SANJAY GHODAWAT UNIVERSITY
KOLHAPUR

Sanjay Ghodawat University (SGU) is established in the Academic Year 2017-18, as a State Private University under Govt. of Maharashtra Act No. XL of 2017 dated 3rd May 2017, with the approval of the UGC and the state Government. "For the true measure of giving is giving without measure." Spread across 150 Acres, Sou. Sushila Danchand Ghodawat Charitable Trust's Sanjay Ghodawat University (SGU) is situated in serene atmosphere amidst idyllic hills and lush green meadows to study in harmony with Nature. The Institution aspires to run along the lines of best-in- the-world education and become a world-class institution where teaching-learning process gets a far deeper meaning. SGU always stands as the guiding star of brilliance, quality and deliverance beyond expectations. Innovativeness and Creativity are the hallmarks of a genius enterprise and SGU stands to be a stage where these qualities would be nurtured, encouraged and blossomed.The genius is incomplete without the sense of social responsibility and SGU's ultimate goal remains the development of an attitude of gratitude that freely gives back without expectations.

The Sanjay Ghodawat University stands as a beacon of light to guide the younger generation of the day on the right path to fulfilment in career and life. The USP of the University is its research based curriculum and academically oriented teaching staff. The world class ambience and infrastructure helps the students to easily accommodate themselves in an environment that is conducive to the teaching- learning process. Hands on experience, challenge based case studies, maximum participation of students in the classroom, use of modern digital technology, smart classrooms, solution orientedthinking promotion, stress on research and innovation,international tie ups, choice based credit system for flexibility in choosing areas of interest etc. are some of the features of the University.

The university will help students develop as a unique individual-to be educated as a whole person, intellectually, emotionally, socially, ethically, and spiritually.The educational program designs are worked out meticulously in line with best in class universities with special focus on:

- Flexible Choice Based Credit System
- OBE - Outcome Based Education System
- Experiential Learning
- Project Based Learning
- Case Based Learning
- Training need analysis based on Performance Appraisal System
- Active Learning tools for effective delivery

- Mentoring / Proctorship
- On line learning /Self learning platforms
- Flipped Classroom concept
- Effective Student Feedback Mechanism

VISION

Internationally recognized university of excellence in creating and disseminating knowledge through value-based quality education leading to betterment of mankind.

MISSION

- To prepare students for life-long learning and leadership in a global academic culture
- To create intellectual manpower relevant to the industry and society at large
- To collaborate with institutions of international repute for academic excellence
- To promote research and development through conducive environment
- To encourage entrepreneurship and skill development programs

CORE VALUES

- Integrity
- Transparency
- Accountability
- Equality
- Empathy
- Stewardship

QUALITY POLICY

Sanjay Ghodawat University is committed to establish high standards in value-based quality education to enhance and nurture young minds to excel in their chosen profession and develop into socially responsible citizens through resourceful collaboration, innovation and research

CHOICE BASED CREDIT SYSTEM (CBCS)

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.

University Grants Commission has come up with the Choice Based Credit System (CBCS) programme in which the students have a choice to choose from the prescribed courses, which are referred as core, elective or minor or soft skill courses and they can learn at their own pace and the entire assessment is graded-based on a credit system. The basic idea is to look into the needs of the students so as to keep up-to-date with development of higher education in India and abroad. CBCS aims to redefine the curriculum keeping pace with the liberalization and globalization in education. CBCS allows students an easy mode of mobility to various educational institutions spread across the world along with the facility of transfer of credits earned by students.

Where the students can choose the prescribed courses, as the core, and elective or soft skill courses, from a range of options, rather than to simply consume what the curriculum offers. They can learn at their own pace and the assessments are graded based on a credit system. It provides an opportunity for students to have a choice of courses or subjects within a programmed resembling a buffet, against the mostly fixed set of subjects now being offered (except for the limited choice of electives in professional degrees and postgraduate programmers) with the flexibility to complete the programmed by earning the required number of credits at a pace decided by the students.

The UGC has always initiated measures to bring efficiency and excellence in the Higher Education System of India. The basic motive is to expand academic quality in all aspects, right from the curriculum to the learning-teaching process to examination and evaluation systems. However, so far multiple methods are followed by different universities across the country towards examination, evaluation and grading system. Considering this diversity, the implementation of the choice based credit system seems to be a good system in assessing the overall performance of a student in a universal way of a single grading system.

OUTCOME BASED EDUCATION (OBE) MODEL

Sanjay Ghodawat University (SGU) has implemented OBE model of education, which is a learner centered approach. SGU has witnessed a sea change in the entire academic systems with implementation of all three components of OBE – Design, Delivery and Assessment. The SGU model of autonomy focuses on experiential learning which believes in learning by doing. This is achieved through hands on experience, industrial assignments, mini projects and live problem solving and collaboration with industries.

SGU is set in to dynamics of transformation and witnessing a shift in focus from teaching to learning and entire academic system of SGU is designed to provide multiple learning opportunities for students to acquire and demonstrate the Knowledge, Skills and Attitudes (KSA) for rewarding career.

The Vision and Mission of the Management, contribution from eminent BOG members and knowledgeable members of Academic Council and Board of Studies, the motivation and drive of the Director, the relentless efforts of the fellow Deans and Head of Departments and all teaching and non teaching staff along with commitment to learning of students made it possible to successfully transform the institute and stand out to carve a niche for itself as an Institute of repute.

OBE is an approach of curriculum design and teaching that focuses on what students should be able to do (attained) at the end of course/ program. Outcome based education (OBE) is student-centered instruction model that focuses on measuring student performance through outcomes. Outcomes include knowledge, skills and attitudes (KSA). Its focus remains on evaluation of outcomes of the program by stating the knowledge, skill and behavior a graduate is expected to attain upon completion of a program and after 4 – 5 years of graduation. In the OBE model, the required knowledge and skill sets for a particular degree is predetermined and the students are evaluated for all the required parameters (Outcomes) during the course of the program.

