjectives, Exclamative adjectives, imperative tense

REFERENCES:

1. Course Material: Synchronie I –Méthode de Français
2. Madanagobalane -Samita Publications, Chennai, 2007

BGM 101	**GERMAN**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	3	0	0	3
	Prerequisite +2 Level English				
	Course Designed by – Department of English				

OBJECTIVES

At the end of this course, students shall be able to obtain good knowledge of the language, to r write and speak German, whereby the emphasis is laid on speech.

COURSE OUTCOMES (COs)

CO1	Will have a basic knowledge of the language
CO2	Will acquire reading and writing skills.
CO3	Will develop basic conversational skills.
CO4	Will understand German lifestyle
CO5	Will gain confidence to survive in a global environment
CO6	Will have attained to survive and adopt change in a foreign culture .

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	L										
	CO2			H	L				H	H	M	L	L
	CO3			H	L				H	H	M	L	L
	CO4			H					H	H	M	L	L
	CO5			H	L				H	H	M		L
	CO6			H					H	H	M		L

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

		√							
4	Approval	37th Meeting of Academic Council, May 2015							

Course structure:

A. German Language (speaking, reading, writing, grammar and test)
B. Life in Germany (shopping, restaurant, doctor, government, bank, post)
C. The German Way (introduction, doing business, conversation, meetings, dining)
D. Germany (Culture, Climate)

UNIT I PRONOUNCIATION 9

Welcome: Introduction to the Language, Spelling and Pronunciation (The alphabets and numbers) Greetings, ordering, requesting, saying thank you - Grammar **– the article "the", conjugation** of verbs

UNIT II SELF INTRODUCTION 9

Shopping - Grammar **–** adjectives, endings before nouns, practice. Self introduction

UNIT III TRAINING 9

Addresses, Occupations, Studies - Grammar **- 'to be', the definite/indefinite** articles, individual Training

UNIT IV ORAL 9

Leisure Time, Sports, Hobbies - Grammar **–** position of a verb in a main clause , oral practice

UNIT V NARRATION 9

At a Restaurant, Food and Drink - Grammar **–** the personal pronoun in the Nominative and Accusative, Narrating an event

RESOURCES:

1. Sprachkurs Deutsch 1 (Verlag Diesterweg), New Delhi Learning Centre

BJP 101	**JAPANESE**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – +2 Level English				
	Course Designed by – Department of English				

OBJECTIVES

To have a basic knowledge of Japanese language, Japanese culture and heritage
To impart knowledge Japanese lifestyle.
To give sufficient exposure to develop basic conversational skills.

COURSE OUTCOMES (COs)

CO1	Will have a basic knowledge of the language
CO2	Will acquire reading and writing skills.
CO3	Will develop basic conversational skills.

CO4	Will understand Japanese lifestyle
CO5	Will gain confidence to survive in a global environment
CO6	Will have attained to survive and adopt change in a foreign culture .

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	L										
	CO2			H	L				H	H	M	L	L
	CO3			H	L				H	H	M	L	L
	CO4			H					H	H	M	L	L
	CO5			H	L				H	H	M		L
	CO6			H					H	H	M		L

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I CULTURAL HERITAGE 9

Introduction-history and origin of Japanese language-Japan and its cultural heritage-Self introduction-counting numbers (1-100)-time-conversation with the use of audio devices, grammar– usage of particles wa, no, mo and ka

UNIT II USAGE 9

Greetings, seasons, days of the week and months of the year-numbers (up to 99,999)-grammar– usage of kore, sore, are, kono, sono, ano, koko and kochira, arimasu and imasu-i-ending and na-ending adjectives-use of audio and drills for practice

UNIT III ORAL 9

Asking the price–associated vocabulary-usage of particles ni, ga and ne- use of audio and drills for practice-Introduction to basic Kanji characters- use of audio and drills for practice

UNIT IV ART AND CULTURE 9

Family relationships- colours-Kanji (numbers) and festivals of Japan-religion-Japanese art and culture-ikebana, origami-introduction to hiragana- use of audio and drills for practice

UNIT V DRILLS AND PRACTICE 9

Vocobulary associated with directions-asking way-particles – e, de, mo, koko, soko, asoko, doko, nani, mae, ushiro, ue, shita- use of audio and drills for practice-introduction to katakana

TEXT BOOKS

1. Japanese Hiragana and Katakana for beginners, Timothy G. Stout, 2011
2. Genki I: An integrated course in elementary Japanese, Eri Banno and Yuko Ikeda, 2011

REFERENCE BOOKS

1. Japanese Reader collection Volume I, Yumi Boutwell and Clay Boutwell, Kotoba books, 2013
2. Living Language Japanese Complete Edition beginners through advanced course, Living Language, 2012

BKR 101	**KOREAN**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	1	0	3
	Prerequisite – +2 Level English				
	Course Designed by – Department of English				

OBJECTIVES

To have a basic knowledge of Korean language, Korean culture and heritage
To impart knowledge on Korean lifestyle and heritage.

COURSE OUTCOMES (COs)

CO1	Will have a basic knowledge of the language
CO2	Will acquire reading and writing skills.
CO3	Will develop basic conversational skills.
CO4	Will understand Korean lifestyle
CO5	Will gain confidence to survive in a global environment
CO6	Will have attained to survive and adopt change in a foreign culture .

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	L										
	CO2			H	L				H	H	M	L	L
	CO3			H	L				H	H	M	L	L
	CO4			H					H	H	M	L	L
	CO5			H	L				H	H	M		L
	CO6			H					H	H	M		L

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I PLANNING 9

Asking/giving reasons for studying Korean, making plans for the holiday, writing letters, describing past travel experiences and future travel plans, shopping in a grocery store, shopping in electronics store, storytelling Grammar: would like to (do), want to (do), construct future tense.

UNIT II MODIFIERS 9

Asking about feelings, asking about problems and giving advice, brief introductions - Grammar: Noun modifier, please try doing (something), irregular adjective/verb

UNIT III PLACING ORDERS 9

Asking about hobbies, asking about abilities (sports), job requirements, Ordering things for delivery, ordering a meal at a restaurant - Grammar: Sentence ending for the honorific form, please do something for me, have tried (something),

UNIT IV DESCRIPTIONS 9

Asking about evening plans, making plans with others, making preparations - Asking about rooms, describing your room to your classmates, describing your house. Grammar: to know/not know how to do something, must (do), have to (do), should,

UNIT V GRAMMAR 9

Describing your plans and giving reasons, cancelling appointments. Grammar: Shall we~? / Should we~?, with, and, irregular verbs/adjective, so, because, cannot, intend to, plan to, or hope to, (more) than, the most, tag question/is n't it? ,will (do)

COURSE MATERIAL:

Korean for Non-Native Speakers (Student Book 1B) Korean Language Education Center, Sogang University

BCN 101	**CHINESE**	**L**	**T**	**P**	**C**
	Total Contact Hours - 60	3	0	0	3
	Prerequisite – +2 Level English				
	Course Designed by – Department of English				

OBJECTIVES

To have a basic knowledge of Chinese language, Chinese culture and heritage

To impart knowledge on Chinese lifestyle and heritage.

COURSE OUTCOMES (COs)	
CO1	Will have a basic knowledge of the language
CO2	Will acquire reading and writing skills.
CO3	Will develop basic conversational skills.
CO4	Will understand Chinese lifestyle
CO5	Will gain confidence to survive in a global environment

CO6	Will have attained to survive and adopt change in a foreign culture

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	L										
	CO2			H	L				H	H	M	L	L
	CO3			H	L				H	H	M	L	L
	CO4			H					H	H	M	L	L
	CO5			H	L				H	H	M		L
	CO6			H					H	H	M		L

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT 1 RISE OF DIALECTS 9

History, Origins, Old and middle Chinese, Rise of northern dialects

UNIT II VARIETIES 9

Influences 3 Varieties of Chinese. 1.Classification 2.Standard Chinese and 3.Nomenclature

UNIT III CHARACTERS 9

Chinese characters, Homophones, Phonology

UNIT IV TRANSCRIPTIONS 9

Tones, Phonetic transcriptions, Romanization, Other phonetic transcriptions

UNIT V GRAMMAR 9

Grammar and morphology, Vocabulary, Loanwords, Modern borrowings and loanwords

REFERENCES:

1. Hannas, William C. (1997), Asia's Orthographic Dilemma, University of Hawaii Press, ISBNHYPERLINK "http://en.wikipedia.org/wiki/Special:BookSources/978-0-8248-1892-0" 978-0-8248- 1892-0.
2. Qiu, Xigui (2000), Chinese Writing, trans. Gilbert Louis Mattos and Jerry Norman, Society for the Study of Early China and Institute of East Asian Studies, University of California, Berkeley, ISBN HYPERLINK http://en.wikipedia.org/wiki/Special:BookSources/978-1-55729-071-7,978-1-55729-071-7.
3. Ramsey, S. Robert (1987), The Languages of China, Princeton University Press, ISBNHYPERLINK "http://en.wikipedia.org/wiki/Special:BookSources/978-0-691-01468-5" 978-0-691-01468-5.
4. Schuessler, Axel (2007), ABC Etymological Dictionary of Old Chinese, Honolulu: University of

Hawaii Press, ISBNHYPERLINK
"http://en.wikipedia.org/wiki/Special:BookSources/978-0-8248-2975-9"978-0-8248-2975-9.
5. R. L. G. " Language borrowing Why so little Chinese in English?" The Economist. June 6, 2013.

BME 102	**ENGINEERING GRAPHICS - C**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	3	0	0	3
	Prerequisite – +2 Level Maths + Physical Science				
	Course Designed by – Dept of Mechanical Engineering				

OBJECTIVES

- To develop graphical skills in students for communication of concepts, design ideas of engineering products, and expose them to existing standards related to technical drawings.
- To impart a sound knowledge on the principles of computers involving the different application oriented topics required for all engineering branches.
- Graduates will demonstrate the ability to apply knowledge of mathematics to develop and analyze computing systems.
- Graduates will have a solid understanding of the theory and concepts underlying computer science

COURSE OUTCOMES (COs)

CO1	To visualize two dimensional graphic representation of three dimensional objects and buildings
CO2	To produce two dimensional graphic representation of three dimensional objects and buildings
CO3	To comprehend and visualize 3D views of objects.
CO4	To understand and generate the different curves used in engineering applications.
CO5	To learn and write program in "C".
CO6	**:** To introduce the fundamental of CAD Graphics used in design.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	J	k	l
2	CO1	H											H
	CO2	M	H										M
	CO3			L									M
	CO4						L		H	H			L
	CO5			L						H			L
	CO6			L							H		L

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

				√					
4	Approval	37th Meeting of Academic Council, May 2015							

UNITI BASIC CURVES, PROJECTION OF POINTS AND STRAIGHT LINES 9

Conics-construction of ellipse, parabola and hyperbola by eccentricity method-construction of involutes of square and circle-Drawing of tangent and normal to the above curves-Scales-Basic drawing conventions and standards- Orthographic projection principles-Principal planes-First angleprojection-Projectionofpoints.Projectionofstraightlines(only first angle projections) inclined to both the principal planes- Determination of true lengths and true inclinations by rotating line method.

UNIT II PROJECTIONS OF PLANES AND SOLIDS 9

Projection of planes (Polygonal and circular surfaces) inclined to both the principal planes. Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method

UNIT III ORTHO GRAPHIC PROJECTIONS, ISOMETRIC PROJECTIONS & FREEHANDSKETCHING 9

Orthographic projection of Simple parts from 3Ddiagram-Principles of isometric projection and isometric view-isometric scale- Isometric projections of simple solids and truncated solids-Prisms, pyramids, cylinders, cones.

UNIT IV PROJECTIONOFSECTIONEDSOLIDS AND DEVELOPMENT OF SURFACES 9

Sectioning of solids in simple vertical position when the cutting lane is inclined to the one of the principal planes and perpendicular to the other-obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids-Prisms, pyramids cylinders and cones.

UNIT V PERSPECTIVE PROJECTION, BUILDING DRAWING AND COMPUTER AIDED DRAFTING 9

Perspective projection of cubes and cylinders by visual ray method .Introduction-components of simple residential or office building-specifications-plan and elevation of different types of Residential buildings and office buildings. Introduction to drafting packages and basic commands used in AUTO CAD. Demonstration of drafting packages.

TEXT BOOKS:

1. N.D.Bhatt and V.M.Panchal, "Engineering drawing", charotar publishing house, 50th edition,2010.
2. K.V.Natarajan "A Textbook of Engineering Graphics", Dhanalakshmi Publishers, Chennai,2009.

REFERENCES:

1. K.R.Gopalakrishna, "Engineering drawing", (Vol-I&II combined) Subhas stores, Bangalore, 2007.
2. K.Venugopal and V.Prabhu Raja, "Engineering Graphics", New Age International Private limited, 2008.

3. Luzzader, Warren.J.,and Duff, John.M.,, "Fundamentals of Engineering Drawing with an introduction to Interactive computer graphics for design and production", Eastern economy edition, Prentice Hall of India Pvt Ltd, New Delhi,2005

BEE 101	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	2	0	0	2
	Prerequisite – Engineering Mathematics, Engineering Physics-I & II				
	Course Designed by – Department of Electrical & Electronics Engineering				

OBJECTIVES: To understand the laws of electrical engineering.

COURSE OUTCOMES (COs)

CO1	Students will gain knowledge regarding the various laws and principles associated with electrical systems.
CO2	Students will gain knowledge regarding electrical machines and apply them for practical problems.
CO3	Students will gain knowledge regarding various types semiconductors.
CO4	Student will gain knowledge digital electronics.
CO5	Student will gain knowledge on electronic systems.
CO6	Students will acquire knowledge in using the concepts in the field of electrical engg. projects and research.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H	M			L		L	L			
	CO2		H	M			L		L	L			
	CO3		H	M			L		L				
	CO4	M	H	M			L		L	L			
	CO5	M	H	M			L		L				
	CO6		H				L		L	H			

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
				√					
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I ELECTRIC CIRCUITS 6

Ohm's law – Kirchoff's Laws, V – I Relationship of Resistor (R) Inductor (L) and capacitor (C). Series parallel combination of R, L&C – Current and voltage source transformation – mesh current & node voltage method –superposition theorem –Thevenin's and Norton's Theorem -Problems.

UNIT II ELECTRICAL MACHINES 6

Construction, principle of operation, Basic Equations and applications - D.C.Generators and D.C.Motors**.** -Single phase Induction Motor - Single Phase Transformer.

UNIT III BASIC MEASUREMENT SYSTEMS 6

Introduction to Measurement Systems, Construction and Operating principles of PMMC, Moving Iron, Dynamometer Wattmeter, power measurement by three-watt meter and two watt method – and Energy meter.

UNIT IV SEMICONDUCTOR DEVICES 6

Basic Concepts of semiconductor devices – PN Junction Diode Characteristics and its Applications – HWR, FWR –Zener Diode – BJT (CB, CE, CC) configuration & Characteristics.

UNIT V DIGITAL ELECTRONICS 6

Number system – Logic Gates – Boolean Algebra– De-**Morgan's Theorem –** Half Adder & Full Adder – Flip Flops.

TEXT BOOKS:

1. N.Mittal "Basic Electrical Engineering". Tata McGraw Hill Edition, New Delhi, 1990.
2. A.K. Sawhney, 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2004.
3. Jacob Millman and Christos C-Halkias, "Electronic Devices and Circuits", Tata McGraw Hill

REFERENCE BOOKS:

1. Edminister J.A. "Theory and Problems of Electric Circuits" Schaum's Outline Series. McGrawHill Book Compay, 2nd Edition, 1983.
2. Hyatt W.H and Kemmerlay J.E. "Engineering Circuit Analysis", McGraw Hill International Editions, 1993.
3. D. P. Kothari and I. J. Nagrath" Electric Machines"Tata McGraw-Hill Education, 2004
4. Millman and Halkias, "Integrated Electronics", Tata McGraw Hill Edition, 2004.

BCS 1L2	**COMPUTER PRACTICE LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	0	0	3	1
	Prerequisite – Fundamentals of Computer				
	Course Designed by – Department of Computer Science &Engineering				
OBJECTIVES: To impart basic computer knowledge					
COURSE OUTCOMES (COs)					
CO1	Demonstrate major algorithms and data				
CO2	Implementation of array operations				
CO3	Implementation of binary tree.				
CO4	Implementation of linked list				

CO5	Students will able to do analyse data using spread sheet
CO6	Student will able to understand the basics of C programming.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	H	L	H		H		L		H	H	H
	CO2						H	H	L				
	CO3						H	H	L		M		
	CO4						H	H	L		M		
	CO5						H	H	L		M		
	CO6						H	H	L		M		

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
				√					
4	Approval	37th Meeting of Academic Council, May 2015							

A) WORD PROCESSING **6**

Document creation, Text manipulation with Scientific Notations. Table creation Table formatting and Conversion. Mail merge and Letter Preparation. Drawing-Flow Chart

B) SPREAD SHEET **9**

Chart-Line Xy Bar and Pie – Formula-Formula Editor-Spread sheet-Inclusion of Object, Picture and Graphics Protecting the document and sheet-Sorting and Import/Export features.

C) SIMPLE C PROGRAMMING* **15**

Data types, Expression Evaluation, Condition Statement. Arrays structures and Unions – Functions

D) SIMPLE C++PROGRAMMING **15**

-Classes and Objects
-Constructor and Destructor

***For Programming exercises Flow chart and Pseudo code are essential.**

BEE1L1	**BASIC ELECTRICAL AND ELECTRONIC ENGINEERING PRACTICES LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	0	0	3	1
	Prerequisite – Basic Electrical and Electronics Engineering				
	Course Designed by – Department of Electrical & Electronics Engineering				

OBJECTIVES: To enhance the student with knowledge on electrical and electronic equipments.													
COURSE OUTCOMES (COs)													
CO1	Students will able to handle basic electrical equipments.												
CO2	Students will able to do staircase wiring.												
CO3	Students will able to understand domestic wiring procedures practically.												
CO4	Student will able to assemble electronic systems.												
CO5	Students will understand all the fundamental concepts involving electrical engineering												
CO6	Students will understand all the fundamental concepts involving electronics engineering												
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low													
1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H	M			L		L	L	M	H	
	CO2		H	M			L		L	L		H	
	CO3		H	M			L		L			H	
	CO4	M	H	M			L		L	L	M	H	
	CO5	M	H	M			L		L		M	H	
	CO6		H				L		L	H		H	
3	Category	Humanities & Social Studies (HS)		Basic Sciences (BS)		Engg Sciences (ES)	Professional Core (PC)		Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)	
						√							
4	Approval	37th Meeting of Academic Council, May 2015											

I LIST OF EXPERIMENTS FOR ELECTRICAL ENGINEERING LAB

1. Fluorescent lamp wiring
2. Stair case wiring
3. Measurement of electrical quantities-voltage current, power & power factor in RLC circuit
4. Residential house wiring using fuse, switch, indicator, lamp and energy meter
5. Measurement of energy using single phase energy meter
6. Measurement of resistance to earth of electrical equipment

II LIST OF EXPERIMENTS FOR ELECTRONICS ENGINEERING LAB

1. Study of electronic components and equipments.
   a. Resistor colour coding using digital multi-meter.
   b. Assembling electronic components on bread board.
2. Measurement of ac signal parameters using cathode ray oscilloscope and function generator.
3. Soldering and desoldering practice.
4. Verification of logic gates (OR, AND, OR, NOT, NAND, EX-OR).
5. Implementation of half adder circuit using logic gates.

	PHYSICS AND CHEMISTRY LABORATORY	L	T	P	C
	Total Contact Hours – 45	0	0	3	1
BPC 1L1/2L1	Prerequisite – Physics and Chemistry				
	Course Designed by – Department of Physics & Chemistry				

OBJECTIVES: To impart knowledge to the students in practical physics and chemistry

COURSE OUTCOMES (COs)

CO1	Students will understand the concept of hall effect
CO2	Students will understand the concept of semiconductors. .
CO3	Student will understand the working of spectrometer.
CO4	Student will able practically understand the chemical reactions.
CO5	Students will Study the magnetic hysteresis and energy product
CO6	Students understand the Determination of Band gap of a semiconductor

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H	M			L		L	L	M	H	M
	CO2		H	M			L		L	L		H	
	CO3		H	M			L		L			H	
	CO4	M	H	M			L		L	L	M	H	M
	CO6		H				L		L	H		H	

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						

4	Approval	37th Meeting of Academic Council, May 2015

I -LIST OF EXPERIMENTS – PHYSICS

1. Determination of Wavelength, and particle size using Laser
2. Determination of acceptance angle in an optical fiber.
3. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
4. Determination of wavelength of mercury spectrum – spectrometer grating
5. Determination of thermal conductivity of a bad conductor – Lee‟s Disc method.
6. Determination of Young‟s modulus by Non uniform bending method
7. Determination of specific resistance of a given coil of wire – Carey Foster‟s Bridge
8. Determination of Young‟s modulus by uniform bending method

9. Determination of band gap of a semiconductor
10. Determination of Coefficient of viscosity of a liquid –Poiseuille‟s method
11. Determination of Dispersive power of a prism - Spectrometer
12. Determination of thickness of a thin wire – Air wedge method
13. Determination of Rigidity modulus – Torsion pendulum

II-LIST OF EXPERIMENTS – CHEMISTRY

1. EstimationofhardnessofWaterbyEDTA
2. EstimationofCopper in brass byEDTA
3. Determination of DOin water (Winkler'smethod)
4. EstimationofChloride in Watersample (Argento metry)
5. Estimationof alkalinityofWater sample
6. Determinationofmolecularweight
7. Conduct metric titration (Simple acid base)
8. Conduct metric titration (Mixture of weak and strong acids)
9. Conduct metric titration using $BaCl_2$vs Na_2SO_4
10. Potentiometric Titration (Fe^{2+} / $KMnO_4$ or $K_2Cr_2O_7$)
11. pH titration (acid & base)
12. Determination of water of crystallization of a crystalline salt (Copper Sulphate)
13. Estimation of Ferric iron by spectrophotometer.

BSS1L7/BSS2L7 YOGA FOREMPOWERMENT

L	T	P	C
0	1	2	1

OBJECTIVE:

Providing Value Education to improve the Students' character - understanding yogic life and physical health - maintaining youthfulness - Measure and method in five aspects of life

UNIT I PHYSICAL HEALTH 6

Manavalakalai (SKY) Yoga: Introduction - Education as a means for youth empowerment - Greatness of Education - Yoga for youth Empowerment.

Simplified Physical Exercises: Hand, Leg, Breathing, Eye exercises - Kapalabathi, Makarasana Part I, Makarasana Part II, Body Massage, Acu pressure, Relaxation exercises - Benefits.

Yogasanas 1: Pranamasana - Hastha Uttanasana - Pada Hasthasana - Aswa Sanjalana Asana - Thuvipatha asva Sanjalana asana - Astanga Namaskara - Bhujangasana - Atha Muktha Savasana - Aswa Sanjalana Asana - Pada Hasthasana - Hastha Uttanasana - Pranamasana.

Pranayama: Naddi suddi - Clearance Practice - Benefits.

Simplified Physical Exercise - Kayakalpa Practices - Meditation Practices.

UNIT II LIFE FORCE 6

Reasons for Diseases: Natural reasons (Genetic / imprints, Planetary Position, Natural calamities and climatic changes) - Unnatural reasons (Food habits, Thoughts, Deeds)

Philosophy of Kaya kalpa: Physical body - Sexual vital fluid - Life force - Bio-Magnetism - Mind.

Maintaining youthfulness: Postponing old age - Transformation of food into seven components - Importance of sexual vital fluid - Measure and method in five aspects of life - Controlling undue Passion.
Kayakalpa practice: Aswini Mudra - Ojas breath - Benefits of Kaya Kalpa.

UNIT III MENTAL HEALTH 6
Mental Frequencies: Beta, Apha, Theta and Delta wave - Agna Meditation explanation-benefits.
Shanti meditation: Shanthi Meditation explanation-benefits
Thuriya Meditation: Thuriya Meditation explanation-benefits
Benefits of Blessing: Self blessing(Auto suggestion) - Family blessing - Blessing the others - World blessing - Divineprotection

UNIT IV VALUES 6
Human Values: Self control - Self confidence - Honesty Contentment - Humility - Modesty Tolerance – Adjustment - Sacrifice - Forgiveness
Purity(Body,Dress,Environment) - Physicalpurity-Mentalpurity - Spiritual purity

Social Values :
Non violence - Service Patriotism - Equality
Respectforparentsandelders - careandprotection - Respectforteacher Punctuality - TimeManagement

UNIT V MORALITY (virtues) 6
Importance of Introspection: I - Mine (Ego, Possessiveness)
SixEvilTemperaments-Greed-Anger - Miserliness-Immoralsexualpassion - InferiorityandsuperiorityComplex - Vengeance
Maneuvering of Six Temperaments: Contentment - Tolerance - Charity - Chastity – Equality - Pardon (Forgiveness)
FiveessentialQualitiesacquiredthroughMeditation:Perspicacity – Magnanimity – Receptivity - Adaptability - Creativity(ImprovedMemoryPower)

Total periods: 30

REFERENCE BOOKS:

1. Yoga for modern age - ThathuvagnaniVethathiri Maharishi
2. Simplified Physical Exercises - ThathuvagnaniVethathiri Maharishi
3. Kayakalpam - Thathuvagnani VethathiriMaharishi
4. Thirukkural -Rev.Dr.G.U.pope
5. Mind-ThathuvagnaniVethathiriMaharishi
6. SoundHealththroughyoga-Dr.Chandrasekaran
7. Light on yoga -BKS.lyenger
8. உணவுமுறை – தத்துவஞானிவேதாத்திரிமகரிஷி

BEN 201	**ENGLISH II**	**L**	**T**	**P**	**C**
	Total Contact Hours – 60	3	1	0	3
	Prerequisite – English I				
	Course Designed by – Department of English				

OBJECTIVES	
Students will be able to actively participate in group discussions. Students will have Telephonic Skills, Giving Directions and Information Transfer	
COURSE OUTCOMES (COs)	
CO1	To make the students aware to different kinds of Learner-friendly modes of language to a variety of self- instructional learning (Computer based)
CO2	To make students comprehend the habit of intelligent Reading as well as Computer- based competitive exams glob
CO3	To achieve a reasonably good level of competency in Report Writing.
CO4	To make the students aware to different kinds of Learner-friendly modes of language to a variety of self- instructional learning (Computer based)
CO5	To achieve a reasonably good level of competency in group discussions
CO6	To achieve a reasonably good level of competency in public speaking

	Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low												
1	COs/POs	a	b	c	d	e	f	g	h	i	J	k	l
2	CO1	M	L	H	L	M			H		M	L	
	CO2			H	L				H		M	L	
	CO3			H	L	M			H		H	L	
	CO4			H	L	M			H		M	L	
	CO5			H	L	M			H		M	L	
	CO6			H	L	M			H		M	L	

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I ORIENTATION 12

Numerical adjectives - Meanings in context - Same words used as different parts of speech -Paragraph writing - Non- verbal communication - Regular and Irregular verbs.

UNIT II ORAL SKILL 12

Listening to audio cassettes - C.Ds , News bulletin - Special Lectures, Discourse - Note taking - Sentence patterns - SV, SVO, SVC, SVOC, SVOCA - and Giving Instructions - Reading Comprehension answering questions. Inferring meaning.

UNIT III THINKING SKILL 12

Self- introduction describing –Group Discussion – Debate –Role play- Telephone- Things- etiquette- Recommendation and Sequencing jumbled sentences to make a suggestions-paragraph-advertisement and notice, Designing or drafting posters, writing formal and informal invitations and replies.

UNIT IV WRITING SKILL 12

Definitions - Compound nouns - Abbreviations and acronyms – (a) business or official letters(for making enquiries, registering complaints, asking for and giving information, placing orders and sending replies): (b) Letters to the editor (giving suggestions on an issue) .

UNIT V FORMAL INFORMATION 12

Editing – Prepositions - Articles - Permission letter for undergoing practical training , Essay writing - Application for a job , letter to the principal authorities regarding admissions, other issues, requirement or suitability of course etc.

TEXT BOOK:

1. Meenakshi Raman, Sangeetha Sharma , Technical English for Communication: Principle and Practice, OUP, 2009.

REFERENCE BOOKS:

1. Sumanth , English for Engineers, Vijay Nicole , Imprints Pvt ltd.2013.
2. Meenakshi Raman and SangeethaSharma , Technical Communication Principles and Practice, Oxford University Press, 2009.
3. Sangeetha Sharma, Binod M ishra , Communication skills for engineers and scientists , PHI Learning Pvt Ltd, New Delhi, 2010.

BMA 201	**MATHEMATICS – II**	**L**	**T**	**P**	**C**
	Total Contact Hours - 60	3	1	0	3
	Prerequisite – Mathematics I				
	Course Designed by – Department of Mathematics				

OBJECTIVES

Ability to apply these principles of mathematics in projects and research works.

COURSE OUTCOMES (COs)

CO1	Student shall be able to Solve differential equations, simultaneous linear equations, and some special types of linear equations related to engineering.
CO2	Relate the use of mathematics in applications of various fields namely fluid flow, heat flow, solid mechanics, electrostatics, etc.
CO3	Ability to test hypothesis
CO4	Find intensity of degree of relationship between two variables and also bring out regression equations.
CO5	Understand to solve matrix problems related to real life problems.
CO6	Formulate mathematical models

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H		L									
	CO2		H				H		L	L		M	
	CO3		H				H		L	L		M	
	CO4					M						M	

	CO5										M	M	
	CO6										M		
3	Category	Humanities & Social Studies		Basic Sciences (BS)		Engg Sciences (ES)	Professional Core (PC)		Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)	
				√									
4	Approval	37th Meeting of Academic Council, May 2015											

UNIT I ORDINARY DIFFERENTIAL EQUATION 12

Higher order linear differential equations with constant coefficients - Method of variation of parameters **– Cauchy's** and L**egendre's linear equations** - simultaneous first order linear equations with constant coefficients.

UNIT II VECTOR CALCULUS 12

Gradient, divergence and curl –Directional derivatives –Irrotational and solenoidal vector fields – vector integration**– Green's theorem in a plane , Gauss divergence theorem and** S**toke's theorem (**without proofs) **–** simple applications involving cubes and rectangular parallelepipeds.

UNIT III ANALYTIC FUNCTIONS 12

Functions of a complex variable **–** Analytic functions **–** Necessary conditions, Cauchy-Riemann equation and sufficient conditions (without proofs) **–** Harmonic and orthogonal properties of analytic functions **–** Harmonic conjugate **–** construction of analytic functions **–** conformal mapping: W= Z+C, CZ, 1/Z and bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12

Complex integration **– Statement and application of Cauchy's integral theorem and Cauchy's integral formula –**Taylor and Laurent expansions **–** Singular points **–** Residues **–** Residue theorem **–** Application of Residue theorem to evaluate real integrals **–** Unit circle and semi-circular contour (excluding poles on boundaries).

UNIT V STATISTICS 12

Mean, Median, Mode **–** Moments **–**Skewness and Kurtosis **–** Correlation **–** Rank Correlation **–** Regression **–**Chi square test for contingency tables.

TEXT BOOK:

1. R.M.Kannan and B.Vijayakumar" Engineering Mathematics–II "2nd Edition, SRB Publication, Chennai 2007.
2. Bali.N.P and Manish Goyal , "Engineering Mathematics", 3rd Edition, Laxmi Publications (P) Lltd, 2008 .
3. Grewal .B/S "Higher Engineering Mathematics", 40th Editon, Khanna Publications, Delhi, 2007

REFERENCES :

1. Ramana.B.V, "Higher Engineering Mathematic", Tata McGraw Hill Publishing Company, New Delhi, 2007.
2. Gupta SC, and VK.Kapoor, "Fundamentals Mathematical Statistics", 11th edition, Sultan Chand Sons, New Delhi, 2014.

BPH201	ENGINEERING PHYSICS -II	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – ENGINEERING PHYSICS -I				
	Course Designed by – Department of Physics				

OBJECTIVES

- To expose the students to multiple areas of science of engineering materials which have direct relevance to different Engineering applications
- To understand the concepts and applications of conducting, Semiconducting, magnetic & dielectric materials as well as their optical properties.

COURSE OUTCOMES (COs)

CO1	Understand about properties and advancements of conducting materials.
CO2	Understand the principle and properties semiconducting materials.
CO3	Acquire Knowledge on Magnetic and dielectric Materials.
CO4	To Know about the creation of new materials with novel properties
CO5	To Understand the impact of modern materials in technical uses.
CO6	Learn new engineering materials and its characteristics

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H											
	CO2		L	H		M							
	CO3		M		H								
	CO4	H		M	L								
	CO5		L	L									
	CO6	H											

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I CONDUCTING MATERIALS 9

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS 9

Intrinsic semiconductor – carrier concentration derivation Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – compound semiconductors -direct and indirect band gap- derivation of carrier concentration in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration — Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS 9

Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials – Ferrites and its applications Superconductivity : properties – Type I and Type II superconductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV DIELECTRIC MATERIALS 9

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – ferroelectricity and applications.

UNIT V ADVANCED ENGINEERING MATERIALS 9

Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, Nanomaterials– Preparation -pulsed laser deposition – chemical vapour deposition – Applications – NLO materials –Birefringence- optical Kerr effect – Classification of Biomaterials and its applications.

TEXT BOOKS:

1. Jayaraman D Engineering Physics II. Global Publishing House, 2014.
2. Palanisamy P.K. Materials Science. SCITECH Publishers, 2011.
3. Senthilkumar G. Engineering Physics II. VRB Publishers, 2011.