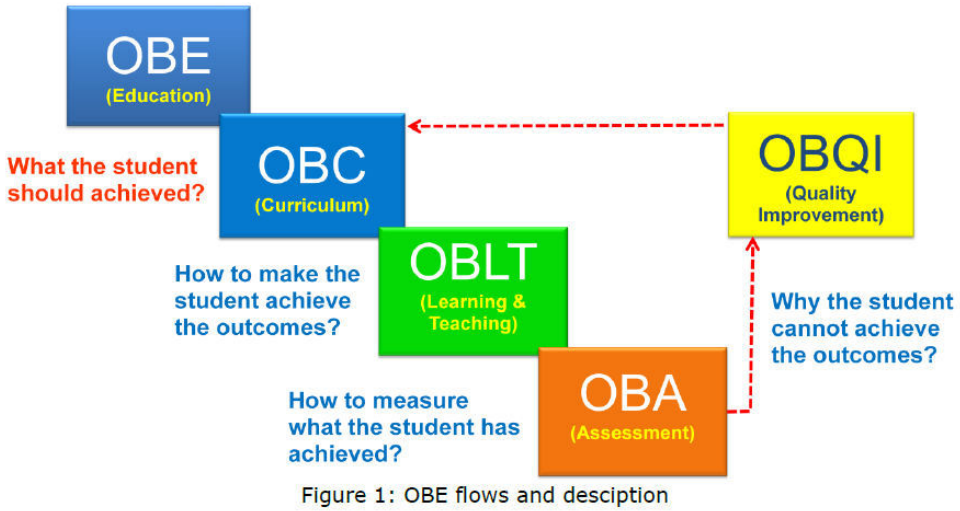
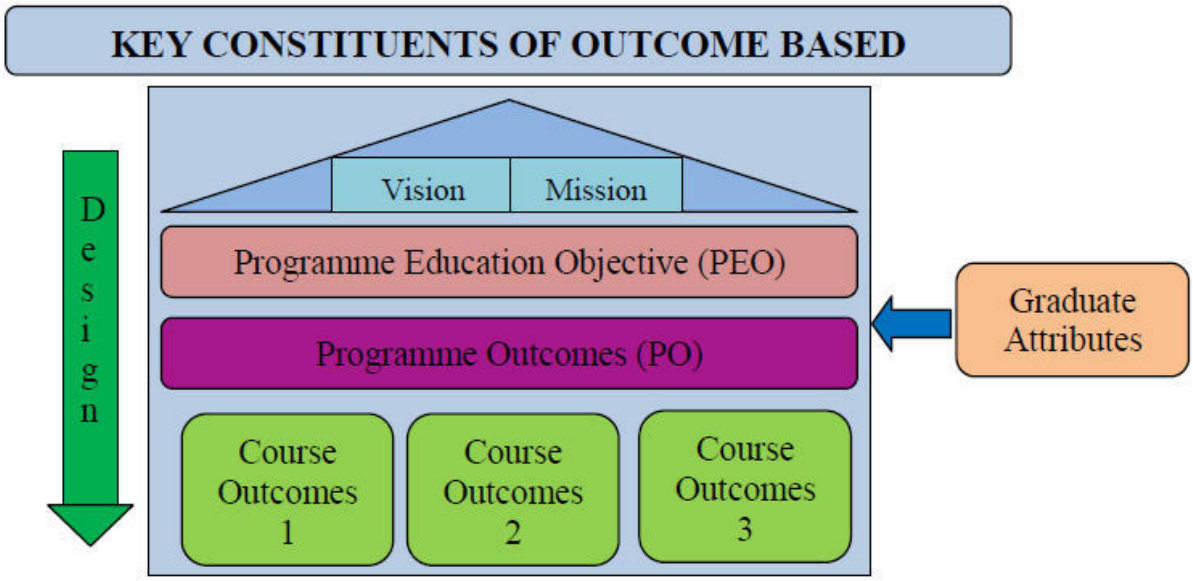


Figure 1: OBE flows and desciption

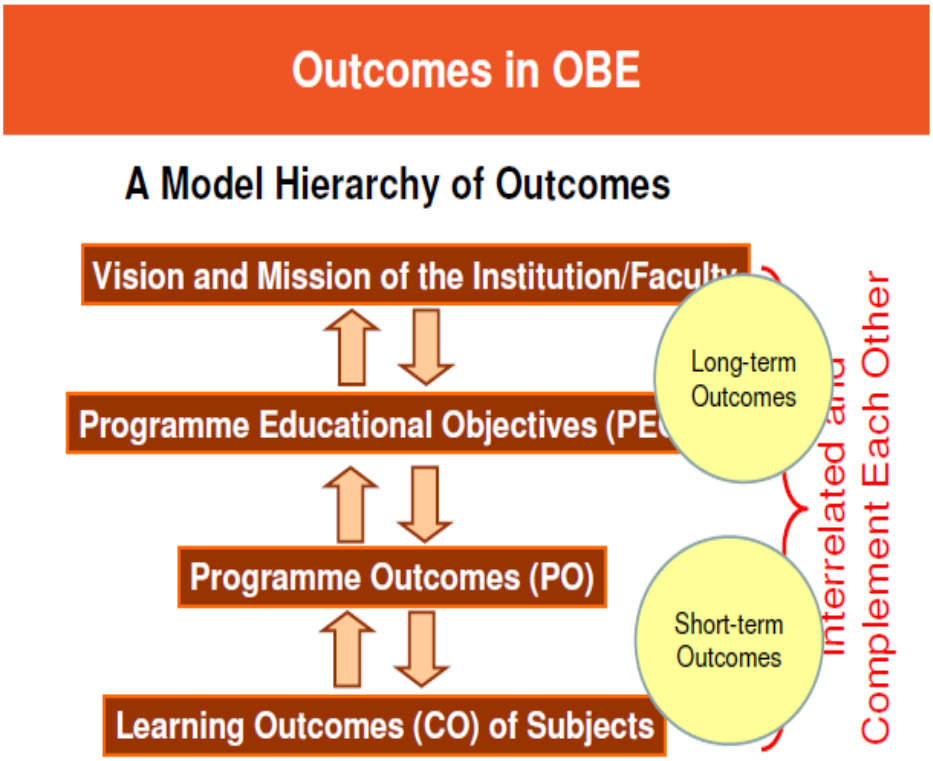


The OBE model measures the progress of the graduate in three parameters, which are

- Program Educational Objectives (PEO)
- Program Outcomes (PO)
- Course Outcomes (CO)

Program Educational Objectives (PEO) are broad statements that describe the career and professional accomplishments that the program is preparing the graduates to achieve. PEO's are measured 4-5 years after graduation. Program outcomes are narrower statements that describe what students are expected to know and be able to do by the time of graduation. They must reflect the Graduate attributes. Course outcomes are the measurable parameters which evaluates each students performance for each course that the student undertakes in every semester.

The various assessment tools for measuring Course Outcomes include Tests and End Semester Examinations, Tutorials, Assignments, Project work, Labs, Presentations, Employer/Alumni Feedback etc,. These course outcomes are mapped to Graduate attributes and Program outcomes based on relevance. This evaluation pattern helps Institutions to measure the Program Outcome. The Program Educational Objective is measure through Employer satisfaction survey (Yearly), Alumni survey (Yearly), Placement records and higher education records.



Special Features of OBE

- OBE is an educational process that focuses on what students **can do** or the **qualities** they should develop after they are taught.
- OBE involves the restructuring of curriculum, assessment and reporting practices in education to reflect the achievement of high order learning and mastery rather than accumulation of course credits.
- Both structures and curricula are designed to achieve those **capabilities** or **qualities**.
- Discourages traditional education approaches based on direct instruction of facts and standard methods.
- It requires that the students demonstrate that they have learnt the required skills and content.

Sanjay Ghodawat University, Kolhapur

(Established as a State University under Government of Maharashtra Act No XL dated 3rd May 2017)

Academic and Examination Rules and Regulations

Sanjay Ghodawat University Kolhapur

Kolhapur - Sangli Highway, A/p Atigre - 416 118,
Tal. - Hatkanangale, Dist. Kolhapur,
Maharashtra, India

(Implemented from Academic year 2020-21)

Academic and Examination Rules and Regulations

1.0 Preamble

The Sanjay Ghodawat University (SGU) stands as a beacon of light to guide the younger generation of the day on the right path to fulfillment in career and life. Outcome Based Education (OBE) model is adopted to enhance the effectiveness of teaching learning process and Credit Based semester system is implemented.

The focus of the University is its research based curriculum and academically oriented teaching staff. The world class ambience and infrastructure helps the students to easily accommodate themselves in an environment that is conducive to the teaching- learning process. Hands on experience, challenge based case studies, maximum participation of students in the classroom, use of modern digital technology, smart classrooms, solution oriented thinking promotion, stress on research and innovation, international tie ups, choice based credit system for flexibility in choosing areas of interest etc. are some of the features of the University.

Vision of SGU is internationally recognized university of excellence in creating and disseminating knowledge through value-based quality education leading to betterment of mankind. To achieve the vision SGU will develop state-of-the-art infrastructure that promotes conducive ambience promoting innovation and research. Create intellectual manpower relevant to the industry and society at large. Foster mutually beneficial partnership with alumni, industry and academia. Inculcate ethics and values to develop socially responsible citizens and promote entrepreneurship.

SGU is offering various programs through schools such as School of Technology, School of Commerce and Management, School of Sciences and School of Arts.

SGU has implemented the outcome based Education (OBE) system and Credit based Evaluation System in all the schools.

The rules and regulations mentioned in this document are applicable to all the Under Graduate (UG) and Post Graduate programs offered by the Sanjay Ghodawat University from the academic year 2018-19. The rules and regulations stated here under are subjected to revisions / refinements, updates and modifications and amendments by academic council (AC) from time to time and applicable to all batches including those already undergoing programs at different year and are binding on all stakeholders including students, faculty, parents and University authorities.

The academic programs of the University shall be governed by rules and regulations approved by the academic council from time to time. Academic council is the supreme and statutory academic body that governs all academic matters of the university and the decisions of the academic council are final and binding in the matters related to academics.

2.0 Definition of Terms

1. University: University means Sanjay Ghodawat University, Kolhapur
2. Academic Year: The period of the year during which students attend university for all academic activities, usually it starts from first of July and ends on 30th of June next year.
3. Semester**:** Academic Year is divided in to 2 parts called Semester, Odd Semester which starts from July and Even Semester which starts from January.

4. Duration of Semester: Total duration of semester is usually 20 weeks per semester including instructions, examination and evaluation. Total instructional days are 90 per semester.
5. **Course:** It is a Subject that is offered in a semester. The course may consist of Theory/Practical/Project/Seminar during semester. Usually taught by instructor in a class. e.g. Physics, Chemistry, Engineering Mechanics, Workshop etc.
6. **Program:** Collection of Courses is called Program. For example B Tech in Mechanical Engineering, M Tech in Civil Engineering, Bachelor of Business Administration. Bachelor of Science etc.
7. **Department:** Department is a unit of the school which offers one or more programs.
8. **Contact Hours:** Time of students in class/laboratory with instructor. Usually in the range of 20-30 Hrs./Week. For the purpose of uniformity one contact hour is measured as 60 minutes
9. **Academic Council (AC):** Means apex academic body governing the academic programs responsible for framing policy , rules and regulations.
10. Board of Examination (BOE): Central body responsible for framing policy, rules and regulations for Examination.
11. Board of Studies (BOS): Departmental academic body to govern the academics of programs (BOS) offered by department.

3.0 Curriculum:

Every program has a prescribed structure which, in general, is known as Curriculum. It prescribes courses to be studied in each semester. The booklet containing courses structure along with detail syllabus for each course of each program is updated periodically and made available on the website.