REFERENCES:

1.Arumugam M., Materials Science. Anuradha publishers, 2010
2. Pillai S.O., Solid State Physics. New Age International(P) Ltd., publishers, 2009
3. Marikani A. Engineering Physics. PHI Learning Pvt., India, 2009
4 http://ocw.mit.edu/courses/find-by-topic
5 http://nptel.ac.in/course.php?disciplineId=122
6 https://en.wikipedia.org/wiki/Engineering_physics

BCH 201	**ENGINEERING CHEMISTRY-II**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – ENGINEERING CHEMISTRY –I				
	Course Designed by – Department of Chemistry				
OBJECTIVES To impart a sound knowledge on the principles of chemistry involving application oriented topics required for all engineering branches.					
COURSE OUTCOMES (COs)					

CO1	Students will understand the concepts and further industrial applications of surface chemistry
CO2	To impart knowledge about the Industrial importance of Phase rule and alloys
CO3	To make the students to be conversant with Analytical techniques of chemistry and their importance
CO4	To have an idea and knowledge about the Chemistry of Fuels and
CO5	Understanding of engineering materials
CO6	All about bonding and molecular structures

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	H	L		H		H				M	
	CO2		H			H		H					
	CO3	H		L		H		H				M	
	CO4			L		H		H					
	CO5			L		H		H					
	CO6			L		H		H		H		M	

3	Category	Humanities & Social Studies	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I SURFACE CHEMISTRY 9

Introduction **:** Adsorption , absorption , desorption , adsorbent, adsorbate and sorption **–** (definition only) Differences between adsorption and absorption Adsorption of gases on solids **–** factors affecting adsorption of gases on solids **–** Adsorption isotherms **–**Frendlich adsorption isotherm and Langmuir adsorption isotherm Role of adsorbents in catalysis, Ion-exchange adsorption and pollution abatement.

UNIT II PHASE RULE AND ALLOYS 9

Introduction **:**Statement of Phase Rule and explanation of terms involved **–** one component system **–** water system **–** Construction of phase diagram by thermal analysis - Condensed phase rule [Definition only] Two Component System : Simple eutectic systems (lead-silver system only) **–** eutectic temperature **–** eutectic composition **–** Pattinsons Process of desilverisation of Lead Alloys: Importance, ferrous alloys **–**nichrome and stainless steel **–** 18/8 stainless steel -heat treatment of steel **–** annealing **–** hardening **–** tempering normalizing **–** carburizing - nit riding . Non- ferrous alloys: Brass and Bronze

UNIT III ANALYTICAL TECHNIQUES 9

Introduction: Type of Spectroscopy - Atomic spectroscopy **–** molecular spectroscopy - Explanation IR spectroscopy **–** principles **–** instrumentation (block diagram only) **–** applications - finger print region UV-visible spectroscopy **—** principle **–** instrumentation (block diagram only) **–** Beer-**Lambert's law**- **–** estimation of iron by colorimetry**–** Atomic absorption spectroscopy- principle

- instrumentation (block diagram only) - estimation of Nickel by Atomic absorption spectroscopy Flame photometry– principles – instrumentation (block diagram only) - estimation of sodium ion by Flame photometry

UNIT IV FUELS 9

Introduction **:** Calorific value – types of Calorific value - gross calorific value – net calorific value Analysis of Coal –- Proximate and ultimate analysis – hydrogenation of coal - Metallurgical coke – manufacture by Otto-Hoffmann method Petroleum processing and fractions – cracking – catalytic cracking – types – fixed bed catalytic cracking method- Octane number and Cetane number (definition only) Synthetic petrol – Bergius processes – Gaseous fuels- water gas, producer gas, CNG and LPG (definition and composition only) Flue gas analysis – importance - Orsat apparatus

UNIT V ENGINEERING MATERIALS 9

Introduction: Refractory's – classification – acidic, basic and neutral refractory's – properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) Manufacture of Refractory's: alumina bricks and Magnesite bricks, Abrasives – natural and synthetic abrasives Natural type : Siliceous - quartz ; Non –siliceous – diamond Synthetic Abrasives : silicon carbide and boron carbide. Lubricants: Liquid lubricants - Properties – viscosity index, flash and fire points, cloud and pour points, oiliness, Solid lubricants – graphite and molybdenum sulphide

TEXT BOOKS:

1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2002).
2. S.S.Dara "A text book of Engineering Chemistry" S.Chand &Co.Ltd., New Delhi (2006).
3. P. J. Lucia, M. Subhashini, "Engineering Chemistry, Volume 1", Crystal Publications, Chennai, (2007).

REFERENCES:

1. B.Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub. Co.Ltd, New Delhi,(2008)
2. B.K.Sharma "Engineering Chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001).
3. http://ocw.mit.edu/courses/find-by-topic
4. http://nptel.ac.in/course.php?disciplineId=122
5. https://en.wikipedia.org/wiki/Spectroscopy

BCS 202	INTERNET PROGRAMMING	L	T	P	C
	Total Contact Hours - 30	2	0	0	2
	Prerequisite – Fundamentals of Computer				
	Course Designed by – Dept of Information Technology				

OBJECTIVES

- To impart a sound knowledge on the principles of computers involving the different application oriented topics required for all engineering branches.
- Graduates will demonstrate the ability to apply knowledge of mathematics to develop and analyze computing systems.
- Graduates will have a solid understanding of the theory and concepts underlying computer science.

COURSE OUTCOMES (COs)

CO1	To enable the student to learn the major components of a computer system.

CO2	To know the correct way of solving problem.
CO3	To identify efficient way of solving problem.
CO4	To learn to use office automation tools.
CO5	To implement office automation tools
CO6	To learn and write program in "C".

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	M	M	H	M		M			L	L	M
	CO2	H	M	M	H	H		M			L	L	M
	CO3	H	M		H	H		M			L	L	M
	CO4	H	M		H	H		M			L	L	M
	CO5	H	M	M	H	H		M			L	L	M
	CO6	H			H	H		M			L	L	M

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
				√					

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I BASIC INTERNETCONCEPTS 6

Internet principles-IPaddressing-Internet Service Provider (ISP)-URL-Basic web concepts-World WideWeb (WWW)-Intranet and Extranet-Internet Protocols: HTTP, TCP, UDP, FTP, Telnet-Domain Name System(DNS)-E mail-Next generation internet.

UNITII WEBDESIGNBASICS 6

Introduction to HTML–Structureof HTMLDocument– Tags-Headings–Links–Images–Lists–Tables –Forms–Frames-Style sheets andits types.

UNITIII DYNAMIC HTML 6

Introduction to DynamicHTML-Object modeland collections-Event model-Filters and transition-Data binding-Data control-Activexcontrol.

UNITIV CLIENT ANDSERVERSIDEPROGRAMMING 6

VBScript&JavaScript:Introduction-Operators–Data type-Control structures-Looping–Classes andObjects–Arrays-Functions-Events-Exampleprograms.

UNITV INTERNETAPPLICATIONS 6

Onlinedatabase-functionsofonlinedatabase-MeritsandDemerits-InternetInformationSystems (IIS)-EDIapplications inbusiness and its types-Internet commerce-Types and Applications

.

TEXT BOOKS:

1. Deitel, Deitel and Nieto, ‘’Internet and World Wide Web- How to program’’, Pearson Education Publishers, 5th edition, 2008.
2. Elliotte Rusty Harold, ‘’Java Network Programming’’, O’Reilly Publishers, 2010
3. Java Script: A Beginners Guide John Pollock 4thEdition, TMH Edition (2013)
4. VB Script Beginners Guide, Jyoti B. Giramkar, Create Space Independent Publishing (2014)

REFERENCES:

1... Krishnamoorthy & S.Prabhu, ‘’Internet and Java Programming’’, New Age International Publishers, 2010.
2. Thomno A.Powell, ’’The Complete Reference HTML and XHTML’’, fourth edition, Tata McGraw Hill, 2001
3. E Commerce Kamlesh K.Bajaj, DebjaniNag, Tata McGraw Hill, Second edition, 2010

BSS201	**PERSONALITY DEVELOPMENT**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	1	1	0	2
	Prerequisite – +2 Level Knowledge				
	Course Designed by – Department of Management Studies				

OBJECTIVES

To make students groom their personality and prove themselves as good Samaritans of the society.

COURSE OUTCOMES (COs)	
CO1	Individual or in-group class presentations pertaining to the applications of conce theories or issues in human development..
CO2	Scores obtained from essay and or objective tests.
CO3	Attendance, classroom participation, small group interactions.
CO4	Research and write about relevant topics.
CO5	Design and complete a research project that can take the form of a developme interview, an observation or assessment through service learning.
CO6	Develop and maintain a Reflection

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	J	k	l
2	CO1	L		H				M					
	CO2		H	H				M					
	CO3							M	H				
	CO4									H	H		
	CO5							M			H	H	
	CO6							M					L

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I INTRODUCTION TO PERSONALITY DEVELOPMENT 6

The concept personality- Dimensions of theories of Freud & Erickson- personality – significant of personality development. The concept of success and failure: What is success? - Hurdles in achieving success - Overcoming hurdles - Factors responsible for success – What is failure - Causes of failure. SWOT analyses.

UNIT II ATTITUDE & MOTIVATION 6

Attitude - Concept - Significance - Factors affecting attitudes - Positive attitude - Advantages – Negative attitude - Disadvantages - Ways to develop positive attitude - Difference between personalities having positive and negative attitude. Concept of motivation - Significance - Internal and external motives - Importance of self-motivation- Factors leading to de-motivation

UNIT III SELF-ESTEEM 6

Term self-esteem - Symptoms - Advantages - Do's and Don'ts to develop positive self-esteem – Low self-esteem - Symptoms - Personality having low self esteem - Positive and negative self-esteem. Interpersonal Relationships – Defining the difference between aggressive, submissive and assertive behaviours - Lateral thinking.

UNIT IV OTHER ASPECTS OF PERSONALITY DEVELOPMENT 6

Body language - Problem-solving - Conflict and Stress Management - Decision-making skills - Leadership and qualities of a successful leader - Character-building -Team-work - Time management -Work ethics –Good manners and etiquette.

UNIT V EMPLOYABILITY QUOTIENT 6

Resume building- The art of participating in Group Discussion – Acing the Personal (HR & Technical) Interview -Frequently Asked Questions - Psychometric Analysis - Mock Interview Sessions.

TEXT BOOKS:

1. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.
2. Stephen P. Robbins and Timothy A. Judge (2014), Organizational Behavior 16th Edition, Prentice Hall.

REFERENCE BOOKS:

1. Andrews, Sudhir. How to Succeed at Interviews. 21st (rep.) New Delhi.Tata McGraw-Hill 1988.
2. Heller, Robert. Effective leadership. Essential Manager series. Dk Publishing, 2002
3. Hindle, Tim. Reducing Stress. Essential Manager series. Dk Publishing, 2003

4. Lucas, Stephen. Art of Public Speaking. New Delhi. Tata - Mc-Graw Hill. 2001
5. Mile, D.J Power of positive thinking. Delhi. Rohan Book Company, (2004).
6. Pravesh Kumar. All about Self- Motivation. New Delhi. Goodwill Publishing House. 2005.
7. Smith, B . Body Language. Delhi: Rohan Book Company. 2004

BBT202	**BIOLOGY FOR ENGINEERS**	**L**	**T**	**P**	**C**
	Total Contact Hours – 30	2	0	0	2
	Prerequisite – Basic Science				
	Course Designed by – Department of Industrial Bio Technology				

OBJECTIVES

Gain vivid knowledge in the fundamentals and uses of biology, human system and plant system**.**

COURSE OUTCOMES (COs)

CO1	Graduates within the first five years will be able to grasp and apply biological engineering principles, procedures needed to solve real-world problems.
CO2	To understand the fundamentals of living things, their classification, cell structure and biochemical constituents
CO3	To apply the concept of plant, animal and microbial systems and growth in real life situations
CO4	To comprehend genetics and the immune system
CO5	To know the cause, symptoms, diagnosis and treatment of common diseases
CO6	To give a basic knowledge of the applications of biological systems in relevant industries

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H						M					
	CO2		H							H			
	CO3			H							M		
	CO4										H		
	CO5												
	CO6						H						M

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						
4	Approval	37th Meeting of Academic Council, May 2015							

UNITI INTRODUCTION TO LIFE 6

Characteristics of living organisms-Basic classification-cell theory-structure of prokaryotic and eukaryotic cell-Introduction to biomolecules: definition-general classification and important functions of carbohydrates-lipids-proteins-nucleic acids vitamins and enzymes-genes and chromosome.

UNIT II BIODIVERSITY 6

Plant System: basic concepts of plant growth-nutrition-photosynthesis and nitrogen fixation-Animal System: elementary study of digestive-respiratory-circulatory-excretory systems and their functions-Microbial System: history-types of microbes-economic importance and control of microbes.

UNIT III GENETICS AND IMMUNE SYSTEM 6

Evolution: theories of evolution-**Mendel's** cell division–mitosis and meiosis-evidence of e **laws of inheritance**-variation and speciation- nucleic acids as a genetic material-central dogma immunity-antigens-antibody-immune response.

UNIT IV HUMAN DISEASES 6

Definition- causes, symptoms, diagnosis, treatment and prevention of diabetes, cancer, hypertension, influenza, AIDS and Hepatitis

UNIT V BIOLOGY AND ITS INDUSTRIAL APPLICATION 6

Transgenic plants and animals-stem cell and tissue engineering-bioreactors-biopharming-recombinant vaccines-cloning-drug discovery-biological neural networks-bioremediation-biofertilizer-biocontrol-biofilters-biosensors-biopolymers-bioenergy-biomaterials-biochips-basic biomedical instrumentation.

TEXT BOOKS:

1. A Text book of Biotechnology, R.C.Dubey, S. Chand Higher Academic Publications, 2013
2. Diseases of the Human Body, Carol D. Tamparo and Marcia A. Lewis, F.A. Davis Company, 2011.
3. Biomedical instrumentation, Technology and applications, R. Khandpur, McGraw Hill Professional, 2004

REFERENCE BOOKS

1. Biology for Engineers, Arthur T. Johnson, CRC Press, Taylor and Francis, 2011
2. Cell Biology and Genetics (Biology: The unity and diversity of life Volume I), Cecie Starr, Ralph Taggart, Christine Evers and Lisa Starr, Cengage Learning, 2008
3. Biotechnology Expanding horizon, B.D. Singh, Kalyani Publishers, 2012

BME201	BASIC MECHANICAL ENGINEERING	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite – +2 Level Maths & Physical Science				
	Course Designed by – Dept of Mechanical Engineering				

OBJECTIVES

- The program educational objectives (PEOs) for the mechanical-engineering program are

to educate graduates who will be ethical, productive, and contributing members of society.

- The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- The ability to apply principles of engineering, basic science, and mathematics to design and realize physical systems, components, or processes

COURSE OUTCOMES (COs)

CO1	an ability to apply knowledge of mathematics
CO2	an ability to apply knowledge of science, and engineering
CO3	Ability to design and conduct experiments, as well as to analyze and interpret data.
CO4	an ability to function on multi-disciplinary teams
CO5	ToprovidebasicKnowledgeofbasicmanufacturingprocess.
CO6	ability to identify, formulate, and solve engineering problems

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	M	M	H	M		M			L	L	M
	CO2	H	M	M	H	H		M			L	L	M
	CO3	H	M		H	H		M			L	L	M
	CO4	H	M		H	H		M			L	L	M
	CO5	H	M	M	H	H		M			L	L	M
	CO6	H			H	H		M			L	L	M

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Professional Elective (PE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I ENERGY RESOURCESANDPOWER GENERATION 6

RenewableandNon-renewableresources-solar,wind,geothermal,steam,nuclearandhidepowerplants-Layout,
majorcomponentsandworking.ImportanceofEnergystorage,Environmentalconstraintsofpowergeneration usingfossil fuelsandnuclearenergy.

UNIT II IC ENGINES 6

Classification,workingprinciplesof petrol anddiesel engines-twostroke andfourstroke cycles,functionsofmain componentsofI.Cengine.Alternatefuelsandemissioncontrol.

UNIT III REFRIGERATION AND AIR-CONDITIONINGSYSTEM 6

Terminologyof Refrigerationand Air-Conditioning,PrincipleofVaporCompression& Absorptionsystem- Layoutoftypicaldomesticrefrigerator-window&Splittyperoomairconditioner.

UNITIV MANUFACTURING PROCESSES 6

BriefdescriptionofMouldmakesandcastingprocess,Metalforming,Classification typesofforging, forging operations, Briefdescription ofextrusion,rolling,sheetforging,anddrawing.Briefdescription ofwelding,brazing andsoldering.Principalmetalcuttingprocessesandcuttingtools,Brief descriptionofCentrelatheandradial drillingmachine.

UNITV MECHANICALDESIGN 6

Mechanicalpropertiesofmaterial-Yieldstrength,ultimatestrength,endurancelimitetc.,Stress-Strain curvesof materials.Stresses inducedinsimpleelements.Factorofsafety-Design ofShaftsandbelts. Typesofbearingsand itsapplications.Introductionto CAD/CAM/CIM&Mechatronics.

TEXTBOOKS:

1. T.J.Prabhuetal, "BasicMechanicalEngineering", SciTechPublications(p)Ltd,2000

REFERENCES:

1. NAGPAL,G.R,"PowerplantEngineering",KhannaPublishers,2004.
2. RAO.P.N,"ManufacturingTechnology",TataMcGraw-HillEducation,2000.
3. Kalpakjian,"ManufacturingEngineeringandTechnology",AdissoWesleypublishers,1995.
4. Ganesan.V,"Internalcombustionengines",TataMcGraw-HillEducation,2000.
5. C.P.Arora,"RefrigerationandAir Conditioning",TataMcGraw-HillEducation,2001.
6. V.B.Bhandari,"DesignofMachineelements",TataMcGraw-HillEducation,2010.

BCE 201	**BASIC CIVIL ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours – 30	2	0	0	2
	Prerequisite – +2 Level Maths & Physical Science				
	Course Designed by – Department of Civil Engineering				

OBJECTIVES: Understand the basic concepts of civil engineering.

COURSE OUTCOMES (COs)

CO1	Will gain knowledge in Design, concept preparation
CO2	Loading calculation
CO3	Structural component design
CO4	Drawing and chart preparation
CO5	Will understand the components of buildings.
CO6	Will learn the engineering aspects to dams , water supply and sewage disposal.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	*COs/POs*	*a*	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*
2	CO1	H	H			H		L					
	CO2					H	H						
	CO3							H	L				

	CO4									L			
	CO5										H	L	
	CO6												
3	Category	Humanities & Social Studies (HS)		Basic Sciences (BS)		Engg Sciences (ES)	Professional Core (PC)		Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)	
						√							
4	Approval	37th Meeting of Academic Council, May 2015											

UNIT I CIVIL ENGINEERING MATERIALS 8

Introduction – Civil Engineering – Materials – Stones – Bricks – Sand – Cement – Plain Concrete – Reinforced Cement Concrete – Steel Sections – Timber – Plywood – Paints – Varnishes (simple examples only)

UNIT II SURVEYING 5

Surveying – objectives – classification – principles of survey-Measurement of distances – Chain survey – Determination of areas – Use of compass – Use of leveling Instrument – (simple examples only)

UNIT III FOUNDATION FOR BUILDING 5

Bearing Capacity of Soil – Foundation – Functions – Requirement of good foundations – Types of foundations – Merits & Demerits.

UNIT IV SUPERSTRUCTURE 7

Stone Masonry – Brick Masonry – Columns – Lintels – Beams – Roofing – Flooring – Plastering– White Washing (Simple examples only)

UNIT V MISCELLANEOUS TOPICS 5

Types of Bridges –Dam- purpose – selection of site - Types of Dams – Water Treatment & Supply sources – standards of drinking- distribution system. – Sewage Treatment (simple examples only)

TEXT BOOKS:

1. Raju.K.V.B, Ravichandran .P.T, "Basics of Civil Engineering", Ayyappa Publications, Chennai, 2012.
2. Seetharaman S., "Basic Civil Engineering", Anuradha Agencies, (1st ed. 2005).
3. Dr.M.S.Palanisamy, "Basic Civil Engineering" (3rded. 2000), TUG Publishers, New Delhi/Tata McGrawHill Publication Co., New Delhi

REFERENCE BOOKS:

1. Rangwala.S.C, "Engineering Materials", Charotar Publishing House, Anand, 41st Edition: 2014.
2. National Building Code of India, Part V, "Building Materials", 2005
3. Ramesh Babu"A Textbook on Basic Civil Engineering" (1998). Anuradha Agencies,

Kumbakonam.
4. RamamruthamS., “Basic Civil Engineering”, DhanpatRai Publishing Co. (P) Ltd. (1999).

BCS2L1	INTERNET PRACTICES LABORATORY	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Internet Programming				
	Course Designed by – Dept of Information Technology				

OBJECTIVES

- To impart a sound knowledge on the principles of computers involving the different application oriented topics required for all engineering branches.
- Graduates will demonstrate the ability to apply knowledge of mathematics to develop and analyze computing systems.
- Graduates will have a solid understanding of the theory and concepts underlying con science.

COURSE OUTCOMES (COs)

CO1	To enable the student to learn the major components of a computer system.
CO2	To know the correct and efficient way of solving problem.
CO3	To identify and implement the correct and efficient way of solving problem.
CO4	To learn to use office automation tools.
CO5	To infer from use office automation tools.
CO6	To learn and write program in “C”.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	M	M	H	M		M			L	L	M
	CO2	H	M	M	H	H		M			L	L	M
	CO3	H	M		H	H		M			L	L	M
	CO4	H	M		H	H		M			L	L	M
	CO5	H	M	M	H	H		M			L	L	M
	CO6	H			H	H		M			L	L	M

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
				√					
4	Approval	37th Meeting of Academic Council, May 2015							

LIST OF EXPERIMENTS

1. HTML (Hypertext Mark-up Language):

Basics of HTML.

How to create HTML Document
Steps for creating a simple HTML Program.
a) Favorite Personality
b) Resume Preparation

2. **ADVANCED HTML:** Advanced Topics of HTML
   a) Time Table
   b) Table Creation
3. **JAVASCRIPT:**
   Script Basics.
   Incorporating JavaScript into Web page.
   a) Star Triangle
   b) Temperature Converters
   Script Basics.
   Incorporating JavaScript into Web page.
   a) Star Triangle
   b) Temperature Converters
4. **VBSCRIPT:**
   VBScript Basics.
   Incorporating VBScript into HTML.
   a) Changing Background Color
   b) Simple Calculator
5. **WEB DESIGN:**
   Inserting External Media in the Web Page.
   a) Forms and Links
   b) Frames with Links and Lists
   To export a Dream weaver Document as XML File, checking entries, working in frames, windows control, the java script URL.

BCM1L1	**BASIC CIVIL & MECHANICALENGINEERING PRACTICES LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	0	0	2	1
	Prerequisite – Basic Civil and Mechanical Engineering				
	Course Designed by – Department of Mechanical Engineering& Civil Engineering				

OBJECTIVES

To provide exposure to the students with hands on experience on various basic Civil & Mechanical Engineering practices.

COURSE OUTCOMES (COs)

CO1	Learn Basic concepts
CO2	Students will get exposure regarding pipe connection for pumps & turbines and to study the joint used in roofs, doors, windows and furniture's.
CO3	Students will get exposure regarding smithy, foundry operations and in latest welding operations such as TIG, MIG, CO2, spot welding etc.,
CO4	Students will get hands on experience on basic welding techniques, machining and sheet metal works.
CO5	Students will get hands on experience on basic machining techniques

CO6	Students will get hands on experience on basic sheet metal techniques

Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low													
1	COs/POs	a	b	c	d	e	f	g	h	i	J	k	l
2	CO1	H	L										
	CO2				H								
	CO3					H	L	L					
	CO4		H				M		L			H	
	CO5		H				M		L			H	
	CO6		H				M		L			H	
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)				
				√									
4	Approval	37th Meeting of Academic Council, May 2015											

LIST OF EXPERIMENTS

I. CIVILENGINEERINGPRACTICE

Buildings:

a) Studyofplumbingandcarpentrycomponentsofresidentialandindustrialbuildings.Safetyaspects.

PlumbingWorks:

a) Studyofpipelinejoints,itslocationandfunctions:valves,taps,couplings,unions,reducers,elbowsin householdfittings.

b) Studyofpipeconnectionsrequirementsforpumpsandturbines.

c) Preparationofplumbinglinesketchesforwatersupplyandsewageworks.

d) Hands-on-exercise:Basicpipeconnection ofPVCpipes&G.I.Pipes–Mixedpipematerialconnection–Pipe connectionswithdifferentjoiningcomponents.

e) Demonstrationofplumbingrequirementsofhigh-risebuildings.

CarpentryusingHandtoolsandPowertools:

a) Studyofthejointsinroofs,doors,windowsandfurniture.

b) Hands-on-exercise: Woodwork,jointsbysawing,planningandcutting.

c) Preparationofhalfjoints,MortiseandTenonjoints.

II MECHANICALENGINEERINGPRACTICE

Welding:

a) Preparationofbuttjoints,lapjointsandteejointsbyarcwelding

BasicMachining:

a) Simple Turning and Taper turning

b) Drilling Practice

SheetMetalWork:

a) Forming&Bending:

b) Modelmaking–Trays,funnels, etc.
c) Differenttypeofjoints
d) Preparationofair-conditioningducts
e) Preparationofbuttjoints,lapjointsandteejointsbyarcwelding

Machineassemblypractice:

a) Assembling,dismantlingand Studyofcentrifugalpump
b) Assembling,dismantlingand Studyofairconditioner
c) Assembling,dismantlingandStudyoflathe

Moulding:

a) Mouldingoperationslikemouldpreparationfor gearandstepconepulleyetc

Fitting:

a) Fitting Exercises–Preparationofsquarefittingandvee–fittingmodels.

Demonstration:

a) Smithyoperations,upsetting,swaging,settingdownandbending.Example–Exercise–Productionofhexagonalheaded bolt.
b) Gaswelding.

REFERENCES:

1. K. Jeyachandran, S. Nararajan& S, Balasubramanian, "A Primer on Engineering Practices Laboratory" ,Anuradha Publications, (2007).
2. T.Jeyapoovan, M. Saravanapandian& S. Pranitha, "Engineering Practices Lab Manual",Vikas Publishing House Pvt. Ltd. (2006)
3. H. S. Bawa, "Workshop Practice", Tata McGraw–Hill Publishing Company Limited, (2007).
4. A. Rajendra Prasad & P. M. M. S Sarma, "Workshop Practice", Sree Sai Publication, (2002).
5. P. Kannaiah& K.L. Narayana, "Manual on Workshop Practice", Sci tech Publication, (1999).

	PHYSICS AND CHEMISTRY LABORATORY	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	0	0	3	1
BPC 1L1/2L1	Prerequisite – Physics and Chemistry				
	Course Designed by – Department of Physics & Chemistry				

OBJECTIVES: To impart knowledge to the students in practical physics and chemistry

COURSE OUTCOMES (COs)

CO1	Students will understand the concept of hall effect
CO2	Students will understand the concept of semiconductors. .
CO3	Student will understand the working of spectrometer.
CO4	Student will able practically understand the chemical reactions.
CO5	Students will Study the magnetic hysteresis and energy product
CO6	Students understand the Determination of Band gap of a semiconductor

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	F	g	h	i	j	k	l
2	CO1	M	H	M			L		L	L	M	H	M
	CO2		H	M			L		L	L		H	
	CO3		H	M			L		L			H	
	CO4	M	H	M			L		L	L	M	H	M
	CO6		H				L		L	H		H	

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						
4	Approval	37th Meeting of Academic Council, May 2015							

I -LIST OF EXPERIMENTS – PHYSICS

1. Determination of Wavelength, and particle size using Laser
2. Determination of acceptance angle in an optical fiber.
3. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
4. Determination of wavelength of mercury spectrum – spectrometer grating
5. Determination of thermal conductivity of a bad conductor – Lee‟s Disc method.
6. Determination of Young‟s modulus by Non uniform bending method
7. Determination of specific resistance of a given coil of wire – Carey Foster‟s Bridge
8. Determination of Young‟s modulus by uniform bending method
9. Determination of band gap of a semiconductor
10. Determination of Coefficient of viscosity of a liquid –Poiseuille‟s method
11. Determination of Dispersive power of a prism - Spectrometer
12. Determination of thickness of a thin wire – Air wedge method
13. Determination of Rigidity modulus – Torsion pendulum

II-LIST OF EXPERIMENTS – CHEMISTRY

1. EstimationofhardnessofWaterbyEDTA
2. EstimationofCopper in brass byEDTA
3. Determination of DOin water (Winkler'smethod)
4. EstimationofChloride in Watersample (Argento metry)
5. Estimationof alkalinityofWater sample
6. Determinationofmolecularweight
7. Conduct metric titration (Simple acid base)
8. Conduct metric titration (Mixture of weak and strong acids)
9. Conduct metric titration using $BaCl_2$vs Na_2SO_4
10. Potentiometric Titration (Fe^{2+} / $KMnO_4$ or $K_2Cr_2O_7$)
11. pH titration (acid & base)
12. Determination of water of crystallization of a crystalline salt (Copper Sulphate)
13. Estimation of Ferric iron by spectrophotometer.

BSS 1L5 / 2L5 NSS PRACTICAL L T P C

0 1 2 1

OBJECTIVES

1. Understand the community in which they work and their relation
2. Identify the needs and problems of the community and involve them in problem-solving
3. Develop capacity to meet emergencies and natural disasters
4. Practice national integration and social harmony and
5. Utilize their knowledge in finding practical solutions to individual and community problems.

1. Regular Activities Programme

1) Traffic regulation
2) Working with Police Commissioner's Office
3) Working with Corporation of Chennai
4) Working with Health Department
5) Blind assistance
6) Garments collection
7) Non-formal education
8) Environmental Education, Awareness and Training (EEAT)
9) Blood donation

2.Special camp Programme

A) Legal awareness
B) Health awareness
C) First-aid
D) Career guidance
E) Leadership training - cum - Cultural Programme
F) Globalization and its Economic Social Political and Cultural impacts.

REFERENCE BOOKS:

1. National Service Scheme Manual, Government of India.
2. Training Programme on National Programme scheme, TISS.
3. Orientation Courses for N.S.S. Programme officers, TISS.
4. Case material as Training Aid for field workers, Gurmeet Hans.
5. Social service opportunities in Hospitals, Kapil K.Krishan,TISS.
6. Social Problems in India, Ram Ahuja.

BMA301	MATHEMATICS – III	L	T	P	C
	Total Contact Hours - 75	**4**	**0**	**0**	**4**
	Prerequisite – Mathematics II				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

1. To introduce Fourier series analysis this is central to many applications in engineering apart from its use in solving boundary value problems.
2. To acquaint the student with Fourier transform techniques used in wide variety of situations.
3. To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes

4. To develop Z transform techniques for discrete time systems.													
COURSE OUTCOMES (COs)													
CO1	To learn the problem solving methods in linear differential equations												
CO2	To learn Dirichlet's condition and operations using Fourier series												
CO3	To have a clear understanding about 2nd order equations and wave equations												
CO4	Properties of Laplace transform and problem solving using it												
CO5	Properties of Fourier transform and problem solving using it												
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low													
1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M											
	CO2		M	H		H							
	CO3		M		H								
	CO4	H			M								
	CO5	H			M	H							
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Maths (BS)		Engg Sciences (ES)	Professional Core		Core Elective (CE)	Non-Major Elective	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)	
				√									
4	Approval	37th Meeting of Academic Council, May 2015											

UNIT 1 PARTIAL DIFFERENTIAL EQUATIONS 9+6

Formation – Solution of Standard types of first order equations – Lagrange's equation – Linear partial differential equations of second and higher order with constant coefficients

UNIT II FOURIER SERIES 9+6

Dirichlet's conditions – General Fourier series- Half range sine and cosine series – Parse Val's identity – Harmonic analysis

UNIT III BOUNDARY VALUE PROBLEMS 9+6

Classification of second order linear partial differential equations – solution of one – dimensional wave equations, one dimensional heat equations.

UNIT IV LAPLACE TRANSFORMS 9+6

Transforms of simple functions – basic operational properties – transforms of derivatives and integrals – initial and final value theorems – inverse transforms – convolution theorem – periodic functions – applications of Laplace transforms for solving linear ordinary differential equation up to second order with constant coefficients and simultaneous equations of first order with constant coefficients.

UNIT V FOURIER TRANSFORMS 9+6

Statement of Fourier integral theorem – Fourier transform pairs – Fourier sine and cosine transforms – properties – transforms of simple functions – convolution theorem – Parse Val's identity

TEXT BOOKS:

1. Kandasamy, P., Thilakavathy, K. and Gunavathy.K. "Engineering Mathematics ", Vol II& III (4th revised edition) S Chand and co. , New Delhi, 2001.
2. Narayanan.S , Manicavachangam pillay ,.T.K., Ramanaiah, G. " Advanced Mathematicsfor Engineering Students ", Vol II & III (2nd Edition), S.Viswanathan (Printers and Publishers Pvt Ltd) 1992.
3. Venkatraman, M.K. " Engineering Mathematics" Vol III – A&B , 13thEdition National Publishing Company , Chennai 2002

BCS301	DATA STRUCTURES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisites –Fundamental of Computing and Programming.				
	Course Designed by – Dept. of Computer Science & Engineering				

OBJECTIVES

This course demonstrates familiarity with major algorithms and data structures and analyzes performance of algorithms. It is used to choose the appropriate data structure and algorithm design method for a specified application and determine which algorithm or data structure to use in different scenarios.

COURSE OUTCOMES (COs)

CO1	Explain the basic data structures and its operations.
CO2	Explain the concept of time complexity and space complexity.
CO3	Identify an appropriate data structure for a problem.
CO4	Make use of basic data structures to solve problems.
CO5	Summarize various searching and sorting algorithms.
CO6	Explain the concept of various data representation.

UNIT- I INTRODUCTION 9

Data objects and structures- The linear list data structure-Array Representation- Vector Representation – Performance analysis- Space complexity – Time complexity.

UNIT- II DATA REPRESENTATION 9

Singly linked list– Circular lists- Doubly liked list – Stacks – Abstract Data Type – Array Representation – Linked representation – Queues.