3.1 Semesters:

SGU implements a credit based semester system. The academic year is divided into two regular semesters. The semesters that begin in July are known as Odd semester and the semester that begin in January are known as Even semesters. Total duration of each semester is generally of 20 weeks including the period of examination, evaluation and grade declaration.

3.2 Course Credit System/Structure:

In general, a certain quantum of work measured in terms of credits is laid down as the requirement for a particular program. Calculation of number of credits for a course in any semester is as per Table 3.1

Table 3.1: Calculation of number of credits for a course

Sr. No.	Course	Credits
1	Lecture of 1 hour/week	**1**
2	Tutorial of 1 hour/week	**1**
3	Practical / Laboratory / Drawing/mini-project of two hours/ week	**1**
4	Seminar (1 hour per week)	**1**

There are mainly two types of courses- viz. Theory courses and Laboratory courses. Generally a theory course consists of Lecture hours (L) and Tutorial hours (T). Tutorial hours may not be assigned to a particular theory course if it has a separate laboratory course. Laboratory course consists of practical hours (P) for which a student works in a Laboratory/Drawing Hall/Workshop. The other courses required to be taken by a student include seminar, mini project, and project at various levels of the program.

A student shall earn credits for a particular course by fulfilling the minimum academic requirements for attendance and evaluation. No credits shall be awarded if a student satisfies the minimum attendance requirements but fails to meet minimum evaluation requirements.

The total number of credits required for completing a program shall be mentioned in the course structure. The total number of credits in a semester which a student registers shall generally be 20--25. The maximum number of credits per semester shall not exceed 30

3.3 Audit Course:

3.3.1 A student may have to register for an audit course in a semester which could be institute requirement or department requirement.

3.3.2 An audit course may include either a) a regular course required to be done as per structure or required as pre-requisite of any higher level course or b) the programmes like practical training, industry visits, societal activities etc.

3.3.3 Audit course shall not carry any credits but shall be reflected in Grade Card as "PP"/"NP" depending upon the satisfactory performance in the semester evaluation as per the course curriculum structure.

4.0 Course Registration:

4.1 Every student must register for the courses that he/she wants to study for earning credits at the beginning of each semester on the prescribed dates announced from time to time and shall be mandatory for every student till he/she completes the program. Only after registration his/her name shall appear in the roll list of each of such courses.

4.2 Students shall be required to fill up a Course Registration Form which shall be made available to them by the Student section of Administration office after payment of required fees.

4.3 Registration, according to rules, should be carried out as per the schedule given in academic calendar. Late registration may be permitted only for valid reasons and on payment of late registration fees. In any case, registration must be completed before the prescribed last date for registration, failing which his/her studentship shall be liable to be cancelled. Students having dues outstanding towards the institute or hostel shall be permitted to register only after clearing such dues.

4.4 In-absentia registration may be allowed only in rare cases at the discretion of the Dean Academics and with prior permission.

4.5 For registration in an odd semester, the student must have earned all the credits of the pre-previous year and at least 75% 2/3rd of the credits previous year. For example, for registration of the 5th semester courses (i.e. 3rd year of program), a student must have earned all the credits of the first year and 2/3rd of the credit second year. Similarly for registration of the 7th semester courses (i.e. 4th year of program), a student must have earned all the credits of the second year and 2/3rd of the credits third year. However, if 2/3rd of the calculation turns out to be a mixed number (integer + fraction) then only the integer part of that number shall be considered for taking decision related with this clause.

4.6 A student registered in odd semester shall be eligible to register for the courses offered in the even semester of that year irrespective of his/her SGPA or the number of credits earned by him/her in that odd semester.

5 .0 Lateral Entry for B Tech Programs

Post diploma students in engineering and B.Sc. Graduates can have lateral entry at third semester of the program. Such admissions are governed by the rules of regulatory bodies like AICTE New Delhi and Directorate of Technical Education Maharashtra state and Sanjay Ghodawat University for Admission criteria and shall undergo all academic requirements as specified by the Academic council.

For such students there shall not be First Year Performance Index (FYPI). Semester Performance Index (SGPA) and Cumulative Performance Index (CGPA) shall be calculated from the third semester onwards taking into consideration the courses undergone by them at Sanjay Ghodawat University Kolhapur.

Registration of the students not covered by the cases mentioned above shall be decided by the Academic Council. Such students shall undergo the academic program as specified by the Academic Council. Such odd entry students shall not be eligible for any medals or awards instituted by the institute.

6.0 Change of Program:

This is applicable to B Tech Programs only. Students shall be eligible to apply for Change of Program after completing the first two semesters. The following rules/ guidelines shall be used for considering their applications for change:

6.1 The change of program shall be permitted strictly on merit basis subject to the rules of admissions prevailing at the time of such change.

6.2 Students without fail grades and/or backlogs shall be eligible to apply for change of program and can give their choices in the order of preference.

6.3 The request for change of program by a student from program A to program B shall be considered if number of students of program B does not exceed the sanctioned capacity of program B and also the minimum strength required to run the program as decided by Academic Council.

6.4 All such transfers can be effected only once at the beginning of the second academic year of the 4-year UG program. No application for change of program during subsequent academic years shall be entertained.