UNIT- III BINARY AND OTHER TREES 9

Trees – Binary trees – Properties of binary trees – Representation of binary trees – Binary tree traversal – Priority queues- Linear lists – Heap – Binary search tree- Binary search tree implementations –AVL trees -Graph – Graph search Methods.

UNIT- IV THE GREEDY METHOD 9

Optimization problems – Greedy method – Applications – Divide and conquer - The method – Applications – Lower bounds on complexity.

UNIT- V DYNAMIC PROGRAMMING 9

The method – Applications – Backtracking - The method – Applications – Branch and bound - The method – Applications.

TEXT BOOK:

1. SartajSahni, "Data Structures, Algorithms and Applications in C++", Second Edition, Universities Press.2005.

REFERENCES:

1. Horowitz, Sahni, Mehta, "Fundamentals of Data Structures in C++", 2nd Edition, Universities Press, 2007.
2. A.V.Aho, Hopcroft, Ullman, "Data Structures & Algorithms", Pearson Education, 2005.
3. http://lib.mdp.ac.id/ebook/Karya%20Umum/Dsa.pdf

BCS302	SYSTEM MODELLING AND SIMULATION	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Engineering Mathematics I, II and III, Fundamental of Computing and Programming.				
	Course Designed by – Dept. of Computer Science & Engineering				

OBJECTIVES

The overall aim of the course is to provide an understanding of Methods, techniques and tools for modeling, simulation and performance analysis of complex systems such as communication and computer networks.

COURSE OUTCOMES (COs)

CO1	Define basic concepts in modeling and simulation (M&S)
CO2	Classify various simulation models and give practical examples for each category
CO3	Construct a model for a given set of data and motivate its validity
CO4	Generate and test random number varieties and apply them to develop simulation models.
CO5	Analyze output data produced by a model and test validity of the model.
CO6	Explain the concept of output analysis of single model.

UNIT I INTRODUCTION TO SIMULATION 9

Advantages and disadvantages of simulation, areas of application, System environment, Components of a system. Discrete and continuous systems, model of a system. Types of models. Steps in a simulation study, simulation examples: simulation of queuing systems, simulation of inventory systems. Discrete event simulation, general principles and computer simulation languages. FORTRAN, SIMSCRIPT, GPSS.

UNIT-II STATISTICAL MODELS IN SIMULATION 9

Review of terminology and concepts. Useful statistical models, discrete distributions, continuous distributions. Poisson process, Empirical distributions, Queuing models: Characteristics of queuing systems, queuing notations. Transient and steady state behaviour of

queues, steady-state behaviour of infinite population, Markovan models, Steady state behaviour of finite population models.

UNIT-III INVENTORY SYSTEMS 9

Measures of effectiveness, inventory policies, deterministic systems probabilistic systems, simulation in inventory analysis.Random number generation.Properties of random numbers.Generation of pseudo-random numbers.Tests for random numbers. Random variate generation: Inverse transform technique, Direct transform for the normal distribution, convolution method. Acceptance-Rejection technique.

UNIT-IV INPUT DATA ANALYSIS 9

Data Collection, Identifying the distribution, Parameter estimation, Goodness-of-fit tests, Verification and validation of simulation models: Models Building, calibration and validation of models.

UNIT-V OUTPUT ANALYSIS FOR A SINGLE MODEL 9

Stochastic nature of 0/1 data, types of simulations with respect to O/P analysis, Measures of performance and their estimation, O/P analysis for terminating simulations, O/P analysis for steady-state simulations.

TEXT BOOKS

1.Jerry Banks, Carson. J.S., and Nelson B.L., "Discrete Event System Simulation", Prentice Hall of India, New Delhi, 2006.
2.Karian, Z. A., Dudewicz, E. J. (112121), "Modern statistical systems, and GPSS simulation: the first course", W. H. Freeman and Company, New York, 2005.

REFERENCES

1. System Modelling and Simulation, V.P.Singh, New Age International Publishers,2009.
2.https://shamsulsarip.files.wordpress.com/2015/07/system-modelling-and-simulation.pdf

BCS303	**COMPUTER ORGANIZATION AND ARCHITECTURE**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Fundamental of Computing and Programming.				
	Course Designed by – Dept. of Computer Science & Engineering				

OBJECTIVES

To have a thorough understanding of the basic structure and operation of a digital computer. To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.

COURSE OUTCOMES (COs)

CO1	Explain the organization and working principle of computer hardware components.
CO2	Explain the hierarchical memory system and data transfer with in a digital computer.
CO3	Outline the operation of arithmetic unit.
CO4	Summarize the execution sequence of an instruction through the processor
CO5	Explain the ways of communication between a processor and I/O devices.
CO6	Explain the concept of Parallel Architecture.

Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low												
COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
CO1	M	H	H	H	M	M		M			M	H
CO2			H		H	M						
CO3	M				H							
CO4		H	M	M				M				
CO5	L		H		H	M					M	M
CO6			M	M	H	L		L			M	H
Category	Humanities & Social Studies (HS)		Basic Sciences &Maths (BS)	Engg Sciences (ES)		Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)		Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)	
						√						
Approval	37th Meeting of Academic Council, May 2015											

UNIT-I ARCHITECTURE FUNDAMENTALS 9

Functional units – CPU Registers–CPU Organization-Different Types of Memory-Memory Hierarchy- Memory operations –Instruction Format – Addressing modes – Basic I/O operations-Evaluating CPU Performance.

UNIT-II CPU ARCHITECTURE 9

Instruction sets of different machines –Parallel Processing- Flynn's Classification- Pipelining-Arithmetic Pipeline-Instruction Pipeline- -Pipelining Hazards- CISC Vs RISC - Super Scalar Architecture.

UNIT-III MEMORY SYSTEM 9

Basic concepts – Semiconductor RAMs – ROMs – Speed – size and cost –Cache Memory-Mapping Techniques-Virtual memory-Evaluating Memory Performance-Secondary Storage-Multiprocessor.

UNIT-IV I/O ORGANIZATION 9

Input-Output, Interface-I/O Performance Measures-I/O Modes of Transfer-Direct Memory Access-Input Output Processor-Interfacing to different types of I/O devices.

UNIT-V PARALLEL ARCHITECTURE 9

Data flow –Static Dataflow-Dynamic Dataflow-Dataflow Graph-Vector Processors – CRAY-1 Vector Processor-EPIC.

TEXT BOOKS:

1.David A. Patterson and John L. Hennessy, "Computer Architecture-A Quantitative Approach", Elsevier, a division of reed India Private Limited, 5thedition, 2012

2. M. Mano, "Computer System Architecture", Third Edition, Pearson Education,2008.

REFERENCE BOOKS:

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, “Computer Organization”,McGraw-Hill, 5th Edition, Reprint 2012.
2. Ghosh T. K., “Computer Organization and Architecture”, Tata McGraw-Hill,3rd Edition, 2011
3. John P. Hayes, “Computer Architecture and Organization”, Tata McGraw Hill,3rd Edition, 1998
4. BehroozParahami, “Computer Architecture”, Oxford University Press, 8th Impression, 2011.
5. http://www.ece.umd.edu/~manoj/350/notes/book.pdf

BCS304	DIGITAL COMPUTER FUNDAMENTALS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Mathematics-I, Mathematics -II, Fundamental of Computing and Programming.				
	Course Designed by – Dept. of Computer Science & Engineering				

OBJECTIVES

- To get a basic understanding of how circuits and systems are designed with digital electronic circuit elements.
- To be able to analyze and design circuits and systems made from digital electronic circuit elements such as gates and flip-flops.
- To master basic design and programming of simple computers.

COURSE OUTCOMES (COs)

CO1	Perform arithmetic operations in any number system.
CO2	Understand the hierarchical memory system and data transfer with in a digital computer.
CO3	Use Boolean simplification techniques to design a combinational hardware circuit.
CO4	Understand the concept of number system.
CO5	Learn the various gates like AND, OR, NOT, XOR.
CO6	Learn the concept of synchronous and asynchronous sequential circuits.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	H	H	M	M	M	H	H	M		M	H
	CO2	M	H	M	H						M		
	CO3	M		H	H	H	L	H	M			M	M
	CO4	H	M							M	M	H	M
	CO5	H		H	M		H	M	M			M	
	CO6	M	H	M		M				L	L		M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT-I NUMBER SYSTEMS AND CODES 9

Review of binary, octal and Hexa decimal representations of numbers and their conversion, Binary arithmetic; conversion algorithms.Weighted binary codes.Non weighted binary codes error-detecting and error-correcting codes-Alphanumeric codes.

UNIT-II BOOLEAN ALGEBRA 9

Introduction to Boolean algebra- The AND, OR and not operations. Laws of Boolean algebra.of Boolean expressions. Boolean expressions and logic diagrams.Universal building blocks.Negative logic.

UNIT-III COMBINATIONAL LOGIC 9

Truth tables and maps.Sum of products and product of sums; Map reduction hybrid functions.Incompletely specified functions.Multiple- Output minimization. Variable- Entered maps. Tabular minimization.analysis of logic schematics.Synthesis of combinational functions.

UNIT-III LOGIC FUNCTION RELIZATION WITH MSI CIRCUITS 9

Multiplexers, De-multiplexers,Decoders and code converters. Arithmetic circuits, Adder, Number complements. Subtracting positive binary numbers with adders.Signed number addition and subtraction.

UNIT-IV SYNCHORONOUS SEQUENTIAL CIRCUITS 9

Basic latch circuits, De-bouncing switch. Flip-flops, truth table and excitation table. Shift registers. Asynchronous and synchronous counters. Shift counters.

UNIT-V ASYNCHRONOUS SEQUENTIAL CIRCUITS 9

Analysis and Design of Asynchronous Sequential Circuits , Reduction of State and Flow Tables ,Race-free State Assignment, Hazards.

TEXT BOOKS:

1. T. L Floyd & Jain, "Digital fundamentals", Pearson Education,3rd edition,2011.
2. Morris Mano M., "Digital Logic and Computer Design", Pearson Education,2010.

REFERENCE BOOKS:

1. Heiser Man, "Digital IC applications", Pearson Education,2007.
2. Raj Kamal, "Digital Systems Principles and Design", Pearson Education, First Edition, 2007.
3.CharlesH.Roth, Jr. and Larry L. Kinney, "Fundamentals of Logic Design", CL Engineering, 7th Edition, 2013.
4.WilliamH.Gothmann, "Digital electronics: an introduction to theory and practice",Prentice-Hall,2006 .
5. http://www.b-u.ac.in/sde_book/digi_com.pdf

BEC305	ELECTRONICS CIRCUITS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Basic Electrical and Electronics Engineering.				

	Course Designed by – Dept. of Electronics and Communication Engineering

OBJECTIVES

An understanding of basic EE abstractions on which analysis and design of electrical and electronic circuits and systems are based, including lumped circuit, digital and operational amplifier abstractions.

COURSE OUTCOMES (COs)

CO1	Learn how to develop and employ circuit models for elementary electronic components, e.g., resistors, sources, inductors, capacitors, diodes and transistor.
CO2	Become adept at using various Methods of circuit analysis, including simplified Methods.
CO3	Learn series-parallel reductions, voltage and current dividers, and the node method
CO4	An ability to formulate and solve the differential equations describing time behavior of circuits containing energy storage elements.
CO5	Explain the various gates like AND, OR, NOT, XOR.
CO6	Explain the concept of capability to use abstractions to analyze and design simple electronic circuits.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	H		H	M	M	M	M	M	L	H	M
	CO2	H	H	M	H	H	M				M		H
	CO3	H	M		H				M				
	CO4	H	H	M				H	L	M	M	M	M
	CO5	H	H		H	H	M						
	CO6	H	M		H	H	M	M	M	M	L	M	H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT- I INTRODUCTION 9

Electronic Devices-Semi conductor- PN junction diode -BJT-FET IC fabrication.

UNIT- II AMPLIFIER CIRCUITS AND SYSTEMS 9

Basic amplifier stages of Low frequencies - Frequency response of amplifiers-Concept of feedback-Properties of negative feedback amplifiers.

UNIT- III OPERATIONAL AMPLIFIER 9

Architecture and characteristics - Parameters-Basic Operational amplifier applications- BIFET - BIMOS and MOS operational amplifier.

UNIT- IV WAVE FORM GENERATOR AND WAVE SHAPING 9

Sinusoidal Oscillators-Crystal Oscillators - Multivibrators - Comparators-Schmitt Trigger-square wave and triangular wave generation-Pulse generation-555 IC timer-Modulation of a square wave-Series regulator- Monolithic Voltage regulator.

UNIT –V SIGNAL CONDITIONING AND DATA CONVERSION 9

Signals and signal processing-Sample and Hold systems-Analog MUX and DEMUX-D/A converter-A/D converters-Integrator and Differentiator-Electronic Analog computations-Active RC filter- Butterworth and Chebyschev filter-Analog multiplier.

TEXT BOOKS:

1. Milman and Halkias, "Integrated Electronics", McGraw Hill, 2010.
2. Electronic Devices and Circuits by Anil K.Maini,VarshaAgarwal,Wiley Publications,2009
3. Allen Mottershed, "Electronic Devices and Circuits ", Prentice-Hall of India,1996.

REFERENCES:

1. Electronic Fundamentals: Circuits,Devices and its Application by Thomas L.Floyd,United states Edition,2006.
2. http://www-mdp.eng.cam.ac.uk/web/library/enginfo/electrical/hong1.pdf

BCS3L1	**DATASTRUCTURES USING C LAB**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	0	0	3	2
	Prerequisite –Fundamental of Computing and Programming, Data Structures, C Programming.				
	Lab Manual Prepared by – Dept. of Computer Science & Engineering				

OBJECTIVES

This course demonstrates familiarity with major algorithms and data structures and analyzes performance of algorithms. It is used to choose the appropriate data structure and algorithm design method for a specified application and determine which algorithm or data structure to use in different scenarios.

COURSE OUTCOMES (COs)

CO1	Implement various basic data structures and its operations.
CO2	Implement various sorting and searching algorithms.
CO3	Implement various tree operations.
CO4	Implement various graphs algorithms.
CO5	Develop simple applications using various data structures.
CO6	Develop algorithms using various searching and sorting techniques.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	M	M	H	M		M		H	L	L	M
	CO2	H	M	M	H	H		M	M		L	L	M
	CO3				H	H				M			
	CO4	H				M							L
	CO5		M	M	H	H		M	H		L	L	M
	CO6	H			H	H		M	M	H	L	L	M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

LIST OF EXPERIMENTS:

1. Simple Cprograms -Control Structures -Functions - Aggregate data types-File handling
2. Implementation of-Lists, Stacks, Queues (Using Arrays, linked lists)-Trees - Searching and Sorting algorithms

BEC3L2	**ELECTRONICS CIRCUITS LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	0	0	3	2
	Prerequisite – Basic Electrical and Electronics Engineering Lab.				
	Lab Manual Designed by – Dept. of Electronics and Communication Engineering				

OBJECTIVES

An understanding of basic EE abstractions on which analysis and design of electrical and electronic circuits and systems are based, including lumped circuit, digital and operational amplifier abstractions.

COURSE OUTCOMES (COs)

CO1	Learn how to develop and employ circuit models for elementary electronic components, e.g., resistors, sources, inductors, capacitors, diodes and transistor.
CO2	Become adept at using various Methods of circuit analysis, including simplified Methods.
CO3	Learn series-parallel reductions, voltage and current dividers, and the node method
CO4	An ability to formulate and solve the differential equations describing time behavior of circuits containing energy storage elements.
CO5	Explain the various gates like AND, OR, NOT, XOR.
CO6	Explain the concept of capability to use abstractions to analyze and design simple electronic circuits.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	H		H	M	M	M	M	M	L	H	M
	CO2	M	H	M	H	H	M				M		H
	CO3		M		H				M				
	CO4	H	H	M				H	L	M	M	M	M
	CO5		H		H	H	M						
	CO6	M	M		H	H	M	M	M	M	L	M	H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

LIST OF EXPERIMENTS:

1.Verification of Boolean Theorems-Implementation of Boolean Function - Adders/ Subtractors- Decoders -Encoders - Multiplexers -Demultiplexers - Comparators - Parity Checker/ Generator.
2. Registers - Counters - Shift Registers - General purpose shift registers - Data transmission.
3. Project - A mini project involving clocked sequential networks design.

BCS3L2	**OBJECT ORIENTED PROGRAMMING LAB**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	0	0	3	2
	Prerequisite –Fundamental of Computing and Programming, Object Oriented Programming using C++,C.				
	Lab Manual Prepared by – Dept. of Computer Science & Engineering				

OBJECTIVES: This lab manual demonstrates familiarity with various concepts of OOPS.

COURSE OUTCOMES (COs)

CO1	Demonstrate class object concepts by using C++.
CO2	Develop programs using inheritance and polymorphism.
CO3	Demonstrate the significance of constructors and destructor.
CO4	Implement function and operator overloading using C++.
CO5	Construct generic classes using template concepts.
CO6	Implement the concept of file handling.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H	H		H	M	M	M	H	H	H	H
	CO2									M			
	CO3		H	H	M	M		H		H		H	H
	CO4	M					L		M		M		
	CO5			M		H		M		M		M	M
	CO6	L	M	M		M	M		L	M	M	H	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

					√				
4	Approval	37th Meeting of Academic Council, May 2015							

LIST OF EXPERIMENTS:

1. Programs Using Functions
- Functions with default arguments
- Implementation of Call by Value, Call by Address and Call by Reference
2. Simple Classes for understanding objects, member functions and Constructors
- Classes with primitive data members
- Classes with arrays as data members
- Classes with pointers as data members – String Class
- Classes with constant data members, Classes with static member functions
3. Compile time Polymorphism
- Operator Overloading including Unary and Binary Operators, Function Overloading
4. Runtime Polymorphism
- Inheritance ,Virtual functions
- Virtual Base Classes, Templates
- File Handling-Sequential access, Random access.

BMA402	**NUMERICAL METHODS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 75	3	2	0	4
	Prerequisite – Engineering Mathematics-I, Engineering Mathematics –II, Engineering Mathematics-III				
	Course Designed by – Dept. of Mathematics				

OBJECTIVES

- To explore complex systems, physicists, engineers, financiers and mathematicians require computational Methods since mathematical models are only rarely solvable algebraically
- Linear algebra underlying systems of equations, ordinary differential equations to simulate systems, and stochastic simulation under random influences.
- Explicit schemes to solve ordinary differential equations; random numbers; stochastic system simulation.

COURSE OUTCOMES (COs)

CO1	Solve a set of algebraic equations representing steady state models formed in engineering problems.
CO2	Fit smooth curves for the discrete data connected to each other or to use interpolation Methods over these data tables.
CO3	Find the trend information from discrete data set through numerical differentiation and Summary information through numerical integration.
CO4	Predict the system dynamic behavior through solution of ODEs modeling the system.
CO5	Solve PDE models representing spatial and temporal variations in physical systems Through numerical Methods.
CO6	Have the necessary proficiency of using MATLAB for obtaining the above solutions.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	H	M	H	M			M				H
	CO2	H	H										
	CO3	H	H	L	M	M							M
	CO4	M	M						M				
	CO5	H	H	L	H	H							
	CO6	M	M						H				H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						

4	Approval	37th Meeting of Academic Council, May 2015

UNIT – I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+6

Linear interpolation Methods (method of false position) – Newton's method – Statement of fixed point theorem – Fixed point iteration: x=g(x) method – Solution of linear system by Gaussian elimination and Gauss-Jordon Methods - Iterative Methods: Gauss Jacobi and Gauss-Seidel Methods - Inverse of a matrix by Gauss Jordon method – Eigen value of a matrix by power method.

UNIT -II INTERPOLATION AND APPROXIMATION 9+6

Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton's forward and backward difference formulas.

UNIT-III NUMERICAL DIFFERENTIATION AND INTEGRATION 9+6

Derivatives from difference tables – Divided differences and finite differences –Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Two and Three point Gaussian quadrature formulas – Double integrals using trapezoidal and Simpsons's rules.

UNIT-IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9+6

Single step Methods: Taylor series method – Euler and modified Euler Methods – Fourth order Runge – Kutta method for solving first and second order equations – Multistep Methods: Milne's and Adam's predictor and corrector Methods.

UNIT- V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIALEQUATIONS 9+6

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit Methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TEXT BOOKS:

1. C.F. Gerald and P.O. Wheatley, 'Applied Numerical Analysis', Sixth Edition, PearsonEducation Asia, New Delhi, 2002.

2. E. Balagurusamy, 'Numerical Methods', Tata McGraw Hill Pub.Co.Ltd, New Delhi, 1999.

REFERENCES:

1. P. Kandasamy, K. Thilagavathy and K. Gunavathy, 'Numerical Methods', S.Chand Co. Ltd., New Delhi, 2003.
2. R.L. Burden and T.D. Faires, 'Numerical Analysis', Seventh Edition, Thomson Asia Pvt. Ltd., Singapore, 2002.
3.https://www.math.ust.hk/~machas/numerical-Methods.pdf

BCS401	**DATABASE MANAGEMENT SYSTEM**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Fundamental of Computing and Programming, Object Oriented Programming using C++				
	Course Designed by – Dept. of Computer Science & Engineering				

OBJECTIVES

- Most of the organizations depend on databases for storing the data and to share the data among different kinds of users for their business operations
- Persistent storage required and several users must be able to safely access the same data concurrently.
- Hence this course discusses about the problems with the file processing system and how it can be handled effectively in Database Systems through various design tools, design techniques and algorithms.

COURSE OUTCOMES (COs)

CO1	Define the fundamental elements of database management systems.
CO2	Explain the basic concepts of relational data model and entity-relationship model.
CO3	Outline relational database design, relational algebra and database language SQL.
CO4	Explain the basic concepts of query processing, transaction management and file storage.
CO5	Develop a database for a given problem.
CO6	To know

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1			S									S
	CO2		M	M		H	L		M	M	L		S
	CO3		S	S	M			M					M
	CO4					M							
	CO5			S						M	M		M
	CO6	M	S		L	M			M			M	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT-I INTRODUCTION 9

Introduction – Database System Applications-Purpose of Database Systems- View of Data- Data Abstraction- Instances and Schemas- Data Models-Database Languages -Relational Databases-Database Design- The Entity-Relationship Model - Data Storage and Querying - Transaction Management - Database Architecture -Database Users and Administrators.

UNIT-II RELATIONAL DATABASES 9

Introduction to Relational model - Structure of Relational Databases - Database Schema - Keys - Schema Diagrams - Relational Query Languages - Relational Operations -Relational algebra - Introduction to SQL - Overview of the SQL Query Language - SQL Data Definition - Basic Structure of SQL Queries - Formal Relational Query Languages- The Relational Algebra-Relational calculus- Relational database design-Normal Forms- Functional dependency.

UNIT-III DATA STORAGE AND QUERYING 9

Storage and File Structure - File Organization - Indexing and Hashing- Ordered Indices- Static Hashing- Dynamic Hashing- Query Processing- Overview- Measures of Query Cost-Selection-Sorting- Join Operation- Evaluation of Expressions- Query Optimization- Overview-Transformation of Relational Expressions- Estimating Statistics of Expression Results- Choice of Evaluation Plans.

UNIT-IV TRANSACTIONS 9

Transactions-Transaction Concept-A Simple Transaction Model-Storage Structure-Transaction Atomicity and Durability-Transaction Isolation-Serializability-Transaction Isolation and Atomicity-Transaction Isolation Levels-Transactions as SQL Statements-Concurrency Control-Lock-Based Protocols-Deadlock Handling-Multiple Granularity-Time Stamp-Based Protocols-Validation Based Protocols-Hierarchical model - Basic Concepts - Data-Structure Diagrams-Network model.

UNIT-V OBJECT-BASED DATABASES 9

Overview-Complex Data Types-Structured Types and Inheritance in SQL-Table Inheritance-Array and Multiset Types in SQL-Object-Identity and Reference Types in SQL-Implementing O-R Features- Persistent Programming Languages-Object-Relational Mapping-Object-Oriented versus Object-Relational - Data warehousing and Data Mining - Decision-Support Systems-Data Warehousing- Data Mining-Classification-Association Rules-Other Types of Associations-Clustering-Other Forms of Data Mining.

TEXT BOOKS:

1. Abraham Silberschatz, Henry. F. Korth and S. Sudharshan, “Database System Concepts”, 6th Edition, Tata McGraw Hill, 2011.
2. RamezElmasri, Shamkant B. Navathe, “Fundamentals of Database Systems", 6th Edition, Addison-Wesley,2010.

REFERENCE BOOKS:

1.PakhiraMalay.K, “Database Management System”,PHI publication,2012.

2.NarainGehani, “The Database Book – Principles and Practice Using MySQL”, Universities Press,2008.
3. Hector Garcia - Molina, Jeff Ullman and Jennifer Widom, “Database systems: The Complete Book” 2nd Edition, Pearson Education,2008.
4. C. J. Date, A. Kannan and S. Swamynathan, “An Introduction to Database Systems”, Pearson Education, 8thEdition,2006.
5. Database%20Management%20Systems%203Rd%20Edition.pdf

BCS402	DESIGN AND ANALYSIS OF ALGORITHM	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Fundamental of Computing and Programming, Object Oriented Programming using C++,Data Structures				
	Course Designed by – Dept. of Computer Science & Engineering				

OBJECTIVES

- Design algorithms for various computing problems.
- Analyze the time and space complexity of algorithms.
- Critically analyze the different algorithm design techniques for a given problem.
- Modify existing algorithms to improve efficiency.

COURSE OUTCOMES (COs)

CO1	Explain the basic concepts of time and space complexity, divide-and-conquer Strategy, dynamic programming, greedy and approximate algorithms.
CO2	Describe the methodologies of how to analyze an algorithm
CO3	Describe the data structures of graph coloring and back tracking
CO4	Design a better algorithm to solve the problems.
CO5	Know about branch and bound techniques.
CO6	To know the concept Travelling Salesman Problem.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	M	M	H	M		M			L	M	M
	CO2	H	M	M	H	H		M		M			M
	CO3				H	H			M				
	CO4	M										M	L
	CO5		M	M	H	H		M			M		M
	CO6	L			H	H		M		M			M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT- I ANALYZING ALGORITHMS 9

Introduction: Efficiency of algorithms – average and worst case asymptotic notation – the order of - other asymptotic notations. Analysis of Algorithms: Analyzing control structures – solving recurrences – homogeneous recurrences – inhomogeneous recurrences.

UNIT- II DIVIDE AND CONQUER METHOD 9

Divide And Conquer Method: Binary search – merge sort – quick sort – strassen's matrix multiplication. Greedy Method: Knapsack problem – Prim's algorithm – Kruskal's algorithm – Dijkstra's algorithm – Huffman trees.

UNIT- III DYNAMIC PROGRAMMING 9

Dynamic Programming: Principle of optimality – computing binomial co-efficient – Warshall's and Floyd's algorithms – optimal binary search tree – knapsack problem – traveling salesman problem.

UNIT- IV BACKTRACKING 9

Backtracking: n queen's problem – sum of subsets – graph coloring – Hamiltonian cycle – knapsack problem.

UNIT- V TRAVELLING SALESMAN PROBLEM 9

Branch and Bound: Knapsack problem – traveling salesman problem – assignment problem Introduction to NP Completeness: easy vs. hard – the class NP – NP complete problems**.**

TEXT BOOKS

1. AnanyLevitin, Introduction to Design and Analysis of Algorithms, Pearson Education Inc., 2005.
2. Ellis Horowitz, SartajSahni and S. Rajasekaran, Fundamentals of Computer Algorithms ,Galgotia Publications, 2nd Edition, New Delhi, 2003.

REFERENCES

1. Aho.A.V, Hopcroft.J.E and Ullman.J.D, Design and analysis of Algorithms, Pearson education, 3rd edition, 2000.
2. Mark Allen Weiss, Data structures and algorithm analysis in C, Pearson Education, 2nd Edition, 2003
3. Thomas.H.Cormen, Charles E. Leiserson, Ronald L.Rivest, Introduction to Algorithms, Prentice Hall of India Pvt. Ltd,3rd Edition,2009.
4. https://www.cs.umd.edu/users/samir/2012lecnotes.pdf

BCS403	SYSTEM SOFTWARE	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Fundamental of Computing and Programming, Computer Organization and Architecture, Operating System				
	Course Designed by – Dept. of Computer Science & Engineering				

OBJECTIVES

The objective of this course is some of the major tasks of the system software of a computer system, focusing on internal working of the Hardware and Software interface of a typical system.

COURSE OUTCOMES (COs)	
CO1	An ability to understand Addressing modes and Instruction formats.
CO2	Understand the functionality of Assemblers.
CO3	Understand the Concept of Linkers and Loaders.
CO4	Abilityunderstands the concept of Macroprocessors.
CO5	Summarize the concepts of Debuggers and implementation of editors.
CO6	An ability to apply design and development principles in the construction of software systems of varying complexity.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	H		H								H
	CO2	H	H	H	H				M		M		
	CO3	M	H	H	M							M	
	CO4	H	H	H	H		L				M		M
	CO5	L	H	H	H								
	CO6			M	M								M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT –I INTRODUCTION TO SYSTEM SOFTWARE 9

Introduction, System Software and Machine Architecture, Simplified Instructional Computer (SIC) - SIC Machine Architecture, SIC/XE Machine Architecture, SIC Programming Examples-Instruction formats - Addressing modes -Typical Architectures.

UNIT- II ASSEMBLERS 9

Functions - Features - Machine dependent - Machine independent - Design options - One pass - Multipass - Implementation – Examples-Basic Assembler Function - A Simple SIC Assembler, Assembler Algorithm and Data Structures, Machine Dependent Assembler Features - Instruction Formats & Addressing Modes, Program Relocation.

UNIT- III LINKER AND LOADER 9

Basic Loader Functions - Design of an Absolute Loader, A Simple Bootstrap Loader, Machine-Dependent Loader Features – Relocation, Program Linking, Algorithm and Data Structures for a Linking Loader; Machine-Independent Loader Features - Automatic Library Search, Loader Options, Loader Design Options - Linkage Editor, Dynamic Linkage, Bootstrap Loaders, Implementation Examples - MS-DOS Linker.

UNIT –IV TEXT EDITORS AND MACRO PROCESSOR 9

Text Editors - Overview of Editing Process, User Interface, Editor Structure, Interactive Debugging Systems - Debugging Functions and Capabilities, Relationship With Other Parts Of

The System, User-Interface Criteria Functions - Macro parameters - Using labels - Conditional macro expansion -Recursive macro expansion – General purpose macro processors -Examples.

UNIT- V COMPILER AND UTILITIES 9

Introduction to Compilers- Different phases of a compiler-Simple one pass compiler - Code optimization techniques - System Software tools -Implementation of editors – Debuggers-Lex and Yacc - The Simplest Lex Program, Recognizing Words With LEX, Symbol Tables, Grammars, Parser-Lexer Communication, The Parts of Speech Lexer, A YACC Parser, The Rules Section.

TEXT BOOKS:

1. L. Beck, "System Software - An Introduction to System Programming", 3rd Edition, Pearson Education, 2005.
2. John.R.Levine, Tony Mason and Doug Brown: Lex and Yacc, O'Reilly, SPD, 1998.

REFERENCES:

1. D.M. Dhamdhere, "System Programming and Operating Systems", Tata McGraw Hill Company, 1999.
2. http://uotechnology.edu.iq/ce/Lectures/Dr-Shaima-Sys-Prog/lec1-2-3-4.pdf
3. https://books.google.co.in/books?id=s7zgF7InxIgC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

BCS405	OPERATING SYSTEMS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Fundamental of Computing and Programming, Internet Programming, Computer Organization and architecture.				
	Course Designed by – Dept. of Computer Science & Engineering				

OBJECTIVES

Every computer professional should have a basic understanding of how an operating system controls the computing resources and provide services to the users. This course provides an introduction to the operating system functions, design and implementation.

COURSE OUTCOMES (COs)

CO1	Illustrate the operating system concepts and its functionalities.
CO2	Apply various CPU scheduling algorithms for problems.
CO3	Outline the needs and applications of process synchronization.
CO4	Identify the issues in deadlock and memory management.
CO5	Illustrate various file and disk management strategies.
CO6	Learn the basic concept of LINUX.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M		H			H	L		M	L	M	H
	CO2		H	H		H	M						H
	CO3						H		M				M
	CO4		M	H	H	M	H	M			M	H	H

	CO5	M	M	H			M			M			M
	CO6		M	M					H			M	L
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Maths		Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)		Project/Term Paper/ Seminar/ Internship (PR)	
4	Approval	37th Meeting of Academic Council, May 2015											

UNIT- I INTRODUCTION TO OPERATING SYSTEM 9

Introduction: What operating systems do? – Computer System Organization - Computer System Architecture – Single processor systems - Multiple processor systems – Clustered Systems – Operating System Structure – Operating System Operations – Special purpose systems: Real Time Embedded Systems, Multimedia Systems and Handheld Systems. Operating System Services: System Calls – System Programs –Virtual Machines - Operating System Design and Implementation.

UNIT- II PROCESS MANAGEMENT 9

Process Management: Process Concept – Process Scheduling – Operation on Process – Cooperating Processes and Inter-process Communication. Threads: Overview – Multithreading Models. Process Synchronization: The Critical Section Problem – Synchronization Hardware – Semaphores – Classical Problems of Synchronization. Deadlocks: System Model – Deadlock Characterization – Methods for handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection –Recovery from Deadlock.

UNIT- III CPU SCHEDULING 9

CPU Scheduling: Basic Concepts – Scheduling Criteria – Scheduling Algorithms. Memory Management: Background – Swapping –Contiguous Memory Allocation –Paging - Segmentation – Segmentation with paging. Virtual Memory: Demand paging – Page Replacement – Thrashing – Allocation of Frames.