7. Facilitation to Students:

7.1 Faculty Advisor:

On joining the institute, a student or a group of students shall be assigned to a faculty advisor who shall be mentor for a student throughout his/her tenure in the institute. A student shall be expected to consult the faculty advisor on any matter relating to his/her academic performance and the courses he/she may take in various semesters / summer term. A faculty advisor shall be the person to whom the parents/guardians should contact for performance related issues of their ward. The role of a faculty advisor is as outlined below:

The role of the Faculty Adviser is outlined below:

a. Guide the students about the rules and regulations governing the courses of study for a particular degree.
b. Advise the students for registering courses as per curriculum given. For this purpose the Faculty Adviser has to discuss with the student his/her academic performance during the previous semester and then decide the number and nature of the courses for which He/She can register during the semester as per the curriculum.
c. Approve the registration of the students.
d. Advice students to overload/ drop one or more courses/activities based on her/his academic performance as per the prescribed rules.
e. At the end of the first semester/year, the Faculty Adviser may even advise a reduced load program for a poorly performing student.
f. Pay special attention to weak students and carefully monitor performance of students recommended for slow track option.
g. Advice students for Course Adjustment / Dropping of courses during the Semester within the stipulated time frame given in the Academic calendar.
h. Advice students seeking semester drop either during the ongoing semester or before the commencement of the semester. FA has to ensure strict compliance of rules and regulations laid down for this purpose. Recommend the cases to the appropriate authorities for consideration.
i. Make revised plan of study for weak/bright students based on their semester wise performance.
j. Suggest modalities for course/credit requirements for the students recommended for exchange program.
k. Guidance and liaison with parents of students for their performance.
l. To ensure that students are not permitted to reregister for courses, which they have already passed.
m. Inform students that any academic activity (course / Lab. / seminar / project / noncredit requirement etc.) undergone without proper registration will not be counted towards the requirements of his/her degree.
n. Strictly warn students that if she/he fails to register during any semester without prior approval, his/her studentship is liable to be cancelled.
o. Keep the students updated about the Academic Administration of the University.

7 .2. Helping Weaker Students:

A student with backlog/s should continuously seek help from his/her faculty advisor, Head of the Department and the Dean of respective schools. Additionally he/she must also be in constant touch with his/her parents/local guardians for keeping them informed about academic performance. The university also shall communicate to the parents/guardians of such student at-least once during each semester regarding his/her performance in in-in various tests and examination and also about his/her attendance. It shall be expected that the parents/guardians too keep constant touch with the concerned faculty advisor or Head of the Department, and if necessary - the Dean of the respective school.

8. 0 Discipline And Conduct:

8.1 Every student shall be required to observe discipline and decorous behavior both inside and outside the campus and not to indulge in any activity, which shall tend to bring down the prestige of the university.

8.2 Any act of indiscipline of a student reported to the Dean, Student Development, shall be discussed in a Disciplinary Action Committee of the institute. The Committee shall enquire into the charges and recommend suitable punishment if the charges are substantiated.

8.3 If a student while studying in the university is found indulging in anti-national activities contrary to the provisions of acts and laws enforced by Government he/she shall be liable to be expelled from the institute without any notice.

8.4 If a student is involved in any kind of ragging, the student shall be liable for strict action as per provisions in the Maharashtra anti-ragging act.

8.5 If any statement/information supplied by the student in connection with his/her admission is found to be false/ incorrect at any time, his/ her admission shall be cancelled and he/she shall be expelled from the university and fees paid shall be forfeited.

8.6 If a student is found guilty of malpractice in examinations then he/she shall be punished as per the recommendations of the Grievance Redressed Committee (CRC) constituted by Board of Examinations.

8.7 Every admitted student shall be issued photo identification (ID) card which must be retained by the student while he/she is registered at Sanjay Ghodawat University Kolhapur. The student must have valid ID card with him/her while in the University Campus.

8.8 Any student who alters or intentionally mutilates an ID card or who uses the ID card of another student or allows his/her ID card to be used by another, student shall be subjected to disciplinary action.

8.9 The valid ID card must be presented for identification purpose as and when demanded by authorities. Any student refusing to provide an ID card shall be subjected to disciplinary action.

8.10 Students should switch off the Mobiles during the Instructional hours and in the academic areas of university Building, Library, Reading room etc. Strict action will be taken if students do not adhere to this.

8.11 During the conduct of any Tests and Examination students must not bring their mobiles. A student in possession of the mobile whether in use or switched off condition will face disciplinary action and will be debarred from appearing for the Test / Examination.

9.0 Academic Calendar

The academic activities of the institute are regulated by Academic Calendar and is made available to the students/ faculty members and all other concerned in electronic form or hard copy. It shall be mandatory for students / faculty to strictly adhere to the academic calendar for completion of academic activities.

Attendance:

Regular 100% attendance is expected from all students for every registered course in lectures, tutorial, laboratory, projects, mini-projects and other courses mentioned in program curriculum. Hence, attendance is compulsory and shall be monitored during the semester rigorously. Students shall be informed at the end of every month if they are failing short of attendance requirements.

A Maximum of 25% absence for the attendance may be permitted only on valid grounds such as illness, death in family of blood relations (Father, Mother, Sister, and Brother) and any other emergency reason which is beyond the control of the student and shall be approved by the authorities in respective departments.

If a student fails to put up 75% attendance individually in each course, the student will be put under X grade category and student will be debarred form attending the End Semester Examination (ESE) and Re-Exam for that semester in that course. However, student has an option to re-register for the course whenever it is offered next time or he can appear for 100% examination for which he will be awarded two grade penalties. Student's FET, CAT1 and CAT2 marks are treated as null and void.

The maximum number of days of absence for students participating in Co- curricular activities /Sports/ Cultural events during a semester shall not exceed 10. Any waiver in this context shall be on the approval of the Academic council only after the recommendation by Dean Academics of the university.

The HOD and Dean of the respective school shall report and recommend to Academic council the cases of students not having 75% attendance as per the records of course instructor. After rigorously analyzing these cases AC may take a decision to debar such student from End-Semester Examination (ESE) for that course. Such a student shall re-register for that course as and when it is offered next. ISE and MSE evaluations of such a student for this course during regular semester shall be treated as null & void.

A student remaining absent during ESE of a course either on medical ground (Accident and/or hospitalization of a student) or any other emergency circumstances (death of immediate close relative i.e. father, mother, brother and sister) or due to representing University at university/state level in sports/co- curricular activities shall be treated as per the rules of Sec 12.6.2 and 11.1.2

The critical cases of absenteeism which are not covered by any of the above clauses shall be reported by concerned Head of Department to Academic dean and all such cases the decision of Academic council is final**.**

10. Modes of Assessment:

10.1 Assessment of Theory Courses:

10.1.1 A student shall be evaluated for his/her academic performance in a theory course through Faculty Evaluation Theory (FET), Continuous Assessment Tests (CAT1 and CAT2) and End Semester Examination (ESE).

10.1.2 The relative weightage for the theory courses having ESE shall be generally as shown in the Table 10.1.2

Table 10.1.2: Weightage for the theory courses in %

FET	CAT1	CAT 2	ESE
20	15	15	50

The details of the weightage of each course shall be listed in the structures of each program.

10.1.3 FET shall be based on student's performance in assignments, quizzes, seminars, Course projects and field assignments, term papers, etc. The mode of FET shall be decided and announced by the Course Instructor at the beginning of the course.

10.1.4 CAT1 shall generally be of one hour duration for each course and shall be held as per the schedule declared in the Academic calendar for that Semester. The test will be based on first two units of the course.

10.1.5 CAT2 shall generally be of one hour duration for each course and shall be held as per the schedule declared in the Academic calendar for that semester based on unit 3 and unit 4 of the syllabus.

10.1.6 ESE is of three hours comprehensive examination having the weightage of 60% for unit 5 and 6 and 40% to unit 1 to unit 4. It is of 100 marks

10.1.7 All examinations and evaluations shall be compulsory. Credits for a course shall be awarded only if a student satisfies evaluation criteria and acquires the necessary minimum grade.

10.1.8 There shall be no re-examination for CAT1 and CAT2 of the courses having all the three components of evaluation viz. FET, CAT1 CAT2 and ESE. However, a student remaining absent for CAT1 and CAT2 for representing the institute in state level or university level sports/co-curricular activities (on prior recommendation and approval from) or on valid grounds such as illness, death in family or other emergency reason which is beyond control of a student (on approval by the head of department and dean of respective school shall be considered for Make- up examinations.

10.1.9 A student remaining absent for ESE of a course either due to medical reason (Accident and/or hospitalization of a student) or other emergency circumstances (death of immediate close relative i.e. father, mother, brother and sister) or due to

representing college at university/state level in sports/co-curricular activities shall be awarded with grade "I". Such a student shall be allowed to appear for make-up examination scheduled along with re-examinations of other courses. The student shall apply to COE with proper documentary evidence to appear for make-up examination. After make-up examination, a student shall be entitled to an appropriate grade as per Table I of Sec. 10.1.2 based on his/her performance during the regular semester and in make-up examination.

10.2 Assessment of Laboratory Courses:

10.2.1 The assessment of laboratory course shall be continuous and based on turn-by-turn supervision of the student's work and the quality of his/her work as prescribed through laboratory journals and his/her performance in viva-voce examinations uniformly distributed throughout the semester. Where ESE for the laboratory course is specified ESE shall be based on performing an experiment followed by an oral examination. The relative weightage for FEP and ESE for assessment of laboratory courses shall be 50% each for FEP and ESE and a minimum performance of 40% in both ISE and ESE separately shall be required to get the passing grade.

10.2.2 ESE for laboratory course shall normally be held before the ESE for theory courses and shall be conducted by a panel of examiners appointed by COE from the panel of experts approved by BOS. This activity shall be coordinated by Department Examination Coordinator (DEC) in consultation with HOD of the respective department.

10.2.3 Student failed in ESE of a laboratory course in a regular semester shall be eligible to appear for 100% examination conducted along with ESEs of laboratory courses of the subsequent semester. Such examination shall be fairly comprehensive (generally of 3 hours similar to POE i.e. Practical-Oral-Examinations) to properly judge his/her practical skill and theoretical knowledge for that laboratory course. He/She shall suffer one grade penalty.

11.0 The Grading System:

Absolute Grading System (AGS) is adopted based on absolute numerical marks obtained by the student during all stages of evaluation for a course.

11.1. Award of Grade (Regular Semester):

11.1.1 For every course registered by a student in a semester, he/she shall be assigned a grade based on his/her combined performance in all components of evaluation scheme of a course as per the structure. The grade indicates an assessment of the student's performance and shall be associated with equivalent number called a grade point.

11.1.2 The academic performance of a student shall be graded on a ten point scale. The Absolute Grading System is followed. Letter grades, the guidelines for conversion of marks to letter grades and their equivalent grade points are as given in Table.

Table 11.1.2: Grade Table for Regular Semester

Marks Obtained	Grade Letter GL	Grade Point GP	Performance Description
90-100	**O**	**10**	Outstanding
80-89	**A+**	**09**	Excellent
70-79	**A**	**08**	Very Good
60-69	**B+**	**07**	Good
50-59	**B**	**06**	Above Average
45-49	**C**	**05**	Average
40-44	**P**	**04**	Pass
00-39	**F**	**00**	Fail
-	**Ab**	**00**	Absent
-	**X**	**00**	Detained (Failed)
-	**Satisfactory**	**-**	Pass in Non Credit Courses
-	**Un Satisfactory**	**-**	Failed in Non Credit Courses

11.1.3 A student shall pass the course if he/she gets any grade in the range "O" to "P".

11.1.4 "FF" grade shall be awarded to a student in a course if he/she gets less than 40% marks jointly in the FET, CAT1, and CAT2 & ESE for a theory course and in PET & ESE for a laboratory course. A course shall then be eligible to apply for re-examination. A student failed in laboratory course shall be eligible to apply only for 100% examination conducted with the laboratory examinations of the subsequent semester. In both cases, a student has to suffer one grade penalty.

12 Assignment of X Grade

Grade "X" in a regular course shall be given to a student if he/she falls in any of the following categories.

12.1 A student does not maintain the minimum 75% attendance in any of the theory or laboratory courses.

12.2 A student has not completed most of the Evaluations like FET, CAT1 and CAT2 due to non-medical reasons (for example when a student has missed all or most of the components of internal evaluation conducted by the instructor in that semester).

12.3 The performance of a student is less than 40% in FET, CAT1 and CAT2 Combined.

12.4 A student is guilty of any academic malpractice during semester (Such cases shall be dealt by Grievance Redressed and Discipline Committee).