UNIT-IV FILE HANDLING 9

File Systems: File Concepts - Access Methods – Directory Structure – File System Mounting – File Sharing – Protection. File System Structure – File System Implementation – Allocation Methods - Free-Space Management – Directory implementation – Recovery.

UNIT- VLINUX 9

Secondary Storage Management: Disk Structure – Disk Scheduling – Disk Management – Swap Space management-Case Study: Linux System – Components of Linux Systems – Process Management – Process Scheduling – Security.

TEXT BOOKS:

1. Silberschatz, Galvin, Gagne, "Operating System Concepts", 8thedition, John Wiley & Sons, Inc., 2009.
2. William Stallings, "Operating Systems", Pearson Education, 6th Edition. 2006.

REFERENCS:

1. D.M.Dhamdhere, "Operating Systems: A Concept-Based Approach", 2nd Edition, Tata McGraw Hill, 2006.
2. Andrew S. Tanenbaum, "Modern Operating Systems", Pearson Education, 3rd Edition.2005.
3. https://it325blog.files.wordpress.com/2012/09/operating-system-concepts-7-th-edition.pdf.

BCE406	ENVIRONMENTAL STUDIES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Physical Sciences				
	Course Designed by – Dept of Civil Engineering				

OBJECTIVES

1. To study the nature and facts about environment.
2. To find and implement scientific, technological, economic and political solutions to environmental problems.
3. To study the interrelationship between living organism and environment.
4. To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
5. To study the dynamic processes and understand the features of the earth's interior and surface.
6. To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

COURSE OUTCOMES (COs)

CO1	Play an important role in transferring a healthy environment for future generations
CO2	Analyze the impact of engineering solutions in a global and societal context
CO3	Discuss contemporary issues that results in environmental degradation and would attempt to provide solutions to overcome those problems
CO4	Ability to consider issues of environment and sustainable development in his personal and professional undertakings
CO5	Highlight the importance of ecosystem and biodiversity

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1						H	H	H				H
	CO2						H	H	M				M
	CO3							M	H				H
	CO4							H	H				H
	CO5						H		M				M
	CO6							M	H				

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

			√						
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES 9

Definition, scope and importance, Need for public awareness.

Natural Resources : Renewable And Non – Renewable Resources

Natural resources and associated problems

a) Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effect on forests and tribal people.
b) Water resources : Use and over-utilization of surface and ground water, flood, drought conflicts over water, dams-benefits and problems.
c) Mineral resources : Uses and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources : World food problems, changes caused by agriculture and overgrazing , effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, case studies.
f) Land resources : Land as a resource, Land degradation, man induced landslides, soil erosion and desertification

Role of an individual in conversation of natural resources, Equitable use of resources for sustainable lifestyles.

UNIT II ECOSYSTEMS 8

Concepts of an ecosystem. Structure and function of an ecosystem, producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids - Introduction, types, characteristic features, structure and function of the following ecosystem :- Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, estuaries)-

Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation - Ethics : Issues and possible Solutions, Climate change, global warming, acid rain, ozone layer depletion.

UNIT III BIODIVERSITY AND ITS CONSERVATION 7

Introduction and Definition - genetic, species and ecosystems diversity, Biogeographical classification of India - Value biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, national and local levels. India as a mega-diversity nation, Hot-spots of biodiversity -Threats to biodiversity, habitat, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation biodiversity - In-situ and Ex-situ conservation of biodiversity.

Environmental Pollution 7

Definition, Causes, effects and control measures of ;- Air Pollution, Water pollution, Soil Pollution, Marine Pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management : Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution - Pollution case studies - Disaster Management : floods earthquake, cyclone and landslides.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 8

From Unsustainable to Sustainable development, Urban problems related to energy, nuclear accident and holocaust, case studies, wasteland reclamation, Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife protection Act, Forest Conservation Act, Issues involved in enforcement of environmental Legislation, public awareness –

Fireworks and its impact on the Environment – Chemicals used in Fireworks – (Fuel –oxidizing Agent – Reducing Agent –Toxic Materials – Fuel –Binder- Regulator) – Harmful nature of ingredients – chemical effects on health due to inhaling fumes – Noise produced by fire crackers – Noise pollution – Noise level standards for fire crackers – Intensity of sound – Impact on hearing – Safety measures.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations, population explosion-Family Welfare programs, Environment and human health, Human Rights, Value Education, HIV and AIDS, Women and Child Welfare, Role of Information Technology in Environment and Human health - Case Studies.

TEXTBOOKS:

1. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", Pearson Education Pvt., Ltd., Second Edition, ISBN 81-297-0277-0, 2004.
2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
3. BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd.,Ahmedabad – 380 013, India, 1989.
4. Benny Joseph, "Environmental Studies"., TATA McGraw Hill, 2010

REFERENCES

1. Trivedi R.K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol.I and II, EnviroMedia 2009
2. Cunningham, W.P.Cooper, T.H.Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
3. Wager K.D. "Environmental Management", W.B. Saunders Co., Philadelphia, USA, 1998.
4. Trivedi R.K. and P.K. Goel, "Introduction to Air Pollution", Techno Science Publications 2013
5. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB),2001.
6. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
7. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
8. Jadhav, H &Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
9. Mckinney, M.L. & School, R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition. 639p.
10. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
11. Rao M N. &Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publish Co. Pvt. Ltd. 345p.
12. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut.
13. http://eng.mft.info/uploadedfiles/gfiles/c8e31c9e52d84c3.pdf

BCS4L1	DBMS LABORATORY	L	T	P	C
	Total Contact Hours - 30	0	0	3	2
	Prerequisite –Database Management System				
	Lab Manual Designed by – Dept. of Computer Science and Engineering				

OBJECTIVES: The main objective isstudents gain knowledge about databases for storing the data and to share the data among different kinds of users for their business operations.

COURSE OUTCOMES (COs)

CO1	Develop database modeling for a problem.
CO2	Design a database using normalization.
CO3	Implement a data base query language.
CO4	Develop GUI using front end tool.
CO5	Develop a connection between frontend and database.
CO6	Implement a Data Manipulation Language.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1			S									S
	CO2		M	M		H	L		M	M	L		S
	CO3		S	S	M			M					M
	CO4					M							
	CO5			S						M	M		M
	CO6	M	S		L	M			M			M	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

LIST OF EXPERIMENTS

1. Data Definition, Manipulation of base tables and views
2. High level programming language extensions.
3. Front end tools.
4. Forms-Triggers-Menu Design.
5. Reports.
6. Database Design and implementation
7. An exercise using Open Source Software like MySQL.

BCS4L2	OPERATING SYSTEM LABORATORY	L	T	P	C
	Total Contact Hours - 30	0	0	3	2

	Prerequisite –Operating Systems
	Lab Manual Designed by – Dept. of Computer Science and Engineering

OBJECTIVES The main objective is students gain knowledge about various Operating System Memory management and Commands using in Operating system.

COURSE OUTCOMES (COs)

CO1	Demonstrate Unix / Linux commands.
CO2	Implement various commands using shell programming.
CO3	Implement various CPU scheduling algorithms.
CO4	Implement various disk scheduling algorithms.
CO5	Implement memory management techniques.
CO6	Implement Synchronization and Semaphores.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1		H	H		H				M			H
	CO2		H	H		H							
	CO3		H	H		M							M
	CO4		M			H							H
	CO5		H	M		M							
	CO6		H	M		M				M			H

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

LIST OF EXPERIMENTS

1. Working with basic Unix/ Linux commands.
2. Shell Programming.
3. Programs using the following system calls of Unix / Linux operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir
4. Programs using the I/O system calls of UNIX operating system (open, read, write)
5. Simulations of Unix / Linux commands like ls, grep, etc.
6. Simulation of scheduling algorithms (CPU and Disk).
7. Implementation of synchronization problems using Semaphore.
8. Simulation of basic memory management schemes.
9. Simulation of virtual memory management schemes.
10. Simulation of file systems.

BCS4L3	COMPUTER GRAPHICS AND MULTIMEDIA LABORATORY	L	T	P	C

	Total Contact Hours - 30	0	0	3	2
	Prerequisite –Multimedia Systems.				
	Lab Manual Designed by – Dept. of Computer Science and Engineering				

OBJECTIVES The main objective is students gain knowledge about multimedia concepts, 2D and 3D Transformations.

COURSE OUTCOMES (COs)

CO1	Explain line drawing using programming language.
CO2	Explain 2D and 3D transformations
CO3	Demonstrate simple 2D animations using animation software.
CO4	Prepare simple scenes using image editing software.
CO5	Explain the linking between web and multimedia.
CO6	Model a simple multimedia application.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1		H	H		H							H
	CO2		H	M		H							
	CO3		H			M							M
	CO4		M	H		H							H
	CO5		H	M		M							
	CO6		H	M		H							H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

LIST OF LAB EXPERIMENTS:

1. To implement Line, Circle and ellipse Attributes
2. To implement line drawing algorithms DDA line algorithm, Bresenham's line algorithm
3. To perform 2D and 3D transformations
4. To perform animation using any Animation software (Create Frame by Frame Animations using multimedia authoring tools)
5. To perform basic operations on image using any image editing software
6. To develop a presentation for a product using techniques like Guide Layer, masking and onion Skin using authoring tools.
7. To create a Jpeg image that demonstrates the various features of an image editing tool.

BMA501	DISCRETE MATHEMATICS	L	T	P	C

	Total Contact Hours - 60	4	0	0	4
	Prerequisite –Engineering Mathematics-I, Engineering Mathematics-II, Engineering Mathematics-III, Numerical Methods.				
	Course Designed by – Dept. of Mathematics.				

OBJECTIVES

- ❖ Reason Mathematically about basic data types and structures (such as numbers, sets, graphs, and trees) used in computer algorithms and systems.
- ❖ Distinguish rigorous definitions and conclusions from merely plausible ones; synthesize elementary proofs, especially proofs by induction.
- ❖ Model and analyze computational processes using analytic and combinatorial Methods.

COURSE OUTCOMES (COs)

CO1	Understand the theory and techniques of logic, graphs and trees, and algebraic systems.
CO2	Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems.
CO3	Communicate Mathematical Ideas.
CO4	Make effective use of appropriate technology.
CO5	Learn the concept about graphs.
CO6	Understand the concept of Lattices.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	H		H								M
	CO2	H	H		H								
	CO3	H	M		H						M		
	CO4	H	H		H								M
	CO5	M											
	CO6	H			M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
			√						

4	Approval	37th Meeting of Academic Council, May 2015

UNIT-I LOGIC 12

Statements - Truth Tables - Connectives - Normal forms - Properties calculus - Inference theory for statement Calculus and Predicate Calculus.

UNIT-II COMBINATORIES 12

Review of Permutation and Combination - Mathematical Induction - Pigeon hole Principle - Principle of inclusion and exclusion - Generating function -Recurrence relations.

UNIT-III GROUPS 12

Semigroups- Monoids-Groups-Permutation group-Consets-Lagrange's theorem - Group homomorphism- Kernal - Rings and Fields (Definitions and Examples only)

UNIT-IV LATTICES 12

Partial ordering - Posets - Hasse diagram - Lattices - Properties of Lattices - Sub Lattices - Special Lattices - Boolean, Algebra

UNIT-V GRAPHS 12

Introduction of Graphs - Graph terminology - Representation of Graphs - Graph Isomorphism- Connectivity- Euler and Hamilton Paths.

TEXT BOOKS:

1. Tremblay J.P and Manohar R, "Discrete Mathematical Structures with Application to Computer Science", McGraw Hill Book Company, International Edition, 1987, Sections 1 2,1 to 1-2,4; 1-2, 6 to 1-2,14; 1-3,1 to 1-3,5; 1-4,1 to 1-4,3; 1-5,- to 1-5,5:1-6, 4 and 1-6,5 for logic. Section 3:- 1,1 to 3-2, 3; 3-5,1 to 3-5, 5 for Groups Rings and Fields. Sections: 2, 3-8 and 2-3, 9; 4-1, 1 to 4-2, 2 for Lattices.
2. Kenneth H. Rosen, "Discrete Mathematics and its applications", McGraw Hill Book Company 1999, Section 3, 3, 4, 3, 6, 1, 6, 2, 6, 4, 6, 5, 7, 1-7, 5, 8, 1-8, 5

REFERENCE BOOKS:

1. Ralph P., Grimaldi, "Discrete and Combinatorial Mathematics", Pearson Education, Fifth Edition,2008
2. Venkataraman M.K, Discrete Mathematics", The National Publishing Company 2000.
3. Iyengar S. N, Chandrasekaran V. M, Venkatesan K.A. and Arunachalam PS., "Discrete Mathematics", Vikas Publishing House Pvt. Ltd,2003.
4. http://www.cse.iitd.ernet.in/~bagchi/courses/discrete-book/fullbook.pdf

BCS501	**SOFTWARE ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Fundamentals of Computing and Programming, Computer Organization and Architecture.				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

This course is intended to provide the students with an overall view over Software Engineering discipline and with insight into the processes of softwaredevelopment.

COURSE OUTCOMES (COs)

CO1	Outline the features of different lifecycle models.
CO2	Explain the principles involved in gathering and validating software requirements
CO3	Make use of suitable models through analysis of requirements and arrive at an appropriate software design.
CO4	Appreciate the quality assurance procedures during software development
CO5	Explain software project management and software maintenance practices.
CO6	Explain the Concept of Software Testing.

Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low													
1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H	H	H	H	M		M	H	M	H	H
	CO2		H			H							
	CO3			H	H				H	M	H	M	M
	CO4					M							
	CO5	M	M	M	M		M		M	H		H	
	CO6		M	H		H				H	M		H
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Maths (BS)		Engg Sciences (ES)	Professional Core (PC)		Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)	
							√						
4	Approval	37th Meeting of Academic Council, May 2015											

UNIT- I INTRODUCTION 9

Software Engineering Process paradigms - Project management - Process and Project Metrics – software estimation - Empirical estimation models - Planning - Risk analysis - Software project scheduling.

UNIT- II REQUIREMENTS ANALYSIS 9

Requirement Engineering Processes – Feasibility Study – Problem of Requirements – Software Requirement Analysis – Analysis Concepts and Principles – Analysis Process – Analysis Model- Software Prototyping – Selecting the Prototyping Approach – Prototyping Methods and Tools – Specification – Software Requirement Specification – Specification Review.

UNIT- III SOFTWARE DESIGN 9

Software design - Abstraction - Modularity - Software Architecture - Effective modular design - Cohesion and Coupling - Architectural design and Procedural design - Data flow oriented design.

UNIT- IV USER INTERFACE DESIGN AND REAL TIME SYSTEMS 9

User interface design - Human factors - Human computer interaction - Human - Computer Interface design - Interface design - Interface standards. Programming languages and coding - Language classes – Code documentation - Code efficiency - Software Configuration Management.

UNIT- V SOFTWARE QUALITY AND TESTING 9

Software Quality Assurance - Quality metrics - Software Reliability - Software testing - Path testing – Control Structures testing - Black Box testing - Integration, Validation and system testing - Software Maintenance - Reverse Engineering and Re-engineering. CASE tools - projects management, tools - analysis and design tools - programming tools - integration and testing tool - Case studies.

TEXT BOOK:

1. Roger Pressman S., “Software Engineering: A Practitioner's Approach”, 7thEdition, McGraw

Hill, 2010.

REFERENCE BOOKS:

1. I. Sommerville, "Software Engineering", Eighth Edition, Pearson Education, 2007
2. Pfleeger, "Software Engineering-Theory & Practice", 3rd Edition, Pearson Education, 2009
3. Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli, "Fundamentals of Software Engineering", Pearson Education, 2003.
4. http://www.vumultan.com/Books/CS605-Software%20Engineering%20Practitioner%E2%80%99s%20Approach%20%20by%20Roger%20S.%20Pressman%20.pdf

BEC501	**MICROPROCESSOR AND ITS APPLICATIONS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Fundamentals of Computing and Programming, Digital Computer Fundamentals.				
	Course Designed by – Dept. of Electronics and Communication Engineering.				

OBJECTIVES

Become proficient in the functional and technological characteristics of microprocessor architectures.
Understand and write assembly language programs.
Learn about memory components, peripheral support devices and their interface logic.

COURSE OUTCOMES (COs)

CO1	Identify the basic functions of a microprocessor and explain the instruction sets of 8085 and 8086 microprocessors.
CO2	Make use of the instruction set of 8085 microprocessor and develop assembly code to Solve problems.
CO3	Illustrate the use of various general purpose interfacing devices.
CO4	Develop skills to write programs using 8086 processor development tools.
CO5	Compare the architecture of 8085, 8086 and 8051 microcontroller.
CO6	Explain the Concept Assembly Languages.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M		M	M	H							
	CO2		M										
	CO3							M					
	CO4	M				M	L						
	CO5				M								
	CO6	M	L	L									

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT-I INTRODUCTION TO MICROPROCESSOR 9

Evolution of microprocessors-Comparison of many computers with mini and large computers-Advantages and limitations of microprocessors based system design. Architecture and Organization: CPU-Registers-ALU Decoders-Bus system- Tri-state logic-Data Flow-Intel architecture 8085 microprocessor-Function of various block and signals- Organization of a micro-computer-Brief Introduction to Z80, MC 6800 and Intel 8086.

UNIT-III INSTRUCTIONSET 9

The origin of software-program execution - Addressing modes-Instruction format- and classifications - Intel 8085 Instruction set- Stack and subroutine-Instruction-Timing and operation status.

UNIT-III BASIC PATTERNS OF MEMORY SYSTEMS 9

Memory devices: ROM, RAM, EPROM-Interfacing memory sections-Methods of data transfer - Programmed data transfer schemes and DMA method of transfer-8257 programmable DMA controller-Parallel I/O interfacing-Interfacing of ADC and DAC-Intel 8085 I/O-structure.

UNIT-IV INTERRUPT STRUCTURES 9

Need for interrupt structures-Handling of specific sources of interrupts-Software interrupts-hardware interrupt – Multiple interrupt -polling and vectoring-8259 programmable interrupt controller - 8255 programmable peripheral interface-8253/8254 programmable interval timer-Interfacing of 7 segment display.

UNIT-V ASSEMBLY LANGUAGES PROGRAMMING 9

Assembly Language programming-Mnemonics-Assemblers-Simple programs-List of arrays-Arithmetic character manipulation-Flow chart-Subroutines –Debugging-Testing-Typical programs using Intel 8085-Applications to temperature control and speed control of stepper motor-Traffic light control-Microprocessor based data acquisition systems.

TEXT BOOKS:

1. RameshS.Gaonkar, “Microprocessor Architecture, Programming and Applications with the 8085”,6th edition, Penram International Publishing (India) Pvt. Ltd., 2013

REFERENCE BOOKS:

1. A.P.Mathur, “Introduction to Microprocessors”, Third Edition, Tata McGraw Hill,2006
2. Rafiquzzaman, “Microprocessors and Microcomputer Development Systems: Designing Microprocessor-Based Systems”, John Wiley & Sons Inc,2005
3. N.K. Srinath, “8085 Microprocessor: Programming and Interfacing”, PHI Learning, 2010.
4.https://inspirit.net.in/books/academic/8085%20Microprocessor%20-%20Ramesh%20Gaonkar.pdf

BCS502	COMPUTER NETWORKS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Fundamental of Computing and Programming, Internet Programming				
	Course Designed by – Dept. of Computer Science & Engineering				

OBJECTIVES

Computer Networking is the vital part of any organization these days. This course provides a foundation to understand various principles, protocols and design aspects of Computer Networks and also helps to achieve the fundamental purpose of computer networks in the form of providing access to shared resources.

COURSE OUTCOMES (COs)

CO1	Explain data communication system, components and the purpose of layered architecture.
CO2	Illustrate the functionality of each layer of OSI and TCP/IP reference model.
CO3	Explain the data link layer and network layer protocols.
CO4	Outline the functions of transport layer protocols.
CO5	Summarize application layer protocols.
CO6	Learn the Functionalities of Application layer.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	F		H	H	M	L	M	M	M	L	M	S
	CO2			H	H		M		M			M	
	CO3	M		M	H				M				M
	CO4			H	H	H		H		M		M	
	CO5			M	M		M		H		M		
	CO6	L		H	H								M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

4	Approval	37th Meeting of Academic Council, May 2015

UNIT- I INTRODUCTION TO NETWORKS 9

Introduction: The uses of computer networks - Network hardware - Network software - Reference models - Example of networks- Network standardization.

The Physical Layer: The theoretical basis for data communication – Guided Transmission media - Wireless transmission – PSTN - Mobile telephone - Communication satellite.

UNIT- II DATALINK LAYER 9

The Data Link Layer: Data link layer design issues - Error detection and correction - Elementary data link protocols - Sliding window protocols - Example of data link protocols- ETHERNET – 802.11, 802.16, Bluetooth- Data link layer Switching.

UNIT- III NETWORK LAYER 9

The Network layer: Network layer design issues - Routing algorithms - Congestion control algorithms -Approaches to Congestion Control-Traffic-Aware Routing-Admission Control-Traffic Throttling-Load Shedding - Internetworking- Network layer in Internet.

UNIT –IV TRANSPORT LAYER 9

The Transport layer: Transport layer design issues-Addressing,Connection Establishment-Connection Release-Error Control and Flow Control - Transport protocols - Simple transportprotocol - Internet transport protocols UDP, TCP.

UNIT- V APPLICATION LAYER 9

The Application layer: Domain name system - Electronic mail - World wide web-Architectural Overview-Static Web Pages-Dynamic Web Pages and Web Applications-HTTP—The Hypertext Transfer Protocol-The Mobile Web-Web Search – Multimedia – Cryptography, Digital signature- Communication Security.

TEXT BOOKS:

1. Andrew S. Tanenbaum, "Computer Networks", Pearson Education, 5th edition 2010.
2. Behrouz A. Forouzan, "Data and Computer Communications", 4th Edition, McGraw Hill,2007.

REFERENCE BOOKS:

1.WilliamStallings,"Data and Computer Communications",8th Edition, Pearson Education,2006

2. Douglas E. Comer, "Internetworking with TCP/IP, Volume-I", 6th Edition, Pearson Education, 2013.

3.http://tocs.ulb.tu-darmstadt.de/49378155.pdf

BCS5L1	NETWORKING LABORATORY	L	T	P	C
	Total Contact Hours - 30	0	0	3	2
	Prerequisite –Computer Networks				
	Lab Manual Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

The main Objective of this course is student know about Networking Concepts and Protocols.

COURSE OUTCOMES (COs)

CO1	Develop knowledge to implement client server applications.
CO2	Develop skills in UNIX socket programming.
CO3	Develop skills to use simulation tools.
CO4	Analyze the performance of network protocols.
CO5	Analyze the network traffic.
CO6	Establish a Connection using TCP/IP Protocol.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1			H	H	M	L	M	M	M	L	M	S
	CO2			H	H		M		M			M	
	CO3	M		M	H				M				M
	CO4			H	H	H		H		M		M	
	CO5			M	M		M		H		M		

	CO6	L		H	H								M
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)		Core Elective (CE)		Non-Major Elective (NE)		Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√							
4	Approval	37th Meeting of Academic Council, May 2015											

LIST OF EXPERIMENTS:

1. Implement a simple TCP client-server where in a server acts as a time and date server.
2. Print a client address at server end.
3. Write a program in which a process is made to handle posix signals.
4. Program an echo UDP Server.
5. Create a daemon.
6. Create a simple Chat Program.
7. Create a simple out of band Sending and Receiving program.
8. Program to capture each packet and examine its checksum field.

BEC5L2	**MICROPROCESSOR LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	0	0	3	2
	Prerequisite –Microprocessor and its Applications.				
	Lab Manual Designed by – Dept. of Electronics and Communication Engineering.				

OBJECTIVES

The Main objective of this Lab manual is Create the Assembly Language Programming.

COURSE OUTCOMES (COs)

CO1	Make use of the microprocessor trainer kit to execute 8085 programs.
CO2	Develop assembly language program for 8085to solve simple programs.
CO3	Make use of interfacing devices for a specified application.
CO4	Develop simple assembly language program for 8086.
CO5	Develop assembly language program for 8086 using BIOS/DOS Calls
CO6	Develop assembly language Conversion Program BCD to Hexa and Vice Versa.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M		M	M	H							
	CO2		M										
	CO3							M					
	CO4	M		H		M	L						
	CO5				M								
	CO6	M	L	M									

3	Category	Humanities & Social Studies (HSS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

EXPERIMENTS ON 8085:

1. Study of 8085 Microprocessor Simulator
2. 8 bit Addition, Subtraction, Multiplication
3. 16 bit Addition, Subtraction, Multiplication and Division.
4. BCD to Hexa and Hexa to BCD code Conversion.

BCS 5L2	**SOFTWARE ENGINEERING LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	0	0	3	2
	Prerequisite –Software Engineering ,Database Management System				
	Lab Manual Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

The Main objective of this Software Engineering Lab is known about various phases in software development.

COURSE OUTCOMES (COs)

CO1	Analyze the problem and do project planning.
CO2	Identify project scope, objectives, and perform data modeling.
CO3	Identify the deliverables in various phases of SDLC.
CO4	Implement solutions using modern tools.
CO5	Explain test plan, perform validation testing, coverage analysis.
CO6	Testing and Maintenance the applications.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H	H	H	H	M		M	H	M	H	H
	CO2		H			H							
	CO3			H	H				H	M	H	M	M
	CO4					M							
	CO5	M	M	M	M		M		M	H		H	
	CO6		M	H		H				H	M		H

3	Category	Humanities & Social Studies (HSS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

1. Problem Analysis and Project Planning

Thorough study of the problem – Identify project scope, Objectives, infrastructure

2. Software Requirement Analysis

Describe the individual Phases/ modules of the project, Identify deliverables

3. Data Modeling

Use work products – data dictionary, use case diagrams and activity diagrams, build and test lass diagrams, sequence diagrams and add interface to class diagrams.

4. Software Developments and Debugging

5. Software Testing

Prepare test plan, perform validation testing, coverage analysis, memory leaks, develop test case hierarchy, Site check and site monitor.

LIST OF EXPERIMENTS

1. Library System
2. Course Registration System
3. Quiz System
4. Student marks analyzing system
5. Online ticket reservation system
6. Stock maintenance

BCS5C1	**COMPREHENSION I**	**L**	**T**	**P**	**C**
	Total Contact Hours : Test will be conducted at the end of the semester	0	0	0	1
	Prerequisite – All the courses up to fifth semester				
	Course Designed by – Dept. of Computer Science and Engineering				
OBJECTIVES					
• To provide a complete review of Computer Science and Engineeringtopics covered up to fifth semesters, so that a comprehensive understanding is achieved. • It will also help students to face job interviews, competitive examinations and also to enhance the employment potential. • To provide overview of all topics covered and to assess the overall knowledge level up to fifth semester.					

BCS601	**DATA WAREHOUSING AND DATA MINING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Data Structures, Design and Analysis of Algorithm.				
	CourseDesigned by – Dept. of Computer Science and Engineering.				
OBJECTIVES • Dramatic advances in data capture, processing power, data transmission, and storage capabilities are enabling organizations to integrate their various databases into data warehouses. • Data mining is primarily used by the companies with a strong consumer focus. It enables these					

companies to determine the factors such as price, product positioning, or staff skills, and economic indicators, competition, and customer demographics.	
COURSE OUTCOMES (COs)	
CO1	Provide efficient distribution of information and easy access to data.
CO2	Create user friendly reporting environment.
CO3	Find the unseen pattern in large volume of historical data that helps to manage an organization efficiently.
CO4	Understand the concepts of various data mining Techniques.
CO5	Explain the Architecture of Data warehousing.
CO6	Understand the concept of Web Mining.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	M	H		H							H
	CO2	M		H			M						H
	CO3			H	M	H				H		H	H
	CO4	M	M	H		H	M						H
	CO5					H							M
	CO6					M				M		H	H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT- I DATAWAREHOUSE 9

Data Warehouse Roles and Structures – What is a Data Warehouse? – Multi Dimensional Data Model- Data Stores, Warehouses and Marts - The Data Warehouse Environment – Data Warehouse Characteristics - The Data Warehouse Architecture – Meta Data, Metadata Extraction - Implementing the Data Warehouse - OLAP Engine - Data Warehouse Backend Process – Data Warehouse Project Success Factors.

UNIT- II INTRODUCTION TO DATA MINING 9

Basic Data Mining Tasks, Data Mining versus Knowledge Discovery in Data Bases, Data Mining Issues, Data Mining Metrics. Social Implications of Data Mining.Data Mining from a Database Perspective.

Data Mining Techniques - Introduction – A Statistical Perspective on Data Mining – Similarity Measures – Decision Trees – Neural Networks – Genetic Algorithms.

UNIT-III CLASSIFICATION 9

Introduction - Statistical Based Algorithms- Distance Based Algorithms – Decision Tree Based Algorithms - Neural Networks Based Algorithms – Rule Based Algorithms – Combining Techniques.

UNIT IV ASSOCIATION RULES 9

Introduction-Large Itemsets- - Methods to Discover Association Rules - Apriori Algorithm - Partition Algorithm.

Clustering Techniques

Introduction – Outliers – Clustering Paradigms –Hierarchical Algorithms, Partitional Algorithms - Clustering Large Databases.

UNIT-V WEB MINING 9

Introduction-Web Mining – Web Content Mining –Crawlers,Harvest System,Virtual Web View - Web Structure Mining –Page Rank, Web Usage Mining-Preprocessing, Data structures, Pattern Discovery and Pattern Analysis.

TEXT BOOKS

1. ArunK.Pujari.,"Data Mining Techniques", Universities Press,2013.
2. Margaret H. Dunham ,S.Sridhar, "Data Mining Introductory and Advanced Topics", Pearson Education,2006.
3. K.P.Soman,ShyamDiwakar,V.Ajay,"*Data Mining*: *Theory And Practice" ,* PHI Learning Pvt. Ltd., 2006.

REFERENCE BOOKS

1. "Express Learning - Data Warehousing and Data Mining", ITL ESL,Pearson Education, 2012.
2. N.Venkatesan,S.Prabhu,"Data Mining and WareHousing", New Age International (P) Limited, 2010.
3. George M. Marakas, "Modern Data Warehousing, Mining and Visualization: Core concepts", Pearson Education,2003.
4.http://www.essi.upc.edu/~aabello/publications/11.IGIBook1.pdf

BSS601	**VALUE EDUCATION AND PROFESSIONAL ETHICS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Nil				
	Course Designed by – Dept. of Management Studies				

OBJECTIVES

- To teach the philosophy of Life, personal value, social value, mind cultural value and personal health.
- To teach professional ethical values, codes of ethics, responsibilities, safety, rights and related global issues.

COURSE OUTCOMES (COs)

CO1	To learn about philosophy of Life and Individual qualities
CO2	To learn and practice social values and responsibilities
CO3	To learn and practice mind culture, forces acting on the body and causes of diseases and their

	curing
CO4	To learn more of Engineer as Responsible Experimenter.
CO5	To learn more of Risk and Safety assessment with case studies.
CO6	To learn more of Responsibilities and Rights as Professional and facing Global Challenges

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1			M		H		M	H	M	L	L	M
	CO2			M		H		M	H	M	L	L	M
	CO3			M		H		M	H	M	L	L	M
	CO4			H		H		M	H	M	L	L	M
	CO5			H		H		M	H	M	L	L	M
	CO6			H		H		M	H	M	L	L	M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
		√							

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I PHILOSOPHY OF LIFE AND INDIVIDUAL QUALITIES 9

Human Life on Earth - Purpose of Life, Meaning and Philosophy of Life. The Law of Nature – Protecting Nature /Universe. Basic Culture - Thought Analysis - Regulating desire - Guarding against anger - To get rid of Anxiety – The Rewards of Blessing - Benevolence of Friendship - Love and Charity - Self – tranquility/Peace

UNIT II SOCIAL VALUES (INDIVIDUAL AND SOCIAL WELFARE) 9

Family - Peace in Family, Society, The Law of Life Brotherhood - The Pride of Womanhood – Five responsibilities/duties of Man : - a) to himself, b) to his family, c) to his environment, d) to his society, e) to the Universe in his lives, Thriftness (Thrift)/Economics. Health - Education - Governance - People's Responsibility / duties of the community, World peace.

UNIT III MIND CULTURE & TENDING PERSONAL HEALTH 9

Mind Culture - Life and Mind - Bio - magnetism, Universal Magnetism (God –Realization and Self Realization) - Genetic Centre – Thought Action – Short term Memory – Expansiveness – Thought – Waves, Channelizing the Mind, Stages - Meditation, Spiritual Value. Structure of the body - the three forces of the body- life body relation, natural causes and unnatural causes for diseases, Methods in Curing diseases

UNIT IV ENGINEERING AS SOCIAL EXPERIMENTATION AND ENGINEERS'SRESPONSIBILITIES FOR SAFETY 9

Engineering as Experimentation – Engineer as Responsible Experimenters – Codes of Ethics – The Challenger, case study. Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – The Three Mile Island and Chernobyl case studies.

UNIT V ENGINEERS'S RESPONSIBILITIES FOR RIGHTS AND GLOBAL ISSUES 9

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Whistle Blowing – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development –Engineers as Managers – Consulting Engineers – Engineers as Expert Eye Witnesses and Advisors – Moral Leadership.

TEXT BOOKS:

1. Value Education for Health, Happiness and Harmony, The World Community Service, Centre Vethathiri Publications (Unit 1 – III).
2. Mike W Martin and Roland Schinzinger, Ethics In Engineering, Tata Mcgraw Hill, Newyork 2005 (Units IV & V)

REFERENCES:

1. Philosophy of Universal Magnetism (Bio - magnetism, Universal Magnetism) The World Community Service Centre Vethathiri Publications (for Unit III)
2. Thirukkural with English Translation of Rev. Dr. G.U. Pope, Uma Publication, 156, Serfoji Nagar, Medical College Road,Thanjavur 613 004 (for Units I - III)
3. R S Nagaarazan, Textbook On Professional Ethics And Human Values, New Age International Publishers, 2006 (for Units IV-V)
4. Charles D Fledderman, Engineering Ethics, Prentice Hall, New Mexico, 2004(for Units IV-V)

BCS602	**DISTRIBUTED COMPUTING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Fundamentals of Computing and Programming, Internet Programming, Computer Networks.				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

- The differences among: concurrent, networked, distributed, and mobile.
- Resource allocation and deadlock detection and avoidance techniques.
- Distributed Transaction Processing system
- Cryptography and Domain Name system.