In above four cases grade "X" shall be declared one week before ESE and intimated to the Academic Office and COE immediately thereafter. Such a student shall not be permitted to take the ESE of that course.

12.5 Grade "X" may be given to a student if

12.5.1 A student eligible for ESE remains absent for ESE of a course with no written intimation to Exam Cell within four days after the respective ESE is over.

12.5.2 A student is guilty of any academic malpractice during examination. (Such cases shall be dealt by Grievance Redressal Committee).

In 12.5.2 grade "X" in that course shall be declared after Grievance Redressed Committee confirms the academic malpractice.

In above two cases when a student gets "X " grade in a course, then this shall be treated as "FF" for the purpose of calculation of Semester Performance Index (SGPI) and First Year Performance Index (FYPI) or Cumulative Performance Index (CGPI).

12.6 Following rules apply to the student who has obtained grade "X" in a regular semester:

12.6.1 A student obtaining grade "X" in a course in a regular semester or during examination shall be not be allowed to appear for End semester examination and also Re ESE conducted before the beginning of the next semester. His/her FET, CAT1 and CAT2 evaluations for all courses shall be treated as null and void. He/She needs to re-register for courses of that semester in the next academic year whenever they are offered and undergo all evaluations along with fresh regular students for which he will get one grade penalty.

12.6.2 Grade "I" shall be declared in a theory/laboratory course if a student has satisfactory performance FET, CAT1, CAT2 and has fulfilled the 75% attendance requirement, but has not appeared for ESE due to genuine reasons. Such students shall be eligible for the make-up examination of ESE only on medical grounds/valid reasons and on production of authentic medical certificate or other supporting document/s (as required by the University) to the COE within ten days after the respective examination is over. The application form with requisite amount of fees must be submitted to the Exam Cell before the last date of filling such application forms for make-up examinations. These examinations shall be based on 100% syllabus and shall be scheduled before the commencement of the subsequent semester for theory courses and along with ESEs of laboratory courses of the subsequent semester. A student with "I" grade when appears for the make-up examination shall be eligible to obtain a regular performance grade ("O" to "F") as per Table 11.1.2 depending on his/her overall performance in FET, CAT1 ,CAT2 and make-up examination. If a student fails to appear for make-up examination too, a grade "XX" shall be awarded to him/her. Thus "I" is only a temporary grade and shall be replaced by a valid grade only after make-up examination.

12.6.3 There shall be a few audit courses as per the policies of the institute or as decided by DPC of respective program. The grade "PP" (Passed)/ "NP" (Not Passed) shall be awarded for such courses depending upon the performance of a student evaluated by the faculty in-charge. No grade points shall be associated with these grades and performance in these courses shall be not taken into account in the calculation of the performance indices (SGPI, CGPI). However, the award of the degree shall be subject to obtaining a "PP" grade in all such courses.

13. Award of Grades for Re-Examination:

13.1 A student who has obtained grade "F" in regular semester shall be eligible to appear for re-examination conducted before the commencement of the next regular semester. In such cases FET, CAT1 and CAT2 marks are carried forward and a student has to suffer one grade penalty

13.2 A student shall apply for re-examination before the last date of such application and shall appear for re-examination.

13.3 50% weightage similar to ESE shall be given to re-examination and there is one grade penalty.

13.4 **A** student who has obtained "F" grade in ESE of a regular semester and has not availed re-examination option or a student who has obtained "F" grade in both ESE and re-examination shall be eligible to choose one of the two options below to clear his/her backlog:

- Re-registration for the next regular semester course whenever that course is offered.
- Appearing for ESE of the course when conducted...
  A student detained in a regular semester due to either a) by obtaining "X" grade or b) by involvement in academic malpractice or c) by breaking the institute code of conduct and discipline can re-register for the course when offered next

Following rules apply for these cases:

13.5 In first case i.e. Re- registration the earlier performance of a student in all the evaluations of that course shall be treated as null and void. The student has to undergo all the evaluations after re-registration.

14. Grades for Third and Subsequent attempts:

If A student opts for ESE or Re ESE who previously had obtained grade "F" in a course in two attempts, his/her FET, CAT1 and CAT2 performance of the regular semester shall be considered for evaluation and He/She has to suffer two grade penalty for the third attempt and for 4^{th} and subsequent attempts shall be awarded a grade "P" or "F" or "X" based on his/her performance.. However, if a student takes more than three chances (regular examination being the first chance, re-examination being the second chance, to clear a course, then the maximum passing grade that he/she can get shall be only "P". Thus a student has to suffer a grade penalty by accepting a lower grade than that obtained in the regular examination, re-examination, or examination for a re-registered course.

15. CALCULATION OF PERFORMANCE INDICES:

15.1. Semester Grade Point Average (SGPA)

The performance of a student in a one specific semester is indicated by SGPA. SGPA is a weighted average of the grade points obtained in all courses registered by the students during the semester. SGPA can be calculated by following equation.

$$SGPA = S_i = \frac{\sum_{i=1}^{n} C_i P_i}{\sum_{i=1}^{n} C_i}$$

Where, i = 1,2,3…….n are number of courses during semesters. C = No of credits associated with that course and P = Grade point earned in that course. SGPA will be rounded off to two decimal places.

15.2 Cumulative Grade Point Average (CGPA)

The total cumulative performance of a student at the end of specific semester is indicated by CGPA. An up-to-date assessment of the overall performance of a student for the courses from the first semester onwards till completion of the program shall be obtained by calculating Cumulative Grade Point Average (CGPA).

CGPA is a weighted average of the SGPA obtained in all semesters by the students during the semesters. CGPA can be calculated by following equation.

$$CGPA = \frac{\sum_{j=1}^{n} C_j S_j}{\sum_{j=1}^{n} C_j}$$

Where, j = 1,2,3…….n are number of semester during program. C = Total No of credits in the semester for which CGPA is to be calculated.

CGPA will be rounded off to two decimal places.