COURSE OUTCOMES (COs)

CO1	Explain the distributed environment.
CO2	Explain the functionalities of file management system.
CO3	Organize processes in distributed systems.
CO4	Demonstrate the access of remote objects for the service.
CO5	Explain the Concept of Domain Name Distributed Locks.
CO6	Explain the Concept of Distributed Transaction Processing

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1		H	M	M	M						H	
	CO2			H					M	M			H
	CO3	M											
	CO4		M	M								H	
	CO5				M	M							M
	CO6	M	M	H					M			M	

3	Category	Humanities & Social Studies	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT- I INTRODUCTION 9

Characterization of Distributed Systems – Examples – Resource Sharing and the Web – Challenges – System Models – Architectural and Fundamental Models – Networking and Internetworking – Types of Networks – Network Principles – Internet Protocols – Case Studies.

UNIT –II PROCESSES AND DISTRIBUTED OBJECTS 9

Inter–process Communication – The API for the Internet Protocols – External Data Representation and Marshalling – Client –Server Communication – Group Communication – Case Study – Distributed Objects and Remote Invocation – Communication Between Distributed Objects – Remote Procedure Call – Events and Notifications – Java RMI – Case Study.

UNIT- III OPERATING SYSTEM ISSUES 9

The OS Layer – Protection – Processes and Threads – Communication and Invocation – OS Architecture – Security – Overview – Cryptographic Algorithms – Digital Signatures – Cryptography Pragmatics – Case Studies – Distributed File Systems – File Service Architecture – Sun Network File System – The Andrew File System.

UNIT- IV DOMAIN NAME SYSTEM AND LOCKS 9

Name Services – Domain Name System – Directory and Discovery Services – Global Name Service – X.500 Directory Service – Clocks – Events and Process States – Synchronizing Physical Clocks – Logical Time And Logical Clocks – Global States – Distributed Debugging – Distributed Mutual Exclusion – Elections – Multicast Communication Related Problems.

UNIT –V DISTRIBUTED TRANSACTION PROCESSING 9

Transactions – Nested Transactions – Locks – Optimistic Concurrency Control – Timestamp Ordering – Comparison – Flat and Nested Distributed Transactions – Atomic Commit Protocols – Concurrency Control in Distributed Transactions – Distributed Deadlocks – Transaction Recovery – Overview of Replication And Distributed Multimedia Systems.

TEXT BOOKS

1. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", 3rd Edition, Pearson Education, 2002.

2. Andrew S. Tanenbaum, Maartenvan Steen, Distributed Systems, “Principles and Pardigms”, Pearson Education, 2002.

REFERENCES

1.SapeMullender, “Distributed Systems”, 2nd Edition, Addison Wesley, 1993.
2.Albert Fleishman, Distributes Systems, “Software Design and Implementation”, Springer, Verlag, 1994.
3.M. L. Liu, “Distributed Computing Principles and Applications”, Pearson Education, 2004.
4.MugeshSinghal, Niranjan ,GShivaratri, “Advanced Concepts in Operating Systems”, Tata McGraw Hill Edition, 2001.
5. http://read.pudn.com/downloads119/ebook/506473/Distributed%20Computing%20Principles,%20 Algorithms,%20and%20Systems%20-%20[Cambridge%20University %20Press].pdf

BCS603	PRINCIPLES OF COMPILER DESIGN	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Data Structures, Discrete Mathematics.				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

The purpose of this course is to impart concepts of Compiler Design.

COURSE OUTCOMES (COs)

CO1	Explain various phases of a compiler.
CO2	Design token recognizer using modern tools.
CO3	Design Top-down and Bottom-up parsing Techniques.
CO4	Translate given input to intermediate code.
CO5	Identify various types of optimizations on intermediate code and generate assembly code.
CO6	Explain the concept Code generation.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	F	H		H								H
	CO2	H	H	H	H								
	CO3	M	H	H	M								
	CO4	H	H	H	H								M
	CO5	L	H	H	H								
	CO6			M	M								M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship

					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT – I INTRODUCTION 9

Compilers: Introduction-Language Processing System –Analysis of the source program –Cousins of compiler-Grouping of phases-Compiler construction tools-computer language representation-Introduction-Elements of a Formal Language Grammar-Derivation-Reduction - Parse Trees.

UNIT – II LEXICAL ANALYZER 9

Role of a Lexical Analyzer-Issues in Lexical Analysis-Tokens, Patterns and lexemes –Attributes for Tokens- Error recovery-Specification and Recognition of tokens-finite Automata-Non Deterministic Automata-Deterministic Finite Automata-Conversion of an NFA into a DFA-Regular Expression to an NFA-Regular Expression to a DFA-Minimizing the number of states of a DFA-Use of a tool for Generating Lexical Analyzer.

UNIT – III SYNTAX ANALZER 9

Role of Parser-Error Recovery strategies-Context Free Grammar-Top down Parsing-Recursive descent parser-Predictive parser-Bottom Up Parsing-Stack implementation of shift reduce parsing-Operator precedence parsing-precedence Functions- LR Parser- Parser generator.

UNIT – IV INTERMEDIATE CODE GENERATION 9

Intermediate Languages-Intermediate Representations-Implementation of three address statements-Declaration-Declarations in procedure-Declarations in Nested procedures-Assignment Statements-Boolean expressions-Numerical Representation-Control flow translation of Boolean expressions- Flow Control statements-Back Patching.

UNIT – V CODE GENERATION 9

Introduction to Optimization Techniques –The principle sources of optimization- Issues in the Design of a Code generator- Run Time Storage Management –Static allocation-Stack allocation-Design of a Simple code generator

TEXT BOOK

1. A. V. Aho, Ravi Sethi, J.D. Ullman, “Compilers: Principles, Techniques & Tools”, Pearson Education, Second Edition. 2008.

REFERENCES

1. Allen I. Holub, “Compiler Design in C”, PHI Learning. 2009
2. Fisher Leblanc, “Crafting a Compiler with C”, Pearson Education.
3. Jean. Paul Trembley& Paul G. Sorenson, “Compiler Writing – Theory and Practice”, B.S. Publications, 2005.
4.http://dcs.uni-pannon.hu/heckl/web/digszam/Addison%20Wesley%20-%20Aho,%20Sethi,%20Ullman%20Compilers%20Principles,%20Techinques,%20And%20Tools.pdf

BCS6L1	DATA WAREHOUSING AND DATA MINING LABORATORY	L	T	P	C
	Total Contact Hours - 30	0	0	3	2
	Prerequisite –Data ware Housing and Data mining				

	Lab Manual Designed by – Dept. of Computer Science and Engineering.

OBJECTIVES

Data mining is primarily used by the companies with a strong consumer focus. It enables these companies to determine the factors such as price, product positioning, or staff skills, and economic indicators, competition, and customer demographics

COURSE OUTCOMES (COs)

CO1	Provide efficient distribution of information and easy access to data
CO2	Create user friendly reporting environment.
CO3	Find the unseen pattern in large volume of historical data that helps to manage an organization efficiently.
CO4	Understand the concepts of various data mining Techniques.
CO5	Understand the concepts of Preprocessing.
CO6	Explain the concept of Data mining.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	M	H		H							H
	CO2	M		H			M						H
	CO3			H	M	H				H		H	H
	CO4	M	M	H		H	M						H
	CO5					H							M
	CO6					M				M		H	H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

LIST OF EXPERIMENTS:

1. Listing applications for mining
2. File format for data mining
3. conversion of various data files
4. Training the given dataset for an application
5. Testing the given dataset for an application
6. Generating accurate models
7. Data pre-processing – data filters
8. Feature selection
9. Web mining
10. Text mining
11. Design of fact & dimension tables
12. Generating graphs for star schema.

BCS6L2	C# AND .NET LABORATORY	L	T	P	C
	Total Contact Hours - 30	0	0	3	2
	Prerequisite –Object Oriented Programming using C++,Java Programming				
	Lab Manual Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

The main Objective of this course is student know about windows, Web and Console Applications.

COURSE OUTCOMES (COs)

CO1	Display proficiency in C# by building stand-alone applications in the .NET framework using C#.
CO2	Create distributed data-driven applications using the .NET Framework, C#, SQL Server and ADO.NET
CO3	Create web-based distributed applications using C#, ASP.NET, SQL Server and ADO.NET
CO4	Utilize DirectX libraries in the .NET environment to implement 2D and 3D animations and game-related graphic displays and audio.
CO5	Utilize XML in the .NET environment to create Web Service-based applications and components.
CO6	Understand the concept of Web Applications.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1		H	H		H			H			H	
	CO2		H	H		H			H			H	
	CO3		H	H		H			H			H	
	CO4		H	H		H			H			H	
	CO5		M									M	
	CO6			H		M			M			H	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

LIST OF EXPERIMENTS

1. Classes and objects
2. Inheritance
3. Operator overloading
4. Threading
5. Events and delegates
6. Working with windows forms controls
7. Validating data

8. Creating custom dialog box
9. Designing an MDI application with menu
10. Retrieving data from a SQL database
11. Manipulating data in a connected environment
12. Manipulating data in a disconnected environment

BCS6L3	PROGRAMMING IN JAVA LABORATORY	L	T	P	C
	Total Contact Hours - 30	0	0	3	2
	Prerequisite –Fundamentals of Computing and Programming, Object Oriented Programming Using C++				
	Lab Manual Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

The Main objective of this Lab manual is Develop CUI and GUI application using Java Programming.

COURSE OUTCOMES (COs)

CO1	Identify classes, objects, members of a class and the relationships among them for a Specific problem.
CO2	Develop programs using appropriate packages for Inter –thread Communication and Synchronization.
CO3	Develop GUI applications to handle events.
CO4	Develop client server based applications.
CO5	Design, develop, test and debug Java programs using object-oriented principles in Conjunction with development tools including integrated development environments.
CO6	Develop Applets Programs.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1		H	H	H	H				H		H	M
	CO2												
	CO3	M	M	H	H	H			M		M	H	
	CO4									H			H
	CO5		H	H	M								
	CO6	L	H	M		M			H	M		M	M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

JAVA PROGRAMS USING FOLLOWING CONCEPTS

1. Classes& Objects.
2. Constructors & Destructors.
3. Methods Overloading.
4. Inheritance.
5. Interface.
6. Multithreading.
7. Package.
8. Creating Java Applets.

BCS701	**GRID AND CLOUD COMPUTING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Computer Networks, Distributed Computing, Data ware Housing and Data Mining.				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

- Identify the technical foundations of cloud systems architectures.
- Analyze the problems and solutions to cloud application problems.
- Apply principles of best practice in cloud application design and management.
- Identify and define technical challenges for cloud applications and assess their importance.

COURSE OUTCOMES (COs)

CO1	Understand the fundamental principles of distributed computing.
CO2	Understand how the distributed computing environments known as Grids can be built from lower level services.
CO3	Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.
CO4	Analyze the performance of Cloud Computing.
CO5	Understand the concept of Cloud Security.
CO6	Learn the Concept of Cloud Infrastructure Model.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1		H	M	M	M						H	
	CO2			H					M	M			H
	CO3	M											
	CO4		M	M								H	
	CO5				M	M							M
	CO6	M	M	H					M			M	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT- I GRID COMPUTING 9

Introduction - Definition and Scope of grid computing, Computational and Data Grids, Current Grid Activities – Overview of Grid Business Areas, Grid Applications, Grid Computing Anatomy- Concept of Virtual Organization, Grid Architecture- Fabric layer, Connectivity layer, Resource Layer, Collective Layer, Application Layer, Layered Grid Architecture

UNIT-II CLOUD ARCHITECTURE AND MODEL 9

Technologies for Network Based system-System Models for Distributed and Cloud Computing-NIST Cloud Computing Reference Architecture Cloud models: Characteristics-Cloud Services-Cloud Models (IaaS, PaaS, SaaS)-Public vs. Private Cloud-Cloud Solutions-Cloud ecosystem-Service Management-Computing on demand.

UNIT-III CLOUD INFRASTRUCTURE 9

Architectural Design of compute and Storage Clouds-Layered Cloud Architecture Development-Design Challenges-Inter Cloud Resource Management-Resource Provisioning and Platform Deployment-Global Exchange of Cloud Resources.

UNIT-IV PROGRAMMING MODEL 9

Parallel and Distributed Programming Paradigms-Map Reduce-Twister and Iterative Map Reduce-Hadoop Library from Apache-Mapping Applications-Programming Support-Google App Engine, Amazon AWS-Cloud Software Environments-Eucalyptus, Open Nebula, Open Stack, Aneka, CloudSim.

UNIT-V SECURITY IN THE CLOUD 9

Security Overview-Cloud Security Challenges and Risks-Software-as-a-Service-Security Security Governance-Risk Management-Security Monitoring-Security Architecture Design-Data Security-Application Security-Virtual Machine Security-Identity Management and Access Control-Autonomic Security.

TEXTBOOKS:

1. Joshy Joseph & Craig Fellenstein, “Grid Computing”, PHI, PTR-2003(UNIT I)
2. Kai Hwang, Geoffrey C Fox,Jack G Dongarra “Distributed and Cloud Computing ,From parallel processing to the Internet of Things” Morgan Kaufmann Publishers,2012(Unit-II to Unit-V)

REFERENCE BOOKS:

1. John W.Rittinghouse and James F.Ransome, “Cloud Computing Implementation, Management and Security”, CRC Press, 2010
2. Toby Velte, Anthony Velte, Robert Elsenpeter,”Cloud Computing, A Practical Approach”, TMH, 2009.
3. Kumar Saurabh,”Cloud Computing –Insights into New-Era Infrastructure “, Wiley India, 2011
4. George Reese, “Cloud Applications Architectures: Building Applications and Infrastructure in the Cloud” O’Reilly.
5. https://benzology.files.wordpress.com/2013/05/grid-computing-joshy-joseph-ebook.pdf

6.http://cloudipedia.com/files/2009/11/cloud_computing_made_easy.pdf

BCS702	MOBILE AND PERVASIVE COMPUTING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Computer Networks, Distributed Computing, Data ware Housing and Data Mining.				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

This course discuss about knowledge and skills about a new trend in mobile Computing.

COURSE OUTCOMES (COs)

CO1	Explain the concepts and features of mobile networks.
CO2	Explain the working of wireless communication protocols.
CO3	Compare the routing protocols of mobile networks.
CO4	Explain the transport and application layer protocols of mobile networks.
CO5	Outline the basics of pervasive computing.
CO6	Learn the Concept of GSM,GPRS.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M		H									M
	CO2	M		H									
	CO3			H					M				
	CO4			H									M
	CO5	M		M									
	CO6								M				

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT I MOBILE NETWORKS 9

Cellular Wireless Networks–GSM–Architecture–Protocols–connection establishment–FrequencyAllocation–Routing–Mobility Management–Security–GPRS.

UNIT II WIRELESS NETWORKS 9

Wireless LANs and PANs–IEEE 802.11 Standard–Architecture–Services–Network–HiperLAN–BlueTooth-Wi-Fi–WiMAX.

UNIT III ROUTING 9

Mobile IP–DHCP–AdHoc– Proactive and Reactive Routing Protocols–MulticastRouting.

UNIT IV TRANSPORT AND APPLICATION LAYERS 9

Mobile TCP–WAP–Architecture–WWW Programming Model–WDP –WTLS–WTP–WSP–WAE–WTAArchitecture–WML–WMLScripts.

UNIT V PERVASIVE COMPUTING 9

Pervasive computing infrastructure applications- Device Technology - Hardware, Human machineInterfaces, Biometrics, and Operating systems– Device Connectivity–Protocols, Security, and DeviceManagement-pervasive Web Application architectureAccess from PCs and PDAs - Access via WAP.

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", PHI, Second Edition, 2003.
2. Jochen Burkhardt, Pervasive Computing: Technology and Architecture of MobileInternet Ap plications, Addison Wesley Professional; 3rd edition 2007.

REFERENCES:

1.Frank Adelstein, Sandeep KS Gupta, Golden Richard, Fundamentals of Mobile andPervasive C omputing, McGraw-Hill 2005

2. Debashis Saha, Networking Infrastructure for Pervasive Computing: EnablingTechnologies, Kluwer Academic Publisher, Springer; 1st edition, 2002

3. Introduction to Wireless and Mobile Systems by Agrawal and Zeng, Brooks/ Cole(Thomson Learning),1st edition, 2002

4.Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, Principlesof Mobile Computing, Springer, New York, 2003.

5.http://media.techtarget.com/searchMobileComputing/downloads/Mobile_and_pervasive_comp uting_Ch06.pdf

BCS 703	**WEB TECHNOLOGY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Computer Networks, Distributed Computing, Internet Programming				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

This course discuss about various concepts using to develop web programming.

COURSE OUTCOMES (COs)

CO1	To understand the concepts of common gateway interface (CGI) programming.
CO2	To Learn about socket program.
CO3	Implementation of on-line applications.
CO4	Explain About Server Side Programming.
CO5	To Learn about XML Concepts.
CO6	Learn the Concept of Socket Programming.

Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low													
1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1			H									
	CO2	M		H		M							M
	CO3			H									
	CO4			H									M
	CO5	M				H							
	CO6	L		M		M							M
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Maths (BS)		Engg Sciences (ES)	Professional Core (PC)		Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)	
							√						
4	Approval	37th Meeting of Academic Council, May 2015											

UNIT- I INTRODUCTION 9

Internet principles – Basic Web concepts – Client/Server model – Retrieving data from Internet – HTML and Scripting Languages – Standard Generalized Markup language-Next Generation Internet - Protocols and applications.

UNIT- II COMMON GATEWAY INTERFACE PROGRAMMING 9

HTML forms – CGI concepts – HTML tags Emulation – Server-Browser communication – Different Types of Browsers- E-mail generation – CGI client side Applets – CGI Server side Applets – Authorization and Security.

UNIT- III SOCKET PROGRAMMING 9

Streaming – Networking Principles – Sockets – Protocols handlers – Content handlers – Multicasting – Remote method invocation.-Activation-Serialization-Marshal streams.

UNIT- IV SERVER SIDE PROGRAMMING 9

Dynamic Web content – Cascading Style Sheets, XML – Structuring Data-VRML-Server side includes- communication – Active and Java Server Pages.-Firewalls-Proxy Servers-XML with HTML.

UNIT –V ON-LINE APPLICATIONS 9

Simple applications – On-line Databases – Monitoring user events – Plugins – Database Connectivity-Internet information Systems-EDI application in business-Internet commerce-Customization of Internet commerce.

TEXT BOOKS:

1. Paul Deitel, "Internet & World Wide Web: How to Program", Prentice Hall, 4th Edition, 2007.
2. E-Business and E-Commerce Management : S: Strategy, Implementation and Practice by Dave Chaffey, Pearson Education,2013.

REFERENCE BOOKS:

1. Jeff Frantzen and Sobotka, "Java Script", Tata McGraw Hill, 2002.
2. Eric Ladd, Jim O'Donnell, "Using HTML 4, XML and JAVA", Prentice Hall of India – QUE, 1999.
3. N.P.Gopalan&J.Akilandeswari, "Web Technology: A Developer's Perspective", PHI Learning,2008.
4. http://www.icrar.org/__data/assets/pdf_file/0010/1439686/Web-Technology.pdf

BCS704	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS	L	T	P	C
	Total Contact Hours - 45	4	0	0	4
	Prerequisite –Data Structures, Design and Analysis of Algorithm.				
	CourseDesigned by – Dept. of Computer Science and Engineering.				

OBJECTIVES

The purpose of this course is to impart concepts of Artificial Intelligence and Expert System.

COURSE OUTCOMES (COs)

CO1	Describe the modern view of AI as the study of agents that receive percepts from the Environment and perform actions.
CO2	Demonstrate awareness of informed search and exploration Methods.
CO3	Explain about AI techniques for knowledge representation, planning and uncertainty Management.
CO4	Develop knowledge of decision making and learning Methods.
CO5	Describe the use of AI to solve English Communication problems.
CO6	Explain the concept Knowledge Representation.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1		H		H								
	CO2	M			H		M						M
	CO3				H		M	M					
	CO4		M		H								M
	CO5	M			H		H						
	CO6	L	M		M		M						H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

UNIT- I PROBLEMS AND SEARCH 12

What is artificial intelligence? - Problems, problem spaces and search – Searching strategies- Uninformed Search- breadth first search, depth first search, uniform cost seart, depth limited search, iterative deepening search, bidirectional search - Informed Search- Best first search ,Greedy Best first search , A* search – Constraint satisfaction problem , Local searching strategies.

UNIT- II REASONING 12

Symbolic Reasoning Under Uncertainty- Statistical Reasoning - Weak Slot-And-Filler-Structure - Semantic nets – Frames- Strong Slot-And-Filler Structure-Conceptual Dependency-Scripts-CYC.

UNIT- III KNOWLEDGE REPRESENTATION 12

Knowledge Representation - Knowledge representation issues - Using predicate logic - Representing Knowledge Using Rules. Syntactic- Semantic of Representation – Logic & slot and filler - Game Playing – Minimal search- Alpha beta cutoffs –Iteratic deepening planning – component of planning system – Goal stack planning.

UNIT- IV NATURAL LANGUAGE PROCESSING 12

Natural Language Processing –Syntactic processing, semantic analysis-Parallel and Distributed AI-Psychological modeling- parallelism and distributed in reasoning systems – Learning - Connectionist Models – Hopfield networks, neural networks

UNIT- V EXPERT SYSTEMS 12

Common Sense –qualitative physics, commonsense ontologies- memory organization -Expert systems –Expert system shells- explanation – Knowledge acquisition -Perception and Action – Real time search- robot architecture.

TEXT BOOKS

1. Elaine Rich, Kevin Knight, "Artificial Intelligence", 3/e, Tata McGraw Hill, 2009.
2. Russell , " Artificial intelligence :A modern Approach , Pearson Education ,3rd edition,2013

REFERENCE BOOKS

1.Artificial Intelligence and Expert system by V.Daniel hunt, Springer press,2011.
2. Nilsson N.J., "Principles of Artificial Intelligence", Morgan Kaufmann.1998.
3**.** http://www.ggu.ac.in/download/Class-Note13/Artificial%20Intelligence%20and%20Expert%20System24.10.13.pdf

BCS7L1	GRID AND CLOUD COMPUTING LABORATORY	L	T	P	C
	Total Contact Hours - 30	0	0	3	2
	Prerequisite –Distributed Computing, Operating Systems, Grid and Cloud Computing.				
	Lab Manual Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

Be exposed to tool kits for grid and cloud environment.

- Be familiar with developing web services/Applications in grid framework
- Learn to run virtual machines of different configuration.

COURSE OUTCOMES (COs)

CO1	Use the grid and cloud tool kits.
CO2	Design and implement applications on the Grid.
CO3	Design and Implement applications on the Cloud.
CO4	Connect Multiple System Using Zonal Server and JVishwa
CO5	Implement the Theorem using Naive Bayes Approach.
CO6	Implement the Virtual Machine.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1		H	M	M	M						H	
	CO2			H					M	M			H
	CO3	M											
	CO4		M	M								H	
	CO5				M	M							M
	CO6	M	M	H					M			M	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

LIST OF EXPERIMENTS

1. Connecting Zonal Server with JVishwa.
2. Find the Prime Number for largest interval using Grid Computing.
3. Calculate the Matrix multiplication using Grid Computing.
4. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time Find the missing dataset using hadoop and map reduce.
5. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine Classification using Naïve bayes approach.
6. Install a C++ compiler in the virtual machine and execute a sample program.
7. Show the virtual machine migration based on the certain condition from one node to the other.
8. Find procedure to install storage controller and interact with it.
9. Write a word count program to demonstrate the use of Map and Reduce tasks.

BCS7L2	WEB TECHNOLOGYLABORATORY	L	T	P	C
	Total Contact Hours - 30	0	0	3	2

	Prerequisite –Internet Programming ,Fundamental of Computing and Programming
	Lab Manual Designed by – Dept. of Computer Science and Engineering.

OBJECTIVES

Demonstrate the role of languages like HTML, DHTML, CSS, XML, Javascript, ASP and protocols in the workings of the web and web applications.

COURSE OUTCOMES (COs)

CO1	Develop web pages using HTML, DHTML and Cascading Styles sheets
CO2	Develop web pages using HTML, DHTML and Cascading Styles sheets.
CO3	Develop a dynamic web pages using JavaScript (client side programming).
CO4	Develop an interactive web applications using ASP.NET.
CO5	Build and consume web services.
CO6	Develop a Program using XML.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1			H									
	CO2	M		H		M							M
	CO3			H									
	CO4			H									M
	CO5	M				H							
	CO6	L		M		M							M

3	Category	Humanities & Social Studies	Basic Sciences &Maths	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
					√				

4	Approval	37th Meeting of Academic Council, May 2015

LIST OF EXPERIMENTS

1. Create a HTML page, which has properly aligned paragraphs with image along with it.
2. Write a program to display list of items in different styles.
3. Create both client side and server side image maps.
4. Create your own style sheets and use them in your web page.,
5. Create a form with various fields and appropriate front and validations using any one of the scripting languages.
6. Write a program to store the form fields in a database, use any appropriate Server Slide Scripting.
7. Create a web page using XML.
8. Write a program to connect a XML web page to any database engine.

BCS7P1	TERM PAPAER	L	T	P	C
	Total Contact Hours - 60	0	0	4	2
	Prerequisite –Mini Project				
	Lab Manual Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

To teach the student the procedures and methodologies for understanding the literature survey and preparation for research paper.

COURSE OUTCOMES (COs)

CO1	To identify the area of research.
CO2	To prepare list of literatures in the relevant area.
CO3	Compile the abstract from the literatures.
CO4	Focus the search to a well-defined theme and title.
CO5	Make and exhaustive report by compiling all the literatures that student surveyed.
CO6	To prepare a research paper for publications in journal/conference proceedings.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	H	H	H	M	M	M	H	H		M	H
	CO2		H	H	H	H			H	H			H
	CO3		H	M	H	M			H	H		M	H
	CO4	M	M	M	H	M	H	L	H	H			M
	CO5		H		H	M			M	M		H	H
	CO6	M	M	H	H	H	M	M	H	H		M	M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship
									√
4	Approval	37th Meeting of Academic Council, May 2015							

LIST OF TASKS

1. **PREPARING PROPOSAL**
   Proposed Research Topic
   Purposes
   Background
   Method: (suggested Methods – develop your own to suit your research topic)

2. **CONDUCTING LITERATURE REVIEW**
   Exploring and Sharpening your Topic
   Evaluating Information

Taking Notes and Keeping Records

3. **COMPLETING ANNOTATED BIBLIOGRAPHY**
   Citing Your Sources and Avoiding Plagiarism
   Writing and Annotated Bibliography

4. **IDENTIFYING PROBLEM STATEMENT**
   Meeting the Challenges of Research
   Developing New Information

5. **COMPLETING OUTLINE FOR THE RESEARCH**
   Organizing Your Project into an outline
   Pick up your critique paper and begin editing and incorporate the suggestions from guide

6. **SUBMITTING FIRST DRAFT**
   Drafting your Project
   Entering Conversations and Supporting Your Claims

7. **SUBMITTING WORKS CITED**
   Create the individual citations
   Apply the formatting rules

8. **SUBMITTING FULL PAPER**
   Revising, Editing, and Proofreading
   Designing and Presenting Your Project
   Conducting Research in the Disciplines
   Documenting Sources

REFERENCES:

1. Website.
2. Printed Journals.

BCS8C1	**COMPREHENSION II**	**L**	**T**	**P**	**C**
	Total Contact Hours : Test will be conducted at the end of the semester	0	0	0	1
	Prerequisite – All the courses upto eighth semester				
	Course Designed by – Dept. of Computer Science &Engineering				

OBJECTIVES

- To provide a complete review of Computer Science &Engineering topics covered up to eighth semesters, so that a comprehensive understanding is achieved.
- It will also help students to face job interviews, competitive examinations and also to enhance the employment potential.
- To provide overview of all topics covered and to assess the overall knowledge level up to eighth semester.

BCS8P1	PROJECT WORK	L	T	P	C
	Total Contact Hours –18 hours per week	0	0	18	9
	Prerequisite –Term paper				
	Course Designed by – Dept. of Computer Science &Engineering.				

OBJECTIVES

- Learn to work as a member of a project team.
- Understand project management tasks.
- Develop a hardware / software solution for a real-time, industry relevant problem.

COURSE OUTCOMES (COs)

CO1	Apply knowledge of basic science and engineering to Computer Science &Engineering problems
CO2	Implement the simple applications and verify using modern simulation tools.
CO3	Identify, formulate, and model engineering equipment
CO4	Recognize the real world applications and to solve with core engineering knowledge.
CO5	Analyze and work on multidisciplinary tasks
CO6	Choose latest tools, software and equipment to solve real world problems

CORE ELECTIVE – I

BCS001	PARALLEL COMPUTING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Computer Organization and Architecture, Operating Systems				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

- To know about the components and building block hypothesis of Genetic algorithm.
- To understand the features of neural network and its applications.

COURSE OUTCOMES (COs)

CO1	Be able to reason about ways to parallelize a problem.
CO2	Be able to evaluate a parallel platform for a given problem.
CO3	Become familiar with programming with MPI and Vector processor.
CO4	Given a problem, develop an efficient parallel algorithm to solve it.
CO5	Have knowledge of sufficient theoretical background to be able to reason about the behaviour of neural networks.
CO6	Describe different parallel architectures; inter-connect networks, programming models, and algorithms for common operations such as matrix-vector multiplication.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H		H								H
	CO2		H	M	H								
	CO3	L	M		H								M
	CO4												
	CO5		M	H	M								

	CO6	M		M	H									H
3	Category	Humanities & Social Studies		Basic Sciences &Maths		Engg Sciences (ES)	Professional Core (PC)		Core Elective (CE)	Non-Major Elective (NE)		Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)	
									√					
4	Approval	37th Meeting of Academic Council, May 2015												

UNIT-I PARALLEL COMPUTING MODELS &PROGRAM 9

The State of Computing. Multiprocessors & Multi computers, Multi vector & SIMD Computers, PRAM&VLSI Models, Architectural Development Tracks, Conditions of Paralleling Programming, Partitioning & Scheduling, Programming flow mechanism. Systems interconnect Architecture.

UNIT-II PARALLEL COMPUTER PERFORMANCE 9

Performance Metrics & Measures, Parallel Processing Application, Speedup performance laws, Scalability analysis &approaches.Processors& memory hierarchy.Advanced processor technology. Superscalar & Vector processes, Memory hierarchy technologies. Virtual Memory Technology.

UNIT-III BUS, CACHE, MEMORY & PIPELINING TECHNIQUES 9

Backup bus system, Cache memory organization. Shared memory organization, Sequence & Weak consistency models. Linear pipeline processes - nonlinear pipeline processes. Instruction pipeline design, arithmetic pipeline design, Superscalar & Super pipeline design.

UNIT-IV MULTIPROCESSORS & MULTI COMPUTERS 9

Multiprocessor system interconnects. Cache coherence & synchronous mechanisms, Three generation of multi computers.Message-passing mechanism.Principles of multithreading, Fine-grained multi' computers, Callable& Multithreaded architecture, Dataflows Hybrid architecture.

UNIT-V SOFTWARE FOR PARALLEL PROGRAMMING 9

Parallel programming models, parallel layers & compilers, dependency analysis of data arrays, code optimization & scheduling, Loop parallelization & pipelining, Multiprocessor mix design goals.

TEXTBOOKS:

1. Kai Hwang, "Advanced Computer Architecture, Parallel Scalability Programmability"- Tata McGraw Hill,2012.
2. Parallel computing: theory and practice, Michael Quinn, TMH Edition, 2002.
3. **http://www-users.cs.umn.edu/~karypis/parbook/Lectures/GK-CS5451/Chapter%202%20-%20Parallel%20Programming%20Platforms.pdf**

BCS002	DATA SCIENCE	L	T	P	C
	Total Contact Hours - 45	3	0	0	3

	Prerequisite –
	Course Designed by – Dept. of Computer Science and Engineering.

OBJECTIVES

Develop in depth understanding of the key technologies in data science and business analytics: data mining, machine learning, visualization techniques, predictive modeling, and statistics.

COURSE OUTCOMES (COs)

CO1	Demonstrate knowledge of statistical data analysis techniques utilized in business decision making.
CO2	Apply principles of Data Science to the analysis of business problems
CO3	Use data mining software to solve real-world problems.
CO4	Employ cutting edge tools and technologies to analyze Big Data.
CO5	Demonstrate use of team work, leadership skills, decision making and organization theory.
CO6	Recognize and analyze ethical issues in business related to intellectual property, data security, integrity, and privacy.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H	M		H				M		H	H
	CO2								M				
	CO3	M				H				M		H	H
	CO4		M	H						M			
	CO5					M							M
	CO6	L	M	H		H			M	H		M	H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			

4	Approval	37th Meeting of Academic Council, May 2015

UNIT- I INTRODUCTION TO DATA SCIENCE 9

Data Science - Data Scientist- scope of Data Science: the open data movement, science, business, government, education, and sport-Introduction to the R data analysis environment-Formulating data-centric answers to scientific, business and social questions-Best practices: organizing projects, managing collaborations and expectations.

UNIT –II DATA MANAGEMENT 9

Database SQL, data cleaning, normalization, feature selection -creation spectral-decompositions and dimensionality reduction. Exploratory Data Analysis- Data scraping-cleaning and summarization-Visualization I: visualizing to explore-Exploration in scale: introduction to map reduce.

UNIT-III COMPUTATIONAL AND STATISTICAL DATA ANALYSIS 9

Descriptive-dataquality-Exploratory-statistics-correlation-ANOVA-Inferential-theoryof generalization-sampling-statistical-testing-Predictive-supervised-unsupervised-machine learning-exploration to inference- quantifying variation and uncertainty- Linear modeling- regression and prediction- visualizing inferences and uncertainty

UNIT- IV HASHING AND ASSOCIATION RULES 9

Introduction - Frequent item sets and Association rules - Locality Sensitive Hashing - Theory of Locality Sensitive Hashing - Dimensionality Reduction: SVD and CUR - Web spam and Trust Rank, Random Walks with Restarts - Large-Scale Machine Learning: Support Vector Machines - Large-Scale Machine Learning: Decision

UNIT-V GRAPH TEXT MINING AND CLUSTERING 9

Methods and tools for pre-processing- indexing-querying-retrieval -ranking of text at the document - collection levels- Algorithms for text Foriented application in web and social network- Methods and tools for pre-processing graphs- Community mining methods-graph clustering methods(MinFcut, Spectral, Clustering).

TEXTBOOKS:

1. 1. Introduction to Data Science, with Introduction to R Jeffrey Stanton 2012.
2. Georg Hager, Gerhard Wellein, Introduction to High Performance Computing, CRC Press, 2011.

REFERENCES:

1. Wagner, S., Steinmetz, M., Bode, A., Müller, M.M. (Eds.),, High Performance Computing in Science and Engineering, Garching/Munich, Springer Verlog, 2010.

2. https://ischool.syr.edu/media/documents/2012/3/DataScienceBook1_1.pdf

BCS003	SOFTWARE RELIABILITY	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Software Engineering				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

- To explain how system reliability can be measured and how reliability growth models can be used for reliability prediction.
- To describe safety arguments and how these are used.
- To discuss the problems of safety assurance.
- To introduce safety cases and how these are used in safety validation.

COURSE OUTCOMES (COs)

CO1	To understand the software reliability and its various model.
CO2	To understand the metrics used for software reliability and maintainability.
CO3	To understand the fault detection and correction approaches used in developing quality software.
CO4	To understand the design principles for achieving higher reliable software system.

CO5	Apply reliability estimation methods.
CO6	Review the basics of software reliability

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H	H	H	H	M		M	H	M	H	H
	CO2		H			H							
	CO3			H	H				H	M	H	M	M
	CO4					M							
	CO5	M	M	M	M		M		M	H		H	
	CO6		M	H		H				H	M		H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			

4	Approval	37th Meeting of Academic Council, May 2015

UNIT- I INTRODUCTION TO RELIABILITY 9

Reliability - Repairable and Non Repairable systems - Maintainability and Availability - Designing for higher reliability - Redundancy - MTBF - MTTF MDT - MTTR- k out of in systems.

UNIT- II SOFTWARE RELIABILITY 9

Software reliability - Software reliability Vs Hardware reliability - Failures and Faults - Classification of Failures - Counting - System Configuration - Components and Operational Models - Concurrent Systems - Sequential Systems - Standby Redundant systems.

UNIT- III FAULT DETECTION 9

Fault Avoidance - Passive Fault detection - Active Fault Detection - Fault Tolerance - Fault Recovery - Fault Treatment.

UNIT –IVSOFTWARE RELIABILITY MODELLING 9

Introduction to Software Reliability Modeling - Parameter Determination and Estimation - Model Selection - Markovian Models - Finite and Infinite failure category Models - Comparison of Models - Calendar Time Modeling

UNIT- V SPECIAL TOPICS IN SOFTWARE RELIABILITY 9

Management Techniques for reliability - Organization and Staffing - Programming Languages and Reliability - Computer Architecture and Reliability - Proving Program correctness & Reliability Design - Reliability Testing - Reliability Economics.

TEXT BOOKS:

1. John D. Musa, "Software Reliability", McGraw Hill, 1985

2. Glenford J. Myers, "Software Reliability", Wiley Interscience Publication, 1976
3. Michael Berthold, David J. Hand," Intelligent Data Analysis", Springer, 2007.

REFERENCES:

1. Patric D. T.O Connor, "Practical Reliability Engineering", 4th Edition, John Wesley & sons, 2003.
2.*http://2014.issre.net/sites/2014.issre.net/files/Tutorial_Williams_Slides.pdf*

CORE ELECTIVE – II

BCS004	**VHDL**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Digital Computer Fundamentals, System Modelling and Simulation.				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

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

- Code in VHDL for synthesis.
- Decompose a digital system into a controller (FSM) and datapath, and code accordingly.
- Write VHDL test benches.
- Synthesize and implement digital systems on FPGAs.
- Understand behavioral, non-synthesizable VHDL and its role in modern design.

COURSE OUTCOMES (COs)

CO1	Understand and use major syntactic elements of VDHL - entities, architectures, processes, functions, common concurrent statements, and common sequential statements.
CO2	Design combinational logic in a variety of styles including: structural VHDL, and behavioral VHDL, as well as demonstrate an awareness of timing and resource usage associated with each approach.
CO3	Create a VDHL test bench and use it to test/verify a sequential VHDL design of moderate complexity.
CO4	Draw for a given commented VHDL code of moderate complexity, a corresponding RTL level block diagram.
CO5	Create Combinational logic design - Schematic and VHDL.
CO6	Use of test benches, timing constraints, optimization trade-offs.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H		H								H
	CO2		H	M	H		M						
	CO3	L	M		H				M	M			M
	CO4							L					
	CO5		M	H	M		L				M		
	CO6	M		M	H								H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT- IINTRODUCTION TO VHDL 9

Introduction to VHDL - VHSIC Program - VHDL as a standard - Learning VHDL - VHDL Terms - Traditional Design Methods - Behavioral Modeling -Introduction - Transport verses Inertiai Delay - Simulation Deltas - Drivers -Sequential Processing Process Statement - Signal Assignment versus Variable Assignment - Sequential statements - Wait statements Concurrent Assignment Problem - Passive Processes.

UNIT- II DATA TYPES 9

Data Types - Object Types - Data types - File type caveats Subprograms and packages - Subprograms - Packages Predefined Attributes - Value kind attributes - Function kind attributes - Signal kind attributes - type kind attributes - Range kind attributes.

UNIT- III CONFIGURATIONS 9

Configurations - Default Configurations - Component Configurations -Mapping Library Entities - Generic in Configurations - Generic value specification in Architecture - Generic specification in Configurations - Board socket - chip analogy - Block configurations Architecture configurations - Advanced Topics- Register Transfer level description- Constraints-Attributes - Technology Libraries-Synthesis-VHDL Synthesis.

UNIT -IV DESIGN FLOW AND SIMULATION 9

High Level Design Flow- RTL Simulation -VHOL Synthesis functional Gate Level Verification - Place and Route - Post Layout Timing Simulation Static Timing - Top Level System.
Design - CPU Design - Top - Level system Operation - instructions - sample Instruction Representation - CPU -Top - Level Design.

UNIT- V VITAL ARCHITECTURE 9

CPU: Synthesis Description - ALU, Comp, Control, Reg. Register array Shift, TRIREG-CPU: RTL Simulation-Test benches - CPU Simulation - CPU: Synthesis Results - Place and Route process-placing and routing the Device-CPU: VITAL Simulation - VITAL Library - VITAL Simulation Overview- VITAL Implementation Simple VITAL Model -VITAL Architecture - SDF File – Back - Annotated Simulation.

TEXT BOOKS:

1. Douglas Perry, “VHDL”, McGraw Hill, 3rd Edition, 1999
2. J. Bhasker, “A VHDL Primer”, Pearson Education, 3rd Edition, 2005.

REFERENCE:

1. http://www.edutechlearners.com/download/books/A%20VHDL%20Primer%20-%20Jayaram%20Bhasker.pdf

BCS005	BIG DATA ANALYTICS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Data Structures, Data Ware Housing and Data Mining				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

The basics of Analytics – Concepts, Data preparation – merging, managing missing numbers sampling, Data visualization, Basic statistics.

COURSE OUTCOMES (COs)

CO1	Be able to analyze a problem for NN solution in terms of these Methods.
CO2	Have an awareness of the computational theory underlying NN.
CO3	Have a working knowledge of a typical neural network simulation
CO4	Experience in programming NN applications from scratch.
CO5	Have knowledge of sufficient theoretical background to be able to reason about the behaviour of neural networks.
CO6	Have knowledge of sufficient theoretical background to be able to reason about the behaviour of neural networks.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1			H		H							H
	CO2		M									M	
	CO3		M			H							H
	CO4	M					H					M	
	CO5			M		M							M
	CO6					H							M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			

4	Approval	37th Meeting of Academic Council, May 2015

UNIT- IINTRODUCTION TO BIG DATA **9**

Analytics – Nuances of big data – Value – Issues – Case for Big data – Big data options Team challenge – Big data sources – Acquisition – Nuts and Bolts of Big data. Features of Big Data - Security, Compliance, auditing and protection - Evolution of Big data – Best Practices for Big Data Analytics - Big data characteristics - Volume, Veracity, Velocity, Variety – Data Appliance and Integration tools – Greenplum – Informatica.

UNIT- II DATA ANALYSIS **9**

Evolution of analytic scalability – Convergence – parallel processing systems – Cloud computing –grid computing – map reduce – enterprise analytic sand box – analytic data sets – Analytic Methods –analytic tools – Cognos – Micro strategy - Pentaho. Analysis approaches – Statistical significance –business approaches – Analytic innovation – Traditional approaches – Iterative

UNIT- III STREAM COMPUTING 9

Introduction to Streams Concepts – Stream data model and architecture - Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window – Real time Analytics Platform(RTAP)applications IBM Infosphere – Big data at rest – Infosphere streams – Data stage – Statistical analysis– Intelligent scheduler – Infosphere Streams.

UNIT- IV PREDICTIVE ANALYTICS AND VISUALIZATION 9

Predictive Analytics – Supervised – Unsupervised learning – Neural networks – Kohonen models –Normal – Deviations from normal patterns – Normal behaviours – Expert options – Variable entry -Mining Frequent itemsets - Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques –Hierarchical – K- Means – Clustering high dimensional data Visualizations - Visual data analysistechniques, interaction techniques; Systems and applications.

UNIT- V FRAMEWORKS AND APPLICATIONS 9

IBM for Big Data – Map Reduce Framework - Hadoop – Hive - – Sharding – NoSQL Databases - S3 -Hadoop Distributed file systems – Hbase – Impala – Analyzing big data with twitter – Big data for Ecommerce– Big data for blogs.

TEXT BOOKS:

1. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS BusinessSeries, 2012.
2. Colleen Mccue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis",Elsevier, 2007
3. Michael Berthold, David J. Hand," Intelligent Data Analysis", Springer, 2007.

REFERENCES:

1. AnandRajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge UniversityPress, 2012.
2. **http://www.mosaic.geo-strategies.com/wp-content/uploads/2013/10/Big-Data-for-Dummies.pdf**

BCS006	SOFTWARE QUALITY ASSURANCE	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Software Engineering				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

The Objective of this Course is covers the foundations of software quality assurance and the development of appropriate quality assurance strategies via the application of current standards, models and measurement techniques.

COURSE OUTCOMES (COs)	
CO1	Understand standards, models and techniques aimed at achieving quality assurance in a variety of software development environments.
CO2	Research, consolidate and present large amounts of information related to appropriate quality assurance techniques and be able to make recommendations for management strategies.
CO3	Propose and defend innovative solutions to software quality assurance and measurement problems in the context of various software development environments.
CO4	Critically evaluate different software development environments and contexts with respect to the application of appropriate standards and models.
CO5	Evaluate leading edge approaches in software development and attendant quality assurance methodologies, presenting the research using Harvard referencing.
CO6	Understand and apply key quality assurance techniques tailored for specific software development environments.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H	H	H	H	M		M	H	M	H	H
	CO2		H			H							
	CO3			H	H				H	M	H	M	M
	CO4					M							
	CO5	M	M	M	M		M		M	H		H	
	CO6		M	H		H				H	M		H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			

4	Approval	37th Meeting of Academic Council, May 2015

UNIT –I INTRODUCTION TO SQA 9

Introduction to software quality – Software modelling – Scope of the software quality program – Establishing quality goals – Purpose, quality of goals – SQA planning software – Productivity and documentation.

UNIT- II SOFTWARE QUALITY ASSURANCE PLAN 9

Software quality assurance plan – Purpose and Scope, Software quality assurance Management – Organization – Quality tasks – Responsibilities – Documentation.

UNIT- III STANDARDS 9

Standards, Practices, Conventions and Metrics, Reviews and Audits – Management, Technical review – Software inspection process – Walk through process – Audit process – Test processes ISO, CMM compatibility – Problem reporting and corrective action.

UNIT- IV METHODOLOGIES 9

Tools, Techniques and methodologies, Code control, Media control, Supplier control, Records Collection, Maintenance and retention, Training and risk management.

UNIT- V ISO MODELS **9**

ISO 9000 model, CMM model, Comparisons, ISO 9000 weaknesses, CMM weaknesses, SPICE – Software process improvement and capability determination.

TEXT BOOKS:

1. Mordechai Ben – Meachem and Garry S.Marliss, "Software Quality – Producing Practical, Consistent Software", International Thompson Computer Press, 1997.
3. Watt. S. Humphrey, "Managing Software Process", Addison – Wesley, 1998.

REFERENCES:

1. Philip.B.Crosby, "Quality is Free: The Art of making quality certain", Mass Market, 1992.
2.http://www.cipl.net.in/courses/PDF/QA.pdf

CORE ELECTIVE – III

BCS007	COMPUTER VISION	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Data Structures, Design and Analysis of Algorithm				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

- To understand Hough Transform and its applications to detect lines, circles, ellipses.
- To understand three-dimensional image analysis techniques.
- To study some applications of computer vision algorithms.

COURSE OUTCOMES (COs)

CO1	To perform shape analysis and implement boundary tracking techniques
CO2	To apply chain codes and other region descriptors.
CO3	To apply Hough Transform for line, circle, and ellipse detections.
CO4	To implement motion related techniques.
CO5	To develop applications using computer vision techniques.
CO6	To apply 3D vision techniques.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H		H								H
	CO2		H	M	H		M				M		
	CO3	L	M		H				M				M
	CO4						L			M			
	CO5		M	H	M						H		
	CO6	M		M	H								H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship
						√			
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT –I IMAGE PROCESSING FOUNDATIONS 9

Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture.

UNIT- II SHAPES AND REGIONS 9

Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments.

UNIT- III HOUGH TRANSFORM 9

Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation .

UNIT- IV PREDICTIVE ANALYTICS AND VISUALIZATION 9

Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – Spline based motion – optical flow – layered motion.

UNIT –VAPPLICATIONS 9

Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

TEXT BOOKS:

1. E. R. Davies, “Computer & Machine Vision”, Fourth Edition, Academic Press, 2012.
2. R. Szeliski, “Computer Vision: Algorithms and Applications”, Springer 20113.
3. Simon J. D. Prince, “Computer Vision: Models, Learning, and Inference”, Cambridge University Press, 2012.

REFERENCES:

1. D. L. Baggio et al., "Mastering Open CV with Practical Computer Vision Projects", Packet Publishing, 2012.
2.http://szeliski.org/Book/drafts/SzeliskiBook_20100903_draft.pdf

BCS008	BIO INSPIRED COMPUTING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Artificial Intelligence and Expert System				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

To learn how natural and biological systems influence computational field

COURSE OUTCOMES (COs)

CO1	Be able to explain how biological systems exploit natural processes.
CO2	Be able to visualize how complex and functional high-level phenomena can emerge from low-level interactions.
CO3	Be able to understand how large numbers of agents can self-organize and adapt.
CO4	Be able to design and implement simple Bio-inspired algorithms.
CO5	Students will explain how computational processes can be derived from natural models.
CO6	Students will be able to explain basic concepts of dynamical systems.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1			H		H			M		M		H
	CO2		M									M	
	CO3		M			H		L		M			H
	CO4	M					H		M			M	
	CO5			M		M					M		M
	CO6					H							M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
						√			

4	Approval	37th Meeting of Academic Council, May 2015

UNIT- IINTRODUCTION **9**

What is Life? - Life and Information - The Logical Mechanisms of Life - What is Computation? Universal Computation and Computability - Computational Beauty of Nature (fractals, L-systems, Chaos) - Bio-inspired computing - Natural computing -Biology through the lens of computer science.

UNIT- IICOMPLEX SYSTEMS & ARTIFICIAL LIFE 9

Complex Systems and Artificial Life - Complex Networks - Self-Organization and Emergent Complex Behavior - Cellular Automata - Boolean Networks - Development and Morphogenesis - Open-ended evolution.

UNIT- IIINATURAL COMPUTATION AND NEURAL NETWORKS 9

Biological Neural Networks- Artificial Neural Nets and Learning - pattern classification & linear separability - single and multilayer perceptrons, backpropagation - associative memory - Hebbian learning - Hopfield networks - Stochastic Networks – Unsupervised learning.

UNIT- IVEVOLUTIONARY SYSTEMS AND ALGORITHMS 9

Evolutionary Programming: biological adaptation & evolution - Autonomous Agents and Self-Organization: termites, ants, nest building, flocks, herds, and schools. Genetic algorithms: Schema theorem - Reproduction-Crossover-Mutation operators.

UNIT VCOMPETITION, COOPERATION AND SWARM INTELLIGENCE 9

Collective Behavior and Swarm Intelligence - Social Insects - Stigmergy and Swarm Intelligence; Competition and Cooperation - zero- and nonzero-sum games - iterated prisoner's dilemma - stable strategies - ecological & spatial models - Communication and Multi-Agent simulation – Immuno computing.

TEXT BOOKS:

1. Leandro Nunes De Castro, Fernando Jose Von Zuben, "Recent Developments in Biologically Inspired Computing", Idea Group Publishing, 2005.
2. Leandro Nunes De Castro , "Fundamentals of Natural Computing: Basic concepts, Algorithms and Applications", Chapman & Hall/ CRC Computer & Information Science Series, 2006

REFERENCES:

1. Dario Floreano, Claudio Mattiussi, "Bio-Inspired Artificial Intelligence: Theories, Methods and Technologies", MIT Press, 2008.
2. http://www.bioinspiredcomputation.com/self-archived-bookNeumannWitt.pdf
3. http://www.dschool.ir/files/__Bio_Inspired_Artificial_Intelligence__Theories__MethodsTechnologies__Intelligent_Robotics_and_Autonomous_Agents_.pdf

BCS009	REAL TIME SOFTWARE TESTING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Software Engineering, Software Quality Assurance.				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

The Objective of this course student should know basic skills in software testing by implementing various strategies of software testing in their project. They need to bring out the ways and means of controlling and monitoring testing activity.

COURSE OUTCOMES (COs)

CO1	Understand the software test life cycle.

CO2	Understands the relationship between testing, software quality and other verification techniques the theoretical limits of software testing.
CO3	Test coverage measures such as statement, branch, and path coverage.
CO4	Design patterns for test automation.
CO5	Concepts and techniques for black-box and white-box testing.
CO6	The relationship between testing, software quality and other verification techniques.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H	H	H	H	M		M	H	M	H	H
	CO2		H			H							
	CO3			H	H				H	M	H	M	M
	CO4					M							
	CO5	M	M	M	M		M		M	H		H	
	CO6		M	H		H				H	M		H

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship
						√			

4	Approval	37th Meeting of Academic Council, May 2015

UNIT –I TESTING BASICS **9**

Testing as an engineering activity –Role of process in software quality –Testing as a process – Basic definitions –Software testing principles –The tester's role in a software development organization –Origins of defects –Defect classes – The defect repository and test design –Defect examples –Developer / Tester support for developing a defect repository.

UNIT- IITEST CASE DESIGN **9**

Introduction to testing design strategies – The smarter tester – Test case design strategies – Using black box approach to test case design – Random testing – Equivalence class partitioning – Boundary value analysis – Other black box test design approaches – Black box testing and COTS – Using white box approach to test design – Test adequacy criteria – Coverage and control flow graphs – Covering code logic – Paths – Their role in white box based test design – Additional white box test design approaches – Evaluating test adequacy criteria.

UNIT- III LEVELS OF TESTING **9**

The need for levels of testing – Unit test – Unit test planning – Designing the unit tests – The class as a testable unit – The test harness – Running the unit tests and recording results – Integration tests – Designing integration tests – Integration test planning – System test – The different types – Regression testing – Alpha, beta and acceptance tests.

UNIT- IV TEST MANAGEMENT **9**

Basic concepts – Testing, debugging goals, policies – Test planning – Test plan components – Test plan attachments – Locating test items – Reporting test results – The role of three groups in test planning and policy development – Process and the engineering disciplines – Introducing the test specialist – Skills needed by a test specialist – Building a testing group.

UNIT- V CONTROLLING AND MONITORING **9**

Defining terms – Measurements and milestones for controlling and monitoring – Status meeting– Reports and control issues – Criteria for test completion – SCM –Types of reviews – Developing a review program – Components of review plans – Reporting review results.

TEXT BOOKS:

1. Srinivasan Desikan, Gopalaswamy Ramesh, "Software Testing: Principles and Practices", Pearson 2012.
2.Aditya P. Mathur, "Foundations of Software Testing", Pearson, 2008.
3.Paul Ammann, Jeff Offutt, "Introduction to Software Testing", Cambridge University Press, 2008.

REFERENCES:

1. Paul C. Jorgensen, "Software Testing: A Craftsman's Approach", Auerbach Publications, 2008.
2.http://www.tutorialspoint.com/software_testing/software_testing_tutorial.pdf

NON MAJOR ELECTIVE-I

BET407	DIGITAL SIGNAL PROCESSSING	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite –Engineering Mathematics-III, Electronic Circuits.				
	Course Designed by – Dept. of Electronics and Telecommunication Engineering				

OBJECTIVES

To familiarize the concepts of transform based continuous time and discrete time analysis of signals and systems.

COURSE OUTCOMES (COs)

CO1	Understand different types of signals- continuous and discrete, odd and even, periodic and aperiodic etc.
CO2	Analyze continuous time signals and systems by using appropriate mathematical tools like Fourier Transform.
CO3	Analyze sampling process and sampling of discrete time signals.
CO4	Analyze discrete time signals and systems by using appropriate mathematical tools like Fourier Transform.
CO5	Utilize standard signals such as sine, ramp, exponential to characterize systems.
CO6	To provide a foundation to the courses like communication, digital signal processing, control systems, instrumentation, and so on, that deal with signal and system concepts directly or indirectly.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	L										

	CO2	H		M	L								
	CO3	H			M								
	CO4	H	M										
	CO5	M		M									
	CO6	H	M		M								
3	Category	Humanities & Social Studies (HS)		Basic Sciences	Engg Sciences (ES)		Professional Core (PC)		Core Elective (CE)	Non-Major Elective (NE)		Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
										√			
4	Approval	37th Meeting of Academic Council, May 2015											

UNIT -I DISCRETE – TIME SIGNALS AND SYSTEMS: 9

Sampling of Analogue signals – aliasing – standard discrete time signals – classification – discrete time systems – Linear time invariant stable casual discrete time systems – classification Methods – linear and circular convolution – difference equation representation – DFS, DTFT, DFT – FFT computations using DIT and DIF algorithms. Time response and frequency response analysis of discrete time systems to standard input signals.

UNIT II INFINITE IMPULSE RESPONSE DIGITAL FILTERS: 9

Review of design of analogue Butterworth and Chebyshev Filters, Frequency transformation in analogue domain – Design of IIR digital filters using impulse invariance technique – Design of digital filters using bilinear transform – pre warping – Frequency transformation in digital domain – Realization using direct, cascade and parallel forms.

UNIT III FINITE IMPULSE RESPONSE DIGITAL FILTERS: 9

Symmetric and Antisymmetric FIR filters – Linear phase FIR filters – Design using Frequency sampling technique – Window design using Hamming, Hanning and Blackmann Windows – Concept of optimum equiripple approximation – Realisation of FIR filters – Transversal, Linear phase and Polyphase realization structures.

UNIT IV FINITE WORD LENGTH EFFECTS: 9

Quantization noise – derivation for quantization noise power – Fixed point and binary floating point number representations – Comparison – Overflow error – truncation error – coefficient quantization error – limit cycle oscillations- signal scaling – analytical model of sample and hold operations.

UNIT V SPECIAL TOPICS IN DSP: 9

Discrete Random Signals- Mean, Variance, Co-variance and PSD – Periodiogram Computation – Principle of Multi rate DSP – decimation and Interpolation by integer factors – Time and frequency domain descriptions – Single, Multi stage, polyphase structures – QMF filters – Sub band Coding.

TEXT BOOK:

1. John G. Proakis and DimitrisG.Manolakis, 'Digital Signal Processing, Algorithms and Applications ', PHI of India Ltd., New Delhi 3rd Edition 2000.

REFERENCES:

1.SanjitK.Mitra 'Digital Signal Processing', A Computer Based Approach, Tata McGraw-Hill, New Delhi, 1998.Printing, Prentice Hall of India Pvt. Ltd., New Delhi, 1999.
2.https://users.dimi.uniud.it/~antonio.dangelo/MMS/materials/Guide_to_Digital_Signal_Process.pdf

BET702	CELLULAR MOBILE COMMUNICATION	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Computer Networks				
	Course Designed by – Dept. of Electronics and Telecommunication Engineering.				

OBJECTIVES
To import knowledge of signal processing techniques for wireless communication.

COURSE OUTCOMES (COs)

CO1	To introduce advanced wireless communication systems.
CO2	To learn the wireless channel characteristics and models.
CO3	Explain the various standards Wireless Communication.
CO4	Describe different propagation models.
CO5	Classify different Equalization & diversity techniques used in wireless communication.
CO6	Apply signal processing for wireless communication.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	W											
	CO2	H	M										
	CO3	M											
	CO4	H	M		M								
	CO5												
	CO6	M			M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		

4	Approval	37th Meeting of Academic Council, May 2015

UNIT-I INTRODUCTION TO WIRELESS MOBILE COMMUNICATIONS 9
History and evolution of mobile radio systems, Types of mobile wireless services/systems – Cellular, WLL, Paging, Satellite systems, Standard, Future trends in personal wireless systems.

UNIT-II CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS 9
Cellular concept and frequency reuse, Multiple Access Schemes, Channel assignment and handoff, Interface and system capacity, Trunking and Erlang capacity calculations.

UNIT-III MOBILE RADIO PROPAGATION 9

Radio wave propagation issues in personal wireless systems, Propagation models, Multipath fading and based and impulse models, Parameters of mobile multipath channels, Antenna systems in mobile radio.

UNIT-IV MODULATION AND SIGNAL PROCESSING 9

Analog and digital modulation techniques, Performance of various modulation techniques – Spectral efficiency, Error rate, Power Amplification, Equalization/Rake receiver concepts, Diversity and Space-time processing, Speech coding and channel coding.

UNIT-V SYSTEM EXAMPLES AND DESIGN ISSUES 9

Multiple Access Techniques – FDMA, TDMA and CDMA systems, Operational systems, Wireless networking, design issues in personal wireless systems.

TEXT BOOK:

1. K. Feher, Wireless Digital Communication, Prentice Hall of India, New Delhi, 1995.

REFERENCES:

1.T.S. Rappaport, Wireless Communication; Principles and Practice, Prentice Hall, NJ, 1996.
2. W.C.Y. Lee, Mobile Communication Engineering; Theory and Application, Second Edition, McGraw-Hill International, 1998.
3. http://www.wileyindia.com/media/pdf/0471457124.pdf

BBR701	**BIOSAFETY, BIOETHICS, IPR & PATENTS**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	3	0	0	3
	Prerequisite –Professional Courses				
	Course Designed by – Dept. of Genetics Engineering				

OBJECTIVES

To enable understanding chemical principles governing biochemical reactions.

COURSE OUTCOMES (COs)

CO1	Understand Handling of recombinant DNA process and products.
CO2	Biosafety assessment of biotech pharmaceutical products.
CO3	Understand the moral status of animal.
CO4	Understand the intellectual property rights.
CO5	Understand the patent registration.
CO6	Understand the Intellectual Property Rights.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M					M			H		H	
	CO2												
	CO3	H	H		M	H					M		M
	CO4												

	CO5	H	M	H							H		
	CO6	M			M	H							M
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Maths (BS)		Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)		Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)	
										√			
4	Approval	37th Meeting of Academic Council, May 2015											

UNIT- IBIO SAFETY **9**

Introduction to Biosafety. Laboratory associated infections and other hazards, assessment of biological hazards and levels of biosafety, Handling of recombinant DNA processes and products in institutions and industries, biosafety assessment procedures in India and abroad.

UNIT- II BIO ETHICS **9**

Bioethics: Legality, morality and ethics, the principles of bioethics: autonomy, human rights, beneficence, privacy, justice, equity etc. Transgenics and Bioethics: Ecological safety assessment of recombinant organisms and transgenic crops, case studies of relevance (Eg. Bt cotton). Biosafetyassessment of biotech pharmaceutical products such as drugs / vaccines etc.

UNIT –III BIOTECHNOLOGICAL STUDIES **9**

Chronology of Biotechnological studies on animals – Law & legislation on animal experimentation in India and world Moral status of animals as objects of experiments –Moral responsibility of scientists over animal experiments. Personhood – Abortion – Bioethical issues in reproduction, population explosion and control – Voluntary euthanasia & physician assisted suicide – Organ donation & Transplantation.

UNIT- IV INTELLECTUAL PROPERTY RIGHTS **9**

Intellectual property rights (IPR), sovereignty rights, CBD, bioethics and agreement on trade and tariffs Indian sui-generis system for animal variety and farmer's rights protection act. WTO with reference to biotechnological affairs, TRIPs.

UNIT- V PATENTS **9**

General Introduction: Patent claims, the legal decision, Basic Requirements of Patentability**:** Patentable subject matter, novelty and the public domain, non-obviousness Special issues in Biotechnology Patents**:** Disclosure requirements, Collaborative research, Competitive research, Recent Developments in Patent System and Patentability of biotechnological inventions.

TEXT BOOKS

1. BAREACT, Indian Patent Act 1970 Acts & Rules, Universal Law Publishing Co. Pvt. Ltd.,2007
2. Kankanala C., Genetic Patent Law & Strategy, 1st Edition, Manupatra, Information Solution Pvt. Ltd., 2007
3. S.S.Kanka Entrepreneurship Development, S.Chand and Co, New Delhi 1997

REFERENCE BOOKS

1. Beier, F.K., Crespi, R.S. and Straus, T. Biotechnology and Patent protection-Oxford and IBH Publishing Co. New Delhi.
2. Sasson A, Biotechnologies and Development, UNESCO Publications.
3. Singh K, Intellectual Property rights on Biotechnology, BCIL, New Delhi
4. Regulatory Framework for GMOs in India (2006) Ministry of Environment and Forest, Government of India, New Delhi.
5. Cartagena Protocol on Biosafety (2006) Ministry of Environment and Forest, Government of India, New Delhi.
6. **https://cld.pt/dl/download/ddb72433-6067-4e74-91de-ff3e08700b64/1%C2%BA%20Ano/Introdu%C3%A7%C3%A3o%20%C3%A0%20Engenharia%20Biol%C3%B3gica/Outros/Bioprocess%20Engineering%20Principles%20-%20Livro.pdf**

BBM405	BIOSENSORS AND TRANSDUCERS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Biology for Engineers.				
	Course Designed by – Dept. of Bio Medical Engineering.				

OBJECTIVES

- Understand the purpose of measurement, the Methods of measurements, errors associated with measurements.
- Know the principle of transduction, classifications and the characteristics of different transducers and study its biomedical applications.

COURSE OUTCOMES (COs)

CO1	Describe the purpose and Methods of measurements.
CO2	Explain different display and recording devices for various applications.
CO3	Know the principle of transduction, classifications and the characteristics of different transducers and study its biomedical applications
CO4	Remember and understand the concepts, types, working and practical applications of important biosensors.
CO5	Know some of the commonly used biomedical transducers.
CO6	Know the different display and recording devices.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	H	M	H	H	M	H			L	M	
	CO2	M	H	M	H	H	M	H			L	M	
	CO3	M	H	M	H	H	M	H			L	M	
	CO4	M	H	M	H	H	M	H			L	M	
	CO5	M	H	M	H	H	M	H			L	M	
	CO6	M	H	M	H	H	M	H			L	M	

3	Category	Humanities	Basic Sciences	Engg Sciences	Professional	Core El	Non-M	Open El	Project/
							√		

4	Approval		37th Meeting of Academic Council, May 2015

UNIT – I SCIENCE OF MEASUREMENT 9

Units and Standards - calibration Methods - statics calibration - classification of errors, error analysis - statistical Methods - odds and uncertainty.

UNIT – II CHARACTERISTICS OF TRANSDUCERS 9

Static characteristics - accuracy, precision, sensitivity, linearity etc - mathematical model of transducers - zero first - order and second - order transducers - response to impulse step, ramp and sinsoidal inputs.

UNIT – III VARIABLE RESISTANCE TRANSDUCERS 9

Principle of operation, construction details, characteristics and applications of resistance potentiometers, strain gauges, resistance thermometers, thermistors, hot-wire aneometer, piezoresistive sensors and humidity sensors.

UNIT – IV BIOSENSORS - PHYSIOLOGICAL RECEPTORS - J RECEPTORS 9

Chemoreceptors, Baroreceptors, Touch receptors, Biosensors - Working Principle and Types, Applications.

UNIT – V OTHER TRANSDUCERS 9

Piezoelectric tranducers, magnetostrictive transducer, IC sensor digital transducers - smart sensor - fibre optic transducers.

TEXT BOOKS:

1. Doeblin. E. O, Measurment Systems, McGraw Hill Book Co. 1998
2. Renganathan S, Transducer Engineering, Allied Publishers, Chennai,2000.
3.https://www1.ethz.ch/lbb/Education/Biosensors/Lecture_1_overview.pdf

BBM054	**BIOINFORMATICS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Biology for Engineers.				
	Course Designed by – Dept. of Bio Medical Engineering.				

OBJECTIVES

- To introduce Bioinformatics-Elementary commands and Protocols, ftp, telnet, http. Primer on information theory

COURSE OUTCOMES (COs)

CO1	To learn bioinformatics and the protocols.
CO2	To learn Strings-Edit distances two strings-string similarity local alignment gaps-parametric sequence alignments.
CO3	To have a clear view on Amino acid substitution matrices PAM and BLOSSUM.
CO4	To learn Ultrasonic trees-parsimony-Ultrametric problem-perfect phylogeny-phylogenetic alignment.
CO5	To DNA Mapping and sequencing-Map alignment-Large scale sequencing.

CO6		DNA Mapping and sequencing-Map alignment-Large scale sequencing and alignment.											
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low													
1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1			H									
	CO2			H	H		M						
	CO3		M		H		H						
	CO4	H	M		H								`
	CO5			H		H							
	CO6												
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Maths (BS)	Engg Sciences (ES)		Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)		Open Elective	Project/Term Paper/ Seminar/ Internship (PR)	
									√				
4	Approval	37th Meeting of Academic Council, May 2015											

UNIT – I WHAT IS BIOINFORMATICS 9

Scope of Bioinformatics-Elementary commands and Protocols, ftp, telnet, http.Primer on information theory.

UNIT – II SEQUENCING ALIGNMENT AND DYNAMIC PROGRAMMING 9

Introduction-Strings-Edit distance two strings-string similarity local alignment gaps-parametric sequence alignments-suboptimal alignments-multiple alignment-common multiple alignment Methods.

UNIT – III SEQUENCE DATABASE AND THEIR USE 9

Introduction to databases-database search-Algorithms issues in database search-sequence database searchFASTA-BLAST-Amino acid substitution matrices PAM and BLOSSUM.

UNIT – IV EVOLUTIONARY TREES AND PHYLOGENY 9

Ultrasonic trees-parsimony-Ultrametric problem-perfect phylogeny-phylogenetic alignment-connection between multiple alignment and tree construction.

UNIT – V SPECIAL TOPICS IN BIOINFORMATICS 9

DNA Mapping and sequencing-Map alignment-Large scale sequencing and alignment-Shotgun-DNA sequencing-Sequence assembly-Gene predictions-Molecular predictions with DNA strings.

TEXT BOOK:

1. R.D.Lele '"Computer in Medicine" Tata McGraw Hill, Newyork, 1999.

REFERENCES:

1. S.K.Chauhan "PC Organisation", S.K.Kataria and Sons, Delhi 2000.
2. Harold Sackamn "Bio Medical Information Technology", Academic Press, New York.
3.**https://www.lehigh.edu/~inbios21/PDF/Fall2008/Lopresti_11142008.pdf**

NON MAJOR ELECTIVE-II

BET603	TELECOMMUNICATION SWITCHING NETWORKS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Computer Networks				
	Course Designed by – Dept. of Electronics and Telecommunication Engineering.				

OBJECTIVES

- To impart knowledge on basics of antenna theory.
- To study antenna arrays.
- To study aperture antennas.
- To learn special antennas such as frequency independent and broad band antennas.

COURSE OUTCOMES (COs)

CO1	Define various antenna parameters**.**
CO2	Analyze radiation patterns of antennas.
CO3	Evaluate antennas for given specifications.
CO4	Illustrate techniques for antenna parameter measurements.
CO5	Discuss radio wave propagation.
CO6	To understand various techniques involved in various antenna parameter measurements.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	M	M									
	CO2	H	H	L	L								
	CO3	M	M	H	M	L							
	CO4	M		L									
	CO5	H	M										
	CO6	M		M		M							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship
						√			

4	Approval	37th Meeting of Academic Council, May 2015

UNIT –I SWITCHING SYSTEMS 9

Introduction-Message switching-Circuit switching-Manual switching-Functions of switching system- Strowger step by step system-Register translator-Senders-Distribution frames-Cross bar systems-General trunking-Electronic switching-Reed electronic systems-Digital switching systems.

UNIT- II TIME DIVISION SWITHING 9

Introduction-Space and time switching-Time division switching networks-grades of services-Time division switching networks-non blocking networks-synchronization.

UNIT –III TELECOMMUNICATION TRAFFIC 9

Introduction-Unit of traffic-Congestion-Traffic measurement-A mathematical model-Local call systems-Queuing systems.

UNIT –IV TELECOMMUNICATION SIGNALLING 9

Introduction-Customer line signaling- Audio frequency junction and trunk circuits-FDM carrier systems-PCM signaling- Inter register signaling- Common channel signaling principles-CCITT signaling, CCITT signaling, Digital customer line signaling.

UNIT-V TELECOMMUNICATION NETWORKS 9

Introduction-Analog networks-Integrated digital networks-Integrated service digital networks-Cellular radio networks-Intelligent networks-Private networks-numbering-charging-Routing-Network management.

TEXTBOOK:

1. J.E FLOOD, "telecommunication switching,traffic and networks" Pearson education.

REFERENCE BOOKS:

1. T.V.SWAMINATHAN, telecommunication switching system &networks, PHI.
2.**http://www.newagepublishers.com/samplechapter/000969.pdf**

BET605	TELECOMMUNICATION SWITCHING AND SYSTEM MODELLING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – System Modelling and Simulation, Computer Networks				
	Course Designed by – Dept. of Electronics and Telecommunication Engineering.				

OBJECTIVES

- To impart knowledge on basics of microwave electron beam devices and their applications in X band frequency.
- To study Microwave semiconductor devices & applications
- To become familiar with the concepts of Microwave Integrated Circuits.
- To know the concepts of Microwave Measurements.

COURSE OUTCOMES (COs)

CO1	Describe the various waveguide components.
CO2	Classify the microwave tubes (Linear beam tubes and Crossed field tubes)
CO3	Discuss the various microwave semiconductor devices as oscillators for their Performance.
CO4	Design of waveguide components and microwave transmission lines for a given set of parameters.
CO5	Identify the measurement techniques for different parameters like VSWR, impedance, frequency, power of microwave sources and loads.
CO6	Understand Microwave sources and amplifiers.

Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low													
1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	L										
	CO2	H	M										
	CO3	M	L										
	CO4	M	H	M	L								
	CO5	H	M	M	H								
	CO6	M	M	L	M								
3	Category	Humanities & Social Studies (HS)		Basic Sciences		Engg Sciences (ES)	Professional Core (PC)		Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)	
										√			
4	Approval	37th Meeting of Academic Council, May 2015											

UNIT-I SIMULATION 9

Simulation of Random Variables and Random Process Generation of random number and sequences, Gaussian and uniform random numbers, Correlated random sequences, Testing of random numbers generators, Stationary and uncorrelatedness, Goodness of fit test.

UNIT-II MODELING OF COMMUNICATION SYSTEMS 9

Radio frequency and optical sources, Analog and Digital signals, Communication channel and models, Free space channels, Multipath channel and discrete channel noise and interference.

UNIT-III ESTIMATION OF PERFORMANCE MEASURE FOR SIMULATION 9

Quality of estimator, Estimation of SNR, Probability density function and bit error rate, Monte Carlo method, Importance sampling method, Extreme value theory.

UNIT-IV SIMULATION AND MODELING METHODOLOGY 9

Simulation environment, Modeling considerations, Performance evaluation techniques, Error source simulation Validation.

UNIT-V CASE STUDIES 9

Simulations of QAM digital radio link in a fading environment Light wave communication link and satellite system.

TEXT BOOKS:

1. MC.Jeruchim, P.Balaban and K.Samshanmugam, "Simulation of Communication Systems, Plenum press, New York, 1992.
2. Averill.M.Law and W.David Kelton, "Simulation Modeling and Analysiso, McGraw-Hill, 1991.

REFERENCES

1.Geoffrey Gorden, "System Simulation", Prentice Hall of India, 2nd Edition, 1992.

2.W.Turin, "Performance Analysis of Digital Communication Systems", Computer Science Press, New York, 1990.
3.Jerry banks and John S.Carson, "Discrete Event System Simulation", Prentice Hall of India, 1984.
4.http://publications.rwth-aachen.de/record/59063/files/Herzberg_Dominikus.pdf

BBA001	PRINCIPLES OF MANAGEMENT AND ORGANIZATIONAL BEHAVIOUR	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite – Management				
	Course Designed by – Department of Management Studies				

OBJECTIVES

- Familiarize the students with the fundamental concepts of Management and to highlight the approaches in organization behavior

COURSE OUTCOMES (COs)

CO1	Understanding the concepts of Management
CO2	Knowledge on Management Functions
CO3	Understanding the Organization Theory & Approach.
CO4	Knowledge on the Concepts of Motivation
CO5	Clear insight on the factors contributing to discipline
CO6	In-depth Understanding about the concepts of Group Behavior

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H					H					H	
	CO2		H		M					H			
	CO3	M							M		H		
	CO4			M	H							H	
	CO5							M					
	CO6				H								L

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/
					√				
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT -I NATURE OF MANAGEMENT 9

Definition – theory and practice – effective management – Management : Science of Art – Management in India. Development of Management thoughts – Taylor's – Henry Fayol –

Hawthrone experiment – Barnard & Social system – Herbert Simon – Peter Drucker – Various approaches – Management thoughts.

UNIT- II MANAGEMENT PROCESS 9

Co-ordination – Functions of management – Managers and environment – External and internal Business Ethics – Planning – Fundamentals – Definitions & Features – Steps in planning – types of planning – Objectives – Concepts and features – Hierarchy of objectives – role – Process of MBO – Policy & Strategy – Decision making process – Individual Vs Group Decisions.

UNIT- III ORGANIZATION STRUCTURE 9

Organizing – Theory & Approach –Authority & Responsibility – Delegation – Centralization & Decentralization – Line & Staff Relationship – Staffing – Fundamentals – System approach – Manpower Planning – Recruitment & Selection – Training and development – Performance appraisal – Direction – Fundamentals Motivation – Theories of Motivation-Maslow's Hersberg'sMaClelland's theory X,Y & Z leadership – Theories and Styles – Communication – Type – Controlling – System and Process.

UNIT- IV ORGANIZATIONAL BEHAVIOUR 9

Definition – Organization – Managerial Role and Functions – Organizational Approaches, Individual behaviour – Causes – Environmental effect – Behaviour and performance, perception – Organizational implications, Personality – Contributing factors – Dimension, Motivation – Need Theories – Process Theories – Job satisfaction, Learning and Behaviour – Learning Curves, Work Design and Approaches.

UNIT -V GROUP BEHAVIOUR 9

Groups – Contributing factors –Group Norms, types – Causes – Intergroup relations – Conflict and Resolution – Change Process –Resistance to change.

TEXT BOOKS:

1. Herald Knootz and Heinz weihrich, 'Essentials of Management', McGraw Hill Publishing Company, Singapore International Edition, 2004.
2. Ties AF, Stoner and R. Edward Freeman, "Management" Prentice Hall of India Pvt. Ltd., New Delhi -110011, 1995.

REFERENCE BOOKS :

1. Joseph I. Massie 'Essentials of Management', Prentice Hall of India Pvt. Ltd., New Delhi -110011, 2004.
2. L.M. Prasad "Principles and Practice of Management", Sultan Chand & Sons.2001
3. Uma Sekaran, "Organizational Behaviour", Tata McGraw Hill, 2007.
4. https://www.extension.harvard.edu

BBM604	DIGITAL AND MEDICAL IMAGE PROCESSING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Mathematics-III, Computer Graphics and Multimedia Systems.				
	Course Designed by – Dept. of Bio Medical Engineering.				

OBJECTIVES

The aim of the courses to show how to extract, model, and analyze information from medical data and

application in order to help diagnosis , treatment and monitoring of diseases through computer sciences.													
COURSE OUTCOMES (COs)													
CO1	Have a Fundamental Knowledge of digital image processing with Fourier transforms.												
CO2	Acquire knowledge about the image sampling, Modeling and quantization.												
CO3	Have a fundamental knowledge of image enhancement, its process and types of filters used in image processing.												
CO4	Have knowledge about image analysis, classification and reconstruction of act and MRI image												
CO5	Acquire the skills in the transmission of biological images.												
CO6	Understand the concept of Data compression.												
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low													
1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H			S	M			M				M
	CO2		H	M									
	CO3	M			H						H		
	CO4			H		H		M					
	CO5		H	M							H		
	CO6	M				H							M
3	Category	Humanities & Social Studies (HS)		Basic Sciences &Maths (BS)		Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)		Open Elective (OE)		Project/Term Paper/ Seminar/ Internship
									√				
4	Approval	37th Meeting of Academic Council, May 2015											

UNIT-I DIGITAL IMAGE FUNDAMENTAL 9

Elements of digital image processing systems, Elements of Visual perception, Image formation model, Image sampling and quantization, aliasing, zooming and shrinking of digital images. Monochrome Vision Model, Colour Vision Model. Image transforms –Discrete Fourier transform, Properties of Fourier transform, Fast Fourier transform and inverse fast Fourier transform.

UNIT-II IMAGE FUNDAMENTALS 9

Image sampling and quantization, Matrix and Singular Value representation of discrete images Image pre-processing, point operation, Histogram modelling, spatial operations, transform operations.

UNIT-III IMAGE ENHANCEMENT 9

Enhancement by point processing –Simple intensity transformation –Histogram processing – Image subtraction –Image averaging.Spatial filtering –Smoothing filters, sharpening filters. Enhancements in frequency domain-Low pass filtering –High pass filtering.

UNIT-IV IMAGE ANALYSIS, CLASSIFICATION AND RECONSTRUCTION OF ACT AND MRI IMAGES 9

Image analysis, Spatial feature extraction, edge detection, Image segmentation. Image reconstruction from projections, Random transform, filter back projection algorithm, reconstruction of CT images, Imaging Methods in MF images, fourier reconstruction of MRI.

UNIT-V TRANSMISSION OF MEDICAL IMAGES 9

Medical Image, data compression of transmission, transform coding, pixel Coding, predictive coding, Interference coding.

TEXT BOOKS:

1. KavyanNajarian and Robert Splerstor "Biomedical Signals and Image Processing", CRC – Taylor and Francisn, New York, 1991.
2. John L. Semmlow, "Biosignal and Biomedical Image Processing Matlab Based applications" Marcel Dekker Inc., New York, 2004.

REFERENCES:

1. .**http://www.cs.uu.nl/docs/vakken/ibv/reader/readerINFOIBV.pdf**

BBM604	**MEDICAL INFORMATICS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Computer Organization and Architecture, Computer Graphics and Multimedia Systems.				
	Course Designed by – Dept. of Bio Medical Engineering.				

OBJECTIVES

To learn about the historical information of hospitality and recent trends in the Hospital information system.

COURSE OUTCOMES (COs)

CO1	Have Knowledge about the historical information of hospital.
CO2	Have a well-founded knowledge of overview of computer hardware used in the Hospital Information system.
CO3	Have a fundamental knowledge of Hospital Information system.
CO4	Have a skill about the visual programming and multimedia information.
CO5	Acquire the skills integrated medical information system.
CO6	Understand the concept of Computer Peripheral devices.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H				M			M				M
	CO2			M									
	CO3	M			H								
	CO4					H		M			H		
	CO5	M		M			M						
	CO6			M							M		M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship
							√		
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT-I BIOMEDICAL INFORMATION SYSTEM 9

Historical Highlights of health care information system-Biomedical information system-problems and pitfalls-History and evolution of Electronic resources, Multimedia components.

UNIT-II OVERVIEW OF COMPUTER HARDWARE 9

Motherboard and its logic-Memory and I/O interfacing/memory and input output mapping-I/O peripherals and Add-on cards.

UNIT-III HOSPITAL INFORMATION SYSTEM 9

Concept of HIS its position in hospital-introduction of a computerized HIS Automation of medical record-cost and Benefits of HIS-Modems and Networking in Hospitals.

UNIT-IV VISUAL PROGRAMMING AND MULTIMEDIA INFORMATION 9

Visual Basic Principles and Programming-Design, Production and Testing of Multimedia based HIS.

UNIT-V INTEGRATED MEDICAL INFORMATION SYSTEM 9

Integration of inter and intra hospital information system. Role of expert systems-web based Multimedia information system-Video-conferencing-PowerPoint Presentation.

TEXT BOOK:

1. R.D.Lele '"Computer in Medicine" Tata McGraw Hill, NewYork, 1999.

REFERENCES:

1. S.K.Chauhan "PC Organisation", S.K.Kataria and Sons, Delhi 2000.
2. Harold Sackamn "Bio Medical Information Technology", Academic Press, NewYork.
3.http://www2.hawaii.edu/~nreed/ics691BMI2/discpapers/handbookMICh7.pdf

NON MAJOR ELECTIVE-III

BET301	PRINCIPLES OF ANALOG AND DIGITAL SYSTEM	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Digital Computer Fundamentals, Electronics Circuits.				
	Course Designed by – Dept. of Electronics and Telecommunication Engineering.				

OBJECTIVES

To familiarize students with various techniques for amplitude modulation and demodulation of analog signals.

COURSE OUTCOMES (COs)	
CO1	Develop the Student's ability to determine the effects of receiver frequency and phase errors in synchronous modulation systems.
CO2	To familiarize students with techniques for generating and demodulating narrow-band and wide-band frequency and phase modulated signals.
CO3	To familiarize students with basic techniques for generating and demodulating pulse code modulated signals.
CO4	To familiarize students with issues pertaining to the transmission of digital signals over bandwidth-limited communication channels.
CO5	To familiarize students with the fundamentals of analog and digital communication systems.
CO6	Provide students with tools for communication signal analysis.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	M										
	CO2	H	M	S	L								
	CO3	H	H										
	CO4	H	M	M									
	CO5	M	M										
	CO6	H											

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship
							√		

4	Approval	37th Meeting of Academic Council, May 2015

UNIT-I OP-AMP FUNDAMENTALS AND APPLICATIONS 9

Introduction to op-amp : op-amp symbol - terminals - packages - specifications - block diagram representation - ideal op-amp - practical op-amp - open-loop and closed-loop configurations. Practical Limitations of op-amp circuits: Bias and offset currents / offset voltage - frequency compensation and stability - slew rate - CMRR. Op-amp applications: Instrumentation amplifier - - clipper and clamper circuits – LP HP BP and BR filters.

UNIT- II OP-AMP OSCILLATORS AND DATA CONVERSION DEVICES 9

Op-amp oscillators: positive feedback and Barkhausen criterion - Wien Bridge oscillator - phase shift oscillator - square / triangle / ramp function generator. Single-chip oscillators: VCO and its applications - 555 timer (Astable & Monostable operation) and its applications. Data converters: Performance specifications - D/A conversion circuits(R-2R & inverted R-2R Ladder D/A converters) - A/D conversion circuits (Successive approximation, dual slope and flash A/D converters).

UNIT –III DIGITAL DESIGN PRINCIPLES 9

Number systems: Binary codes: Weighted binary codes - non-weighted codes - error-detecting codes - error-correcting codes - alphanumeric codes. Boolean algebra and Logic simplification :

Basic theorems and properties of Boolean algebra – DeMorgan's theorems - canonical and standard forms - universal property of NAND & NOR gates - minimization of logic functions, SOPs & POSs representations, minimization of Boolean expressions using algebraic, k-map and tabular Methods - minimization of multiple output functions.

UNIT- IV COMBINATIONAL & SEQUENTIAL SYSTEM DESIGN 9

Arithmetic functions: Basic adders - subtractors - carry look-ahead adder - decimal adder - magnitude comparator. MSI Logic circuits : Decoders - Encoders - Multiplexers - DeMultiplexers - Code converters - Parity generators/checkers - implementation of combinational functions using MUX, DeMUX, decoders and code converters. Flip-flops: RS flip-flop - T flip-flop - D flip-flop - JK flip-flop - Master-Slave flip-flops - IC flip-flops - their truth table and excitation table. Shift Registers: SISO, SIPO, PISO and PIPO shift registers - bidirectional and universal shift registers. Counters: Asynchronous counter operation - Synchronous counter operation - up/down synchronous counter - ring counter - shift register counter.

UNIT –V MEMORY AND PLDS 9

Introduction to memories: Memory types and terminology - general memory operation. Read-only-Memory: ROM architecture - ROM types - ROM timing - ROM applications. Read/Write Memory: RAM architecture - Static RAM - Dynamic RAM - expanding word size and capacity. PLDs: Fundamentals of PLD - SPLDs - PAL - GAL - Introduction to CPLDs and FPGAs

TEXT BOOKS

1. Floyd and Jain, "Digital Fundamentals", Pearson Education, 8th edition, 2007
2. Morris Mano, "Digital Design", Pearson Education 3rd edition.
3. Ramakant A. Gayakwad, "op-amps and Linear Integrated Circuits", Pearson Education, 4th Edition

REFERENCES

1. John F. Wakerly, "Digital design - Principles and Practices", Prentice Hall International, 3rd edition, 2001
2. Ronald J.Tocci, Neal S.Widmer, "Digital Systems - Principles and Applications", Pearson Education, 8th edition, 2001
3. William I. Fletcher, "An Engineering Approach to Digital Design", Prentice Hall of India, 1980
4. Theodore F.Bogart. Jr, "Introduction to digital circuits", Tata McGraw-Hill International, 1992
5. Coughlin & Driscull, "Operational Amplifiers & Linear Integrated Circuits", Pearson Education, 6th edition, 2003.
6. **http://www.ie.itcr.ac.cr/mmunoz/Comunicaciones/IISem08/Libros%20y%20Documentaci%F3n/Modern%20Digital%20and%20Analog%20Communication%20(BP%20Lathi,3rd%20ed)%20.pdf**

BEC405	LINEAR INTEGRATED CIRCUITS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Digital Computer Fundamentals, Electronics Circuits.				
	Course Designed by – Dept. of Electronics and Communication Engineering.				

OBJECTIVES

- Analyze and design differential amplifier and current sources.
- Enable the students to analyze AC and DC characteristics of operational amplifier.

COURSE OUTCOMES (COs)

CO1	Explain the various current mirror circuits and analyze differential amplifier with active load.
CO2	Describe the characteristics, linear and nonlinear application of operational amplifier.
CO3	Analyze the internal modules of PLL, Analog Multiplier and review its applications.
CO4	Discuss the different types of data convertor architectures.
CO5	Review the special function ICs and its application.
CO6	Understand the concept and applications of ADC and DAC.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	L										
	CO2	M											
	CO3	H	M	M									
	CO4	M											
	CO5	M											
	CO6		M	M									

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective	Project/Term Paper/ Seminar/ Internship (PR)
							√		

4	Approval	37th Meeting of Academic Council, May 2015

UNIT-I BIASING CIRCUITS AND OPERATIONAL AMPLIFIER 9

Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads,Operational Characteristics- Frequency response characteristics - Stability limitations -Frequency Compensation-Slew rate.

UNIT-II APPLICATION OF OPERATIONAL AMPLIFIERS 9

Inverting and Non-inverting amplifiers - Voltage Follower - Summing amplifier - Differential amplifier-Log and antilog amplifier - Instrumentation amplifier - Integrator and Differentiator - Voltage to Current converter - Sinusoidal Oscillators - Active filters(butterworth) - Types- Sample and Hold circuit - Precision diode Half Wave and Full wave rectifiers - . Comparator - Zero crossing detector -Active peak detector, Clipper and Clamper - Square and Triangular waveform generators.

UNIT-III PHASE LOCKED LOOP AND ANALOG MULTIPLIERS 9

556 Voltage Controlled Oscillator -Basic principles of PLL - Basic components- Functional Block Schematic-. Derivations of expressions for Lock and Capture ranges- PLL Applications:

Frequency Synthesis - Frequency Translation - AM and FM detection. Analog Multipliers- Variable Trans conductance Multiplier- Log Antilog Multiplier- Time Division Multiplier- variable Conductance Multiplier.

UNIT-IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTORS 9

Digital to Analog converters - Binary weighed and R-2R Ladder types - Analog to digital converters - Continuous - Counter ramp, successive approximation, single, dual slope and parallel types - DAC/ADC performance characteristics and comparison.

UNIT-V APPLICATION OF ICs 9

555 Timer Functional block diagram and description - Monostable and Astable operation - Applications - - ICL 8038 Function generator IC - IC voltage Regulators: Three terminal Regulator, General purpose regulators-MA780, LM380 Power Amplifier- Isolation Amplifier, Optocoupler ICs

REFERENCES:

1. Roy Choudhury and Shail Jain "Linear Integrated Circuits", New Age Science, 2010.
2. Ramakant A. Gayakwad, "OP - AMP and Linear IC's ", Prentice Hall, 2002.
3. Sonde, B.S, ―Introduction to System Design using Integrated Circuits‖, Second Edition, Wiley Eastern Limited, New Delhi, 1994.
4. Michael Jacob J., "Applications and Design with Analog Integrated Circuits ", Prentice Hall of Inida, 1996.
5. Robert F Coughlin and Fedrick F Driscoll ―Operational amplifiers and linear Integrated Circuits‖, 6th edition, Prentice Hall of India, New Delhi, 2006.
6. Richard J. Higgins "Electronics with Digital and Analog Integrated Circuits‖, Prentice Hall of India, New Delhi, 1983.
7. Millman J. and Halkias C.C., " Integrated Electronics ", McGraw Hill, 2001.
8. **http://ishuchita.com/Books/Linear%20Integrated%20Circuits%20%20by%20%20Roychodhary.pdf**

BET703	SATELLITE COMMUNICATION	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Digital Signal Processing				
	Course Designed by – Dept. of Electronics and Telecommunication Engineering.				

OBJECTIVES

- To enable the student to become familiar with satellites and satellite services.
- Study of satellite orbits and launching.
- Study of earth segment and space segment components
- Study of satellite access by various users.
- Study of DTH and compression standards.

COURSE OUTCOMES (COs)

CO1	Define orbital mechanics and launch methodologies.
CO2	Describe satellite subsystems.
CO3	Design link power budget for satellites.
CO4	Compare competitive satellite services.
CO5	Explain satellite access techniques.

CO6	Understand the concept of LEO,GEO and MEO.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M			H								
	CO2	M	H	M									
	CO3	H	M	M	L								
	CO4	L	M		M								
	CO5												
	CO6	M	H	M	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship
							√		

4	Approval	37th Meeting of Academic Council, May 2015

UNIT-I SATELLITE ORBITS 9

Kepler‘s Laws, Newton‘s law, orbital parameters, orbital perturbations, station keeping, geo stationary and non-Geo-stationary orbits – Look Angle Determination- Limits of visibility – eclipse-Sub satellite point –Sun transit outage-Launching Procedures - launch vehicles and propulsion

UNIT-II SPACE SEGMENT AND SATELLITE LINK DESIGN 9

Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command. Satellite uplink and downlink Analysis and Design, link budget, E/N calculation-performance impairments-system noise, inter modulation and interference, Propagation Characteristics and Frequency considerations- System Reliability and design lifetime.

UNIT-III SATELLITE ACCESS 9

Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Broadcast, multiple access: FDMA, TDMA, CDMA, Assignment Methods, Spread Spectrum communication, compression – encryption.

UNIT-IV EARTH SEGMENT 9

Earth Station Technology-- Terrestrial Interface, Transmitter and Receiver, Antenna Systems TVRO, MATV, CATV, Test Equipment Measurements on G/T, C/No, EIRP, Antenna Gain. Case study: Design an Uplink and Downlink for a typical satellite

UNIT-VSATELLITE APPLICATIONS 9

INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Digital audio broadcast (DAB)- World space services, Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet.

REFERENCES:

1. Dennis Roddy, Satellite Communication', McGraw Hill international, 4th Edition, 2006. Timothy Pratt, Charles Bostian& Jeremy Allmuti, "Satellite Communications", John Wiley & Sons. Second edition 2008.
2. N.Agarwal, _Design of Geosynchronous Space Craft, Prentice Hall, 1986.
3. Bruce R. Elbert, _The Satellite Communication Applications' Hand Book, ArtechHouse Bostan London, second edition 2004.
4. **http://sedighy.ir/wp-content/uploads/2014/10/ ebooksclub.org__Introduction_ to_Satellite_Communication__Artech_House_Space_Applications_.pdf**

BBM055	TELEMEDICINE	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Computer Networks				
	Course Designed by – Dept. of Bio Medical Engineering.				

OBJECTIVES

To learn Ethical and legal issues of Telemedicine - Confidentiality and the law - Patient rights and consent - Access to medical Records.

COURSE OUTCOMES (COs)

CO1	To learn introduce telemedicine advancements in telemedicine .Benefits of tele medicine, Functional Block of a telemedicine system,Tele healthcare.
CO2	To learn Mobile hand held devices and mobile communication - Internet technology and telemedicine using World Wide Web - Video and audio conferencing.
CO3	To have a clear view on medical images diagnosis and treatment - Hospital information - Doctors, paramedics, facilities available.
CO4	To learn Protein Identification Resource(PIR) - Telemedicine in Neuroscience – Telecardiology – Teledermatology – Teleneurology
CO5	To learn Telemedicine technology and Health care delivery for rural population - Use of telemedicine technology for clinical diagnostic study.
CO6	To learn Video Conferencing techniques.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1				M								
	CO2		H	H	M		M						
	CO3		M				H			M			H
	CO4	H			H						H		`
	CO5			H		H							
	CO6						M						M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
							√		

4	Approval	37th Meeting of Academic Council, May 2015

UNIT- I FUNDAMENTALS OF TELEMEDICINE 9

History and advancements in telemedicine - Benefits of telemedicine – Functional Block of a telemedicine system - Tele-healthcare and E-medicine - Use of computers in distance mode of healthcare delivery - Familiarizing with technology of telemedicine – scanner, electro stethoscope - data reception equipment - Scope for telemedicine - Cyber laws related to telemedicine - Telemedicine access to health care services - Limitations of telemedicine.

UNIT- II COMMUNICATION SYSTEMS AND NETWORKS IN TELEMEDICINE 9

Communication infrastructure for telemedicine - LAN and WAN technology - Satellite communication - Mobile hand held devices and mobile communication - Internet technology and telemedicine using World Wide Web - Video and audio conferencing - Types of information - Audio, Video, Still images, Text and data, fax - Types of communication and network - PSTN, POTS, ANT, ISDN, Internet, Wireless communication - GSM satellite, and Microwave – Signal Modulation techniques - Data compression and transfer - Capturing Medical Signals - Types of antennas depending on requirements, Integration and operational issues - System integration, store –and - forward operation, Real-time Telemedicine – Remote Sensing.

UNIT- III DATA EXCHANGE, MANAGEMENT, SECURITY AND STANDARDS IN TELEMEDICINE 9

Network Configuration - circuit and packet switching - H. 320 series (Video phone based ISBN) - T. 120, H.324 (Video phone based PSTN) - Encryption - Cryptography - Mechanisms of encryption - phases of Encryption - Protocols - TCP/IP, ISO-OSI Standard - DICOM, HL7 - Medical information storage and management for telemedicine - Patient information medical history - Test reports, medical images diagnosis and treatment - Hospital information - Doctors, paramedics, facilities available - Pharmaceutical information – Information Security and confidentially of medical records and access control

UNIT- IV APPLICATIONS OF TELEMEDICINE 9

Introduction - Archives - Electronic Documentation - Business aspects - Common Access to Biological Resources and Information (CABRI) - Database indexing and search terms - Nucleic and genome databases - Molecular data base and servers - Array express - Gateway to archives - Sequential retrieval system - Protein Identification Resource(PIR) - Telemedicine in Neuroscience – Telecardiology – Tele dermatology – Teleneurology – Tele ophthalmology – Telepathology – Teleoncology – Telepediatrics – Telepharmacy – Telepsychiatry and mental health – Teleradiology – Telesurgery – Veterinary – Other specialties

UNIT V ETHICAL ASPECTS AND CASE STUDIES IN TELEMEDICINE 9

Ethical and legal issues of Telemedicine - Confidentiality and the law - Patient rights and consent - Access to medical Records - Consent treatment - Jurisdictional Issues - Intellectual property rights - Telemedicine technology and Health care delivery for rural population - Use of telemedicine technology for clinical diagnostic study - Conceptual frame work on home telemedicine.

TEXT BOOKS

1. Olga (EDT) Ferrer – Roca, M.Sosa (EDT) Iudicissa Hand book of Telemedicine IOS press 2002.
2. A.C. Norris, Essentials of Telemedicine and Telecare John Sons & Ltd, 2002.
3. Marilyn J. Field, "A Guide to Assessing Telecommunications in Health Care",NATIONAL ACADEMY PRESS,1996.
4. Bashshur , R. L. , Sanders, J. H and Shannon, G. W.,"Telemedicine: Theory and Practice", Volume 27, Number 2,Springer Netherlands,1999,

REFERENCES

2. Norris, A.C. Essentials of Telemedicine and Telecare. Wiley (ISBN 0-471-53151-0), 2002
3. Wootton, R., Craig, J., Patterson, V. (Eds.), Introduction to Telemedicine. Royal Society of Medicine Press Ltd (ISBN 1853156779), 2006
4. Ferrer-Roca, O., Sosa-Iudicissa, M. (editors), Handbook of Telemedicine. IOS Press (Studies in Health Technology and Informatics, Volume 54). (ISBN 90-5199-413-3), 2002.
5. Simpson, W. 2006. Video over IP. A practical guide to technology and applications. Focal Press (Elsevier). ISBN-10: 0-240-80557-7.
6. **http://ebooks.iospress.nl/volume/current-principles-and-practices-of-telemedicine-and-e-health**

BBR404	**GENOMICS AND PROTEOMICS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Biology for Engineers				
	Course Designed by – Dept. of Genetics Engineering.				

OBJECTIVES

To learn Coding, non-coding chromosome and Applications of Proteome analysis- Proteomics in drug discovery.

COURSE OUTCOMES (COs)

CO1	Have Knowledge of Organization and structure of genomes, Genome Size.
CO2	Understand the Chromosomes Microdissection. Chromosomal mapping techniques.
CO3	To understand the Functional Genomics.
CO4	To understand the principle of Mass spectrometry
CO5	Have Knowledge about Functional genomics.
CO6	Have Knowledge about Proteomics.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H											
	CO2		L	H		M							
	CO3		M		H								
	CO4	H		M	L								
	CO5					M							
	CO6	M		M	L								

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship
							√		
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT –I INTRODUCTION TO GENOMICS 9

Organization and structure of genomes, Genome Size – Genome structure in Viruses and microbes, Coding, non-coding chromosomes and high order structures – Genomes relatedness.

UNIT- II PHYSICAL MAPPING TECHNIQUES 9

Chromosomes Microdissection.Chromosomal mapping techniques. Top down and bottom up approach – Linking and jumping of clones – Genome sequencing – Placing small fragments on map – STS assembly – Gap closure – Pooling strategies – Cytogenetic mapping techniques.

UNIT- III FUNCTIONAL GENOMICS 9

Gene finding – Annotation – ORF and functional prediction – Subtractive DNA library, screening –DNA sequencing -Hybridization techniques– Differential display and representational difference analysis – SAGE – TOGA., Analysis of RNA expression - Comparative genomics . Bioinformatics tools used in Genomics-

UNIT IV PROTEOMICS TECHNIQUES 9

Proteome – Bridging Genomics and Proteomics - Analysis of Proteome - Protein level estimation – Edman protein microsequencing – Protein cleavage – 2D gel electrophoresis – Metabolic labeling – Detection of proteins on SDS gels – Pattern analysis – Mass spectrometry – Principles of MALDI-TOF – Tandem MS-MS – Peptide mass fingerprinting.

UNIT V PROTEIN PROFILING 9

Post translational modification – Protein-protein interaction –Protein Chips – Applications of Proteome analysis- Proteomics in drug discovery- Phage antibodies as tools – Proteomics in plant genetics and breeding - Glycoprotein analysis –Phosphoprotein analysis- Genomics Vs Proteomics.

TEXT BOOKS

1. Primrose, S.B. and Twyman, R.H., "Principles of Genome Analysis and Genomics", Blackwell Publishing Co., 2003.
2. Liebler, D.C., "Introduction to Proteomics", Humana Press, 2002

REFERENCES

1. Pennington, S.R. and Dunn, M.J., "Proteomics", BIOS Scientific Publishers, 2001.
2. Hunt, S.P., Livesey, R. and Livesey, F.J., "Functional Genomics: A PracticalApproach" Oxford University Press, 2000.
3. Suhai S., "Genomics and Proteomics: Functional and Computational Aspects", Springer, 2000.

4. Cantor, C.R. and Smith, C.L., "Genomics: The Science and Technology Behind the Human Genome Project", Wiley and Sons, 1999.
5. Discovering Genomics, Proteomics, & Bioinformatics. Campbell &Heyer (2003) Pearson Education,ISBN:0-8053-4722-4.
6.Bioinformatics, Methods of Biochemical Analysis Series Vol. 43, Baxevanis& Ouellette (2001) John Wiley & Sons, ISBN 0-471-38391-0
7.Computational Molecular Biology.Pevzner, P.A. (2000) MIT Press, ISBN: 0262.
8.**http://authors.library.caltech.edu/9665/1/VAIieeecsm04.pdf**

OPEN ELECTIVE-I

BCS010	**TCP/IP PRINCIPLES AND ARCHITECTURE**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	3	0	0	3
	Prerequisite –Computer Networks				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

To provide a solid foundation for understanding the communication process of the Internet exposure to fundamental concepts of computer networking in the context of the TCP/IP model and protocols.

COURSE OUTCOMES (COs)

CO1	Understand the principles of internetworking protocols.
CO2	Have aSummarize the functions of transport protocols.
CO3	Learn the concepts of routing
CO4	Learn the concept of Rlogin and UDP.
CO5	Have knowledge ofSubnetting and Supernetting.
CO6	Get an exposure to various next generation protocols in internetworking.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	L					H						M
	CO2		M				H						
	CO3	L	M										M
	CO4	M					M						
	CO5	L	M				M						M
	CO6		H				M						M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√	

4	Approval	37th Meeting of Academic Council, May 2015

UNIT- I INTRODUCTION 9

Protocols and standards - OSI model - TCP/ IP protocol suite - addressing -Version - Underlying technologies.

UNIT –II IP ADDRESSES, ROUTING, ARP AND RARP 9

Classful addressing - other issues - Subnetting - Supernetting - classless addressing - routing Methods - delivery - table and modules - CIDR - ARP package - RARP.

UNIT-III IP, ICMP, TGMP AND UDP 9

Datagram - fragmentation - options - checksum - IP package - ICMP - messages, formats - error reporting - query - checksum - ICMP package - IGMP - messages, operation - encapsulation - IGMP package - UDP - datagram - checksum - operation - uses - UDP package.

UNIT- IV TCP, UNICAST AND MULTICAST ROUTING PROTOCOLS 9

Services - flow, congestion and error control - TCP package and operation - state transition diagram - unicast routing protocols - RIP - OSPF - BGP - multicast routing - trees - protocols - MOSPF - CBT - PIM.

UNIT- V APPLICATION LAYER, SOCKETS 9

Client server model - concurrency - processes - sockets - byte ordering - socket system calls - TCP and UDP client-server programs - BOOTP -DHCP - DNS - name space, resolution - types of records - concept - mode of operation - Rlogin.

TEXT BOOKS:

1.Behrouz A. Forouzan, "TCP/IP Protocol Suite", 4th edition, McGraw Hill, 2013.
2.Douglas E. Comer, "Internetworking with TCP/IP: principles, protocols and architecture" (Volume1), 6th Edition, PHI Learning, 2013.

REFERENCES:

1. Douglas E. Comer, David L. Stevens, "Internetworking with TCP/IP, design, implementation and internals Volume 2, 3rdEdition, PHI Learning, 2009.
2. Ed Tittel, Laura Chappell, "TCP/IP", 1st Edition, Cengage Learning, 2008.
3. Dr. SidnieFeit, TCP/IP, architecture, protocols and implementation with IPv6 and IP Security, Tata McGraw-Hill, 2008.
4.**http://cpe.rmutt.ac.th/network/images/cn/[3]Comer_Douglas_Internetworking_with_TCP_IP_Vol.1.pdf**

BCS011	PERFORMANCE EVALUATION IN COMPUTER SYSTEMS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –System Simulation and Modelling ,Operating Systems				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

To understand the mathematical foundations needed for performance evaluation of computerSystems.

COURSE OUTCOMES (COs)

CO1	To understand the analytical modeling of computer systems.

CO2	Analyze a given problem for possibilities of parallel computations.
CO3	Select algorithms and hardware for the solution of high performance projects.
CO4	Use appropriate programming languages efficiently for scientific computations.
CO5	Program computers with shared and distributed memory architectures.
CO6	Run parallel programs on different hardware architectures and software environments.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M											H
	CO2	L	M										
	CO3		M	M					M	M			
	CO4	M											M
	CO5	M				M							H
	CO6	L		M					M				M

3	Category	Humanities & Social Studies	Basic Sciences &Maths	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√	

4	Approval	37th Meeting of Academic Council, May 2015

UNIT-I OVERVIEW OF PERFORMANCE EVALUATION 9

Need for Performance Evaluation in Computer Systems – Overview of Performance Evaluation Methods – Introduction to Queuing – Probability Review – Generating Random Variables for Simulation – Sample Paths, Convergence and Averages – Little's Law and other Operational Laws – Modification for Closed Systems.

UNIT-II MARKOV CHAINS AND SIMPLE QUEUES 9

Discrete-Time Markov Chains – Ergodicity Theory – Real World Examples – Google, Aloha – Transition to Continuous-Time Markov Chain – M/M/1 and PASTA.

UNIT-III MULTI-SERVER AND MULTI-QUEUE SYSTEMS 9

Server Farms: M/M/k and M/M/k/k – Capacity Provisioning for Server Farms – Time Reversibility and Burke's Theorem – Networks of Queues and Jackson Product Form – Classed and Closed Networks of Queues.

UNIT-IV REAL-WORLD WORKLOADS 9

Case Study of Real-world Workloads – Phase-Type Distributions and Matrix-Analytic Methods – Networks with Time-Sharing Servers – M/G/1 Queue and the Inspection Paradox – Task Assignment Policies for Server Farms.

UNIT-V SMART SCHEDULING IN THE M/G/1 9

Performance Metrics – Scheduling Non-Preemptive and Preemptive Non-Size-Based Policies - . Scheduling Non-Preemptive and Preemptive Size-Based Policies – Scheduling - SRPT and Fairness.

TEXT BOOKS

1. MorHarchol - Balter, "Performance Modeling and Design of Computer Systems – Queueing Theory in Action", Cambridge University Press, 2013.
2. LievenEeckhout, "Computer Architecture Performance Evaluation Methods", Morgan and Claypool Publishers, 2010.

REFERENCES

1. Paul J. Fortier and Howard E. Michel, "Computer Systems Performance Evaluation and Prediction", Elsevier, 2003.
2. **http://barbie.uta.edu/~jli/Resources/Resource%20Provisoning&Performance%20Evaluation/17.pdf**

BCS012	ADVANCED COMPUTER NETWORKS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Computer Networks				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

The objective of Advanced Computer Networks is to cover theoretical topics in the areas of advanced networking technologies, distributed computing.

COURSE OUTCOMES (COs)

CO1	Learn the concept of basic Network architecture.
CO2	Understand the various routing Methods.
CO3	Learn the concept about Networking and its types.
CO4	To Acquire experience in Domain Name System.
CO5	Understand the Networking Attacks.
CO6	Have a knowledge about how to protecting the data from intruders.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M		H									
	CO2	L	M	M	H								M
	CO3	M	M	M	M								
	CO4	M		H									M
	CO5	L			H	M							
	CO6												

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

								√	
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT-I NETWORK ARCHITECTURE 9

Review of Basic Network Architectures: OSI reference model, TCP/IP reference model, ATM reference model; Applications(WWW, Audio/Video Streaming, Video conference, Networked Games, Client/Server); Traffic Characterization (CBR, VBR); Switching Paradigms; Multiplexing; Error Control; Flow Control, FTH, DTH, PON, ISDN, DSL, CATV, SONET, Optical Networks.

UNIT-II NETWORK TECHNOLOGIES 9

Local Area Network Technologies: Fast Ethernet, Gigabit Ethernet, IEEE 802.11 WLAN, Bluetooth, Connecting LANs, VLANS.

UNIT-III ROUTING AND ITS TYPES 9

Internetworking: Inter domain Routing, BGP, IPv6, Multicast Routing Protocols, Multi Protocol Label Switching, Virtual Private Networks, High speed transport protocols, Quality of Service Mechanisms, Improving QoS in Internet, DiffServ and IntServ Architectures, RSVP.

UNIT-IV DOMAIN NAME SYSTEMS 9

Distributed Systems: Naming, DNS, DDNS, Paradigms for Communication in Internet, Caching, Issues of Scaling in Internet and Distributed Systems, Caching Techniques forWeb, Protocols to Support Streaming Media, Multimedia Transport Protocols, Content Delivery Networks, Overlay and P2P Networks.

UNIT-V ATTACKS AND SECURITY IN NETWORK 9

Applications and Other Networking Technologies: RTP, RTSP, SIP, VoIP, Security Systems, SSH, PGP, TLS, IPSEC, DDoS Attack, Mitigation in Internet, Security in MPLS; Introduction to Cellular, Satellite and Ad hoc Networks.

REFERENCES:

1. Behrouz A. Forouzan, Data Communications and Networking, Fourth Ed., Tata McGraw Hill, 2006.
2. Larry L. Peterson and Bruce S. Davie, Computer Networks: A Systems Approach, Fourth Ed., Morgan Kaufmann, 2007.
3. Markus Hoffmann and Leland R. Beaumont, Content Networking: Architecture, Protocols, and Practice, Morgan Kauffman, 2005.
4. **http://www.cs.wayne.edu/~hzhang/courses/7290/Lectures/0-0%20-%20Course%20plan.pdf**

BCS013	**MOBILE COMMUNICATION**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Computer Networks				
	Course Designed by – Dept. of Computer Science and Engineering.				
OBJECTIVES					

The objective of This course is designed to all student understand about Medium Access Control (MAC), Wireless LAN, Bluetooth.	
COURSE OUTCOMES (COs)	
CO1	Understand the concepts and features of mobile networks.
CO2	Understand the working principles of wireless communication protocols.
CO3	Compare the routing protocols of mobile networks.
CO4	Learn DLL and MAC layer protocols for reliable and noisy channels.
CO5	Learn TCP & UDP protocols.
CO6	Have knowledge Radio signal propagation and properties of wireless communication systems.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	F		H									M
	CO2	M		H									
	CO3			H					M				
	CO4			H									M
	CO5	M		M									
	CO6								M				

3	Category	Humanities & Social Studies	Basic Sciences &Maths (BS)	Engg Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√	

4	Approval	37th Meeting of Academic Council, May 2015

UNIT – I INTRODUCTION 9

Medium access control – Telecommunication systems – Broadcast systems-SDMA-TDMA-FDMA-TCP/IP-UDP.

UNIT – II STANDARDS 9

Wireless LAN: Features-Security standards –Protocol Stack- IEEE 802.11: Standards-Architecture-Frame format-Features –HIPERLAN: Architecture-Standards – Bluetooth and Its Application.

UNIT-III ADHOC NETWORKS 9

Characteristics-Performance issues- Routing in mobile hosts-Applications of Ad hoc wireless networks-Issues in Ad hoc networks: Medium Access Scheme-Security-Energy management-Deployment Considerations.

UNIT-IVNETWORK ISSUES 9

Mobile IP - DHCP - Mobile transport layer - Indirect TCP - Snooping TCP -Mobile TCP - Transmission time-out freezing - Selective retransmission -Transaction oriented TCP.

UNIT-V APPLICATION ISSUES 9

Wireless application protocol - Dynamic DNS - File systems - Synchronization protocol - Context- aware applications - Security - Analysis of existing wireless network.

TEXTBOOK

1. J. Schiller, "Mobile Communications", 2nd Edition, Pearson Education, 2005.
2. William Stallings, "Wireless Communications and Networks", Pearson Education, 2002

REFERENCES

1. KavehPahlavan, PrasanthKrishnamoorthy, "Principles of Wireless Networks", 1stEdition, Pearson Education, 2003.
2. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "Principles ofMobile Computing", Springer, 2003.
3. C.K.Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.
4. **https://sgar91.files.wordpress.com/2011/10/mobile_communications_schiller_2e.pdf**

BCS014	**HIGH SPEED NETWORKS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Computer Networks				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

This course gives an overview of High speed computer networks and TCP/IP protocols. It also discusses the security and network management aspects.

COURSE OUTCOMES (COs)

CO1	To learn High speed networks, Traffic and congestion management.
CO2	To understand resource allocation and service management approaches.
CO3	Compare the routing protocols of mobile networks.
CO4	Understand wireless network operations and functions.
CO5	Learn network management and its protocols.
CO6	Have knowledge ATM protocol Architecture.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	M	M	H	H								
	CO2		M	H	H								
	CO3			H	H								
	CO4			H	H								
	CO5		H										
	CO6	M	M	H	M								

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)

								√	
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT-I HIGH SPEED NETWORKS 9

Introduction-frame relay networks –ATM protocol architecture-ATM logical connection –ATM cells-ATM service categories -AAL- high speed LANS: the emergence of high speed LANS-Ethernets-fiber channel-wireless LAN.

UNIT-II CONGESTION CONTROL 9

Congestion control in data networks and internets-link level flow and error control TCP Traffic - congestion control in ATM networks- Interior routing protocols.

UNIT-III QOS AND SWITCHING 9

Integrated service architecture-queuing discipline -random early detection differentiated services protocol for QOS support- RSVP- Multiportal Label switching - Real time transport protocol- IP v6.

UNIT-IV WIRELESS LAN 9

Local broad band and Ad hoc networks .Introduction to wireless LANS-IEEE 802.11 WLAN-WATM-HIPERLAN-Ad hoc networking and WPAN.

UNIT-V NETWORK MANAGEMENT AND APPLICATION 9

Network management- choosing a configuration method-MIB-SNMP-XMLCORBA-COPS-VPNS-Mobile IP-voice over IP

TEXTBOOKS:

1. Williams Stallings, ”High Speed networks and Internet Performance and Quality of Service”, Pearson Second Edition, 2002.
2. KavenPahlavan and PrashantKrishnamoorthy, “Principles of Wireless Network”, Prentice Hall Of India, 2010
3. Adrian Farrel,” The Internet and Its Protocols”, Elsevier Publications, 2011.

REFERNCES:

1. Behrouz A. Forouzan, “Data Communication and Computer Networking”, 4thedition, 2011.
2. Larry L. Peterson and Bruce S.Davie, ”Computer Networks”, Third edition, Elsevier Publications, 2003.
3. **http://www.kiv.zcu.cz/~ledvina/vyuka/PDS/PDS-tut/HighSpeedNetworks/hsn0101.pdf**

BBA009	**INTELLECTUAL PROPERTY RIGHTS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite – Value Education and Professional Ethics & Professional Courses				
	Course Designed by – Dept of Management Studies				

OBJECTIVES

Strong intellectual property rights (IPR) protection is crucial to fostering trade, and

achieving the goals and benefits of global integration. Countries with high standards of IPR protection tend to attract more investment, stimulate more innovation, thereby developing more rapidly. Countries with inadequate protection are often vulnerable to infringements of intellectual property rights that hinder trade flow and economic development.

Hence, the objective is to introduce IPR to the UG Engineering and Technology students.

COURSE OUTCOMES (COs)

CO1	Understand the principles, function and basic legal rules of IP Law.
CO2	Recognize the relevant criteria for generating and protecting intellectual works.
CO3	Recognize the intellectual property likely to be produced in the academic and professional environment.
CO4	Demonstrate appreciation and critical awareness of pertinent IP issues in the academic and professional lives.
CO5	Understand the relevance and impact of IP Law on academic/scientific works/studies.
CO6	Understand the different forms of infringement of intellectual property rights.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H					H					H	
	CO2		H		M					H			
	CO3	M							M		H		
	CO4			M	H							H	
	CO5							M					
	CO6	H			H					M			L

3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper Seminar/ Internship (PR)
								√	
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT I PROPERTIES AND TYPES 9

Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i). Movable Property ii. Immovable Property and iii. Intellectual Property.

UNIT II PATENTS AND RIGHTS 9

IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures..

UNIT III INTERNATIONAL TRADE 9

International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT).

UNIT IV WTO 9

Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.

UNIT V CASE STUDIES 9

Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TEXT BOOKS:

1. Subbaram N.R. "Handbook of Indian Patent Law and Practice ", S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.

REFERENCES:

1. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000.
4. www.ipmatters.net/features/000707_gibbs. html.
5. http://www.metastudio.org/Science%20and%20Ethics/file/readDoc/535a76367d9d331598f49e2d/34_Hb_on_IPR.pdf

NON MAJOR ELECTIVE-II

BCS015	PHP PROGRAMMING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Internet Programming ,Web Technology				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

This course gives all students exposure to basics of PHP and gives knowledge on session tracking and graphics using PHP.

COURSE OUTCOMES (COs)

CO1	To learn Recognize the difference between HTML, XHTML, MySQL& PHP.
CO2	To understand Differentiate between PHP Web & HTML Controls.
CO3	Understand different Web controls.
CO4	Apply the Understand connecting Web pages with DB.
CO5	Understand about Classes, Constructors.

CO6	Have knowledge about Data Storage.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1			H									
	CO2	M		H		M							M
	CO3			H									
	CO4			H									M
	CO5	M				H							
	CO6	L		M		M							M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√	

4	Approval	37th Meeting of Academic Council, May 2015

UNIT –I PHP INTRODUCTION 9

PHP Basics - Evolution of PHP - Introduction to PHP Programming Variables, Operators, and Constants: Introduction to Variables – Operators – Type Juggling - Type Casting - Variable Variables - function for Determining and Setting Variable- Types - Constants. Control Structures: Conditional Expressions- Arrays: Introduction to Arrays- Initializing Arrays - Working with Arrays. Functions: Introduction to Functions - Passing Arguments to Functions - Returning Values from Functions - Understanding the Scope of a Variable within a Function, Variable Functions and Variable Argument Functions

UNIT- II UNDERSTANDING CLASSES 9

Classes – Constructors - Extending a class, Form Parsing in PHP: Parsing HTML Posted Values in PHP - Form Validation- Printing the Confirmation Page - Printing Hidden Fields - Putting Theory into Practice. Handling Files: Working with Files - Putting Theory into Practice.

UNIT III HANDLING DATA STORAGE 9

An Introduction to Database Concepts - Database Management System - Relational Database Management System - Database Normalization - PHP Support to various Databases - Web Database Architecture -MySQL Database Programming.Using PHP with SQL Databases: Working with MySQL - Using Multiple Databases Simultaneously - Important PHP-MySQL Functions - Error handling in MySQL – Error Types in PHP - Creating Customized Error Handlers.

UNIT- IV SESSION TRACKING 9

An Overview of Sessions - Tracking Sessions. Input Validators in PHP: Validation Basics - Performing Validations in an HTML Web Page - Performing Validations in PHP - Functions for Validating User Input - Validating Email Addresses. Cookies: What Is a Cookie? Implementing Cookies in PHP - Are Cookies Harmful?

UNIT –V GRAPHICS IN PHP **9**

Graphics on the web - Creating Images in PHP. Understanding CVS: CVS an Overview – The CVS Repository – Environment Variables in CVS - CVS Command Options. PEAR: Introduction to PEAR – Coding Standards in PEAR – PEAR and CVS – Contributing Codes to PEAR – Requirements to Make Changes in PEAR – Help in PEAR.

TEXT BOOKS:

1. Matt Doyle," Beginning PHP 5.3",Wiley,2011.
2.AshishWilfred,Meeta Gupta and KartikBhatnagar with NIIT, "PHP Professional Projects", Prentice Hall of India, 2002.

REFERENCES:

1. Kevin Tatroe, Peter MacIntyre, RasmusLerdorf ,"Programming PHP",O'Rielley,2013.
2.RasmusLerdorf and Kevin Tatroe, "Programming in PHP", O'Reilly and Associates, 2002.
3.**http://www.infoap.utcluj.ro/multi/programming_PHP.pdf**

BCS016	**VIRTUAL REALITY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –System Modelling and Simulation.				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

This course gives Design a virtual environment and compelling virtual reality experience.

COURSE OUTCOMES (COs)

CO1	Be able to understand about computer graphics and 3 D.
CO2	Comprehend and analyze the fundamental issues of virtual reality**.**
CO3	Be able to familiar with virtual reality hardware.
CO4	Create compelling virtual experiences.
CO5	Learn the concepts about animating the virtual environment.
CO6	Have knowledge about virtual reality applications.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1	H	H		H	H							
	CO2	H	H		H								M
	CO3		M										
	CO4	H			M	M							
	CO5												M
	CO6	M	H		H	M							

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship
								√	
4	Approval	37th Meeting of Academic Council, May 2015							

UNIT-I VIRTUAL REALITY AND ENVIRONMENTS 9

Introduction - Computer graphics - Real-time Computer Graphics -, Flight Simulation - Virtual environments- Requirements- Benefits of virtual reality. The historical development of virtual reality: Scientific landmarks, 3d computer graphics: Virtual world space - Positioning the observer- Perspective projection - Human vision - Stereo perspective Projection - Human Vision -Stereo Perspective Projection - 3D clipping - Color theory - 3D Modeling -Illumination models - Reflection models - Shading Algorithms - Hidden surf ace removal - Stereographic Images.

UNIT-II GEOMETRIC MODELING 9

Conversion from 20 to 3D-3D Space curves-3D Boundary Representation -modeling strategies. Geometric Transformations ; Frames of references -Modeling Transformations - Instances - Packing - Flying - Scaling the Virtual Environment-Collision detection. Generic Virtual Reality: Virtual Environment - Computer environment - Virtual reality Technology- Models of interaction - Virtual Reality Systems.

UNIT-III ANIMATING THE VIRTUAL ENVIRONMENT 9

The dynamics of numbers - Animation of objects - shape and Object In betweening - Frame-from deformation - Particle systems Physical Simulation Objects falling in a gravitational field - Rotating Wheels-Elastic collision -Projectiles - simple Pendulums - Springs - Flight dynamics of an aircraft. Human Factors; Eye-Ear- Somatic senses- Equilibrium.

UNIT-IV VIRTUAL REALITY HARDWARE 9

Sensor Hardware - Head Coupled displays - Acoustic hardware - Integrated Virtual Reality systems. Virtual Reality Software: Modeling virtual worlds -Physical Simulation-Virtual Reality Toolkits.

UNIT-V VIRTUAL REALITY APPLICATIONS 9

Engineering-Entertainment-Science-Training Future of Virtual Reality: Virtual environments - Models of interactions.

REFERENCES:

1. John Vince, “Virtual Reality Systems”, Pearson Education, 2005.
2. Adams, “Visualization of Virtual Reality”, Tata McGraw Hill, 2000.
3. **http://www.cs.tut.fi/kurssit/SGN-5406/lectures/VR1-introduction.pdf**

BCS017	E COMMERCE	L	T	P	C
	Total Contact Hours - 45	3	0	0	3

	Prerequisite –Internet Programming ,Web Technology
	Course Designed by – Dept. of Computer Science and Engineering.

OBJECTIVES

This course Discuss the current drivers and inhibitors facing the business world in adopting and using Ecommerce.

COURSE OUTCOMES (COs)

CO1	Create and refine website and application designs based on industry's usability.
CO2	Assess the suitability of various design principles for websites and applications.
CO3	Apply the skills necessary for large-scale project development on the Web.
CO4	Apply the technologies required to design and prototype Web-based information system
CO5	Recognize the business impact and potential of e-Commerce.
CO6	Understand the nature of e-Commerce.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1								H				
	CO2	M				M			H				
	CO3	M							H			H	
	CO4								H				
	CO5					M						M	
	CO6	M							H			M	

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√	

4	Approval	37th Meeting of Academic Council, May 2015

UNIT-I ELECTRONIC COMMERCE 9

Electronic Commerce, Electronic Data Interchange (EDI), E-Commerce Types – PC and networking: Networking, Communication media – Computer Communication Systems: ISO model, Electronic mail, X.400 Message Handling System, E-mail security, Lightweight directory access protocol – Internet: Introduction, Communication protocols, Issues of concern.

UNIT-II ELECTRONIC DATA INTERCHANGE 9

EDI: Introduction, Cost and Benefits, Components of EDI System, Implementation Issues – UN/EDIFACT Standard: Introduction, An EDIFACT Message, Interchange Structure, Message Directories - EDI Over Internet, Commerce Over Extranets, Identification and Tracking Tools.

UNIT-III BUSINESS PROCESS REENGINEERING 9

Business process reengineering – Approach to BPR, BPR methodology – Change management: Change management in the Government, Implementation plan.

CONCERNS FOR E-COMMERCE GROWTH

Legal issues, Risks: Paper document versus electronic document, Technology for authenticating an electronic document, Laws for e-commerce, EDI interchange agreement.

UNIT-IV CYBER SECURITY 9

Cyber Attacks, Hacking, Firewalls, IDS, Secure Sockets Layer, Symmetric and asymmetric crypto systems, Guidelines for Cryptography Policy, Developing a Security Policy.

CYBER CRIMES: Cybercrimes and the Information Technology Act, 2000, Cyber forensics

UNIT-V CASE STUDIES 9

E-Commerce: Case Studies: ITC's e-Choupal - E-Governance: Case Studies: Indian customs EDI System, Indian Railways, Government of Andhra Pradesh – eSeva.

COMPUTER EMERGENCY RESPONSE TEAM (CERT): Introduction, CERT-In, CERT-In Activities

REFERENCE BOOKS:

1. Kamlesh K Bajaj, Debjani Nag, "E-Commerce – The Cutting Edge of Business", Tata McGraw Hill, Second Edition, 2006
2. David Whitley, "E-Commerce: Strategy, Technologies and applications", McGraw Hill, 2000.
3. Ravi Kalakota and Andrew B. Whinston, "Frontiers of Electronic commerce", Pearson Education, 2005.
4. Pete Loshin, Paul A. Murphy, "Electronic Commerce", Jaico Publisher.
5. **https://books.google.co.in/books?id=Co8iBAAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false**

BCS018	**ADVANCED WEB DESIGN**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Internet Programming ,Web Technology				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

This course builds web applications using ASP and client side script technologies use with Microsoft's IIS.

COURSE OUTCOMES (COs)

CO1	Create richly interactive environments natively within browsers.
CO2	Build web application frameworks which facilitate rapid application development.
CO3	Integrate web applications easily into other server-side web procedures, such as email and

	searching.												
CO4	Understand about web design concepts.												
CO5	Learn various tools and concepts using to build web applications.												
CO6	Understand the role of scripting in web designing.												

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1			H									
	CO2			H		H							
	CO3			H		M							M
	CO4												
	CO5												
	CO6			M		H							M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√	

4	Approval	37th Meeting of Academic Council, May 2015

UNIT – I FUNDAMENTALS 9

Introduction to the Web-Web enabling Technologies-Web Service Protocol-web Design Concepts- Examining Good and Bad Web Design-Page Design Resources.

UNIT – II SIMPLE DESIGN ISSUES 9

Page Design-HTML-Web Page Style Considerations-Page composition-Type Faces-Tag Parameters-Color and Graphics for web Pages-WYSIWYG web Page Editor-Dream Weaver.

UNIT – III ADVANCE DESIGN ISSUES 9

Advanced Page Design-Tables and Frames-Preparing Graphics and animations Forms-Cascading Sheets-User interface Design-Page grid-Page Templates-Usability Testing.

UNIT – IV SCRIPTING IN DESIGN 9

Typography and Graphic Design for the Web-Creating Transparent GIP- Lean Graphics-Image Maps-Palette Map-web Programming-Web Site Garage-W3C HTML Validation Services-Net Mechanic-DHTML-XML.

UNIT –V TOOLS AND APPLICATIONS 9

Online Applications-Developing an Online Shopping application-Database Design Issues-Connecting Database with tools such as Java, ASP, Cold fusion-Designing Portals and Vortals.

TEXT BOOK:

1. Deitel and Deitel, "Internet and World Wide Web-How to Program", 3rd Edition, Pearson Education, 2005.

REFERENCES:

1.N.P.Gopalan&J.Akilandeswari, "Web Technology: A Developer's Perspective", PHI Learning,2008
2.JeffFrantzen and Sobotka, "Java Script", Tata McGraw Hill, 2002.
3.JustinHunter,William Crawford, "Java Servlet Programming", O'Reilly Publications, 2nd Edition, 2001.
4.**http://cdn.oreillystatic.com/oreilly/booksamplers/9781449319274_sampler.pdf**

BCS019	**OBJECT ORIENTED DATA BASE DESIGN**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	3	0	0	3
	Prerequisite –Database Management Systems ,Software Engineering				
	Course Designed by – Dept. of Computer Science and Engineering.				

OBJECTIVES

The objective of the course is to provide postgraduate students with a sound technical exposure to the concepts, principles, Methods, and best practices in software architecture.

COURSE OUTCOMES (COs)

CO1	Design and motivate software architecture for large scale software systems.
CO2	Recognize major software architectural styles, design patterns, and frameworks.
CO3	Describe a software architecture using various documentation approaches.
CO4	Apply the technologies required to design and prototype Web-based information systems.
CO5	Learn various Database Modelling.
CO6	Understand the concept of clustering and Indexing.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/POs	a	b	c	d	e	f	g	h	i	j	k	l
2	CO1			H									H
	CO2		M	H								M	H
	CO3		M	H								M	H
	CO4												
	CO5		H	M									
	CO6											H	M

3	Category	Humanities & Social Studies (HS)	Basic Sciences &Maths (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Project/Term Paper/ Seminar/ Internship (PR)
								√	

4	Approval	37th Meeting of Academic Council, May 2015

UNIT-I INTRODUCTION TO DATABASE 9

Database management systems - The concepts of the database- levels of representation, using a DBMS. Relational systems - toward the relational model, The relational model, using a relational system, Advantages & limitations of relational systems. A new generation of systems - A new computing context, New Applications.

UNIT-II DATABASE MODELING 9

Fundamental Aspects - The role of the data model general principles, Data manipulation languages, some important models - ER, SDM, IFO, RM/T, Daplex, Type systems - Concept of type. Data abstraction. Polymorphism, sub typing Integrating models & type system-Abstract types and modeling, concepts of inheritance, classes & relations, views & desired data constants.& transaction.

UNIT-III PROGRAMMING LANGUAGES 9

Extended relational models and system - different approaches, model with structured values, Deductive models and logic programming, models with object identity. Extensible systems. Database programming language - Two approaches Integration into an existing languages. Persistent programming languages.

UNIT-IV OBJECT ORIENTED DATABASE 9

Object Oriented systems - Principles & technology databases. The system - origins & objective Data model, Data manipulation, interface generator, the programming environment.Implementation of the 02 system.

UNIT-V CLUSTERING AND INDEXING 9

Object manager architecture - Introduction, Problems encountered, Addressing mechanisms, Virtual memory, two address levels, distributed architecture, Data management - Data representation, large sets & long strings, Representing inheritance. Indexing, clustering, transactions & versions.

TEXT BOOKS:

1. C.S.R. Prabhu,"Object-Oriented Database Systems: Approaches and Architectures", 2nd edition., Prentice-Hall Of India Pvt. Limited, 2005.
2. Jan L. Harrington,"Object-oriented Database Design Clearly Explained",MorganKaughman,2000.

REFERENCES:

1. Abraham Silberschatz, Henry F.Korth, S. Sudharson, "Database System Concepts", 6th Edition, Tata McGraw Hill, 2011.
2. **http://web.cs.wpi.edu/~cs561/s12/Lectures/2-3/OO.pdf**