Conversion of CGPA to percentage marks for CGPA ≥ 4.5 can be obtained using equations. Percentage marks = (CGPA x 10) – 7.5.

15.3 For the students acquiring "I" grade (which is only a temporary grade) in any of the courses, SGPA, CGPA shall be calculated only after make-up examination.

16. First Year Performance Index (FYPI): (Applicable For B. Tech Programs Only)

16.1 For a student registered in Sanjay Ghodawat University Kolhapur right from the First semester, First-Year-Performance-Index (FYPI) shall be calculated as weighted average of the grade points obtained in all the courses registered by him/her in semesters I and II only.

$$FYPI = \frac{\sum_{1} C_i g_i}{\sum_{1} C_i}$$

Where summation is for all the courses registered by a student in first two semesters. FYPI shall be calculated when for the second semester is calculated. FYPI shall be rounded off to two decimal places.

16.2 FYPI shall reflect all the courses undergone by a student in the first year including the courses in which he/she has failed. FYPI may get modified in the subsequent semesters whenever a student clears his/her first year backlog courses.

16.3 If a student has been awarded "I" grade in the regular semester course of the first year then, FYPI shall be calculated after the make-up examination on the basis of the grade obtained by that student in a make-up examination.

16.4 If a student has obtained grade "F" or "X" at any time in any of the courses registered by him, then zero grade points corresponding to these grades shall be taken into consideration for calculation of FYPI.

17 Maximum Duration for Completing the Program

Maximum duration for completing any program UG/PG offered by Sanjay Ghodawat University is respective program duration plus two additional years.

Maximum duration for getting the B. Tech degree for students admitted in the first semester of UG program is, program duration plus two additional years (i.e. 12 Semesters and 6 academic years) For lateral entry student academic admitted in the third semester shall be (10 Semester and 5 Years).

The maximum duration of the program includes the period of withdrawal, absence and different kind of leaves permission to student but excludes the period of rustication of the student from the university however genuine case an confidential of valid reason may be referred to academic council for extending this limit by additional criteria

18 NFTE (Not Fit For Technical Education) (Applicable to B Tech program only)

It is mandatory for the student to earn all credits of first year specified for semester I & II or eligible for ATKT as per the rules to seek admission to semester III of second year in three years from the date of admission to avoid NFTE. If a student fails to become eligible for admission to Semester III in three year from the date of his admission, he shall be declared as “Not Fit for Technical Education” leading to discontinuation of his/her registration with the university. Such cases should be put up in the academic council.

19. Academic Progress Rules (ATKT Rules):

19.1 A student shall be allowed to register for the courses of the next year's odd semester only if he/she has earned all the credits of the previous year and has earned at least $2/3^{rd}$ credits of the current year. If $2/3^{rd}$ calculation turns out to be a mixed number (integer + fraction) then only the integer part of that number shall be considered for deciding the eligibility for ATKT.

At the end of 1st year a student shall be allowed to keep terms (ATKT) to 2nd year of study provided he/she attends course work prescribed for 1st year with prescribed attendance and successfully earned at least $2/3^{rd}$ of the total credits specified for 1st year program.

For Example: Total credits for B. Tech first year 2017-18, are 45 (Total of Semester I and II). A Student should earn minimum $2/3^{rd}$ of the 45 Credits i.e. A student can go to next higher class with a maximum backlog of $1/3^{rd}$ credits of semester I & II of the first year.

Student, who fails to earn those credits, cannot register for next semester, either it can re-registrar for the course and credits or can use the next opportunity to earn the credits when exams are conducted. **.**

(b) At the end of 2nd year a candidate shall be allowed to keep terms to 3rd year of study provided he/she attends course work prescribed for 2nd year with prescribed attendance, and successfully cleared 1st year program and at least $2/3^{rd}$ of total credits prescribed for 2nd year program.

(c) At the end of 3rd year a candidate shall be allowed to keep terms to final year of study provided he/she attendants course work prescribed for 3rd year with prescribed attendance, and should have completed 2nd year program and $2/3^{rd}$ of total credits prescribed for 3rd year program.

All such candidates fulfilling the above criteria shall be declared as FAILED, ATKT.

A student shall be allowed to take admission for odd semester of next academic year only if he/ she have earned all the credits of the previous year and $2/3^{rd}$ happens to be a decimal, it is rounded to only integer part.

20. Semester Grade Report:

20.1 Semester grade report reflects the performance of a student in that semester (SGPI) and also his/her cumulative performance for the first year (FYPI) and also the cumulative performance since the third semester of his/her study (CGPA).

20.2 The semester grade card issued at the end of each semester/ summer term to each student shall contain the following.

- The credits for each course registered for that semester.
- Any audit course/s undertaken by a student in a Semester.
- The letter grade obtained in each course.
- The total number of credits earned by a student for the first year separately.
- The total number of credits earned by a student since the 3rd semester onwards.
- SGPI, FYPI, CGPI.
- A list of backlog courses, if any.
- Remarks regarding eligibility of registration for the next semester.

20.3 Semester grade card shall not indicate class or division or rank however a conversion from grade point index to percentage based on CGPI shall be indicated on the final grade card of the program.

21 Award of Degree:

Following rules prevail for the award of degree.

- A student has registered and passed all the prescribed courses under the general institutional and departmental requirements.
- A student has obtained CGPI $\geq$ 4.75.
- A student has paid all the institute dues and satisfied all the requirements prescribed.
- A student has no case of indiscipline pending against him/her.
- Academic Council shall recommend the award of degree to a student who is declared to be eligible and qualified for above norms.

22 Grace Marks

- Maximum total grace marks will be 1 % of the total theory credit courses x 100 subjected
- To maximum 6 marks in that semester.
- Grace marks will be given candidate for change in grades for theory credit courses i.e. from
- Fail to pass grade only and will be reflected in final ESE marks.
- The grace marks are applicable only for maximum 1/3rd courses (rounded to higher Integer part i.e. if there are 4 theory courses then 4/3 = 1.33 = 2 courses).
- Maximum grace marks will be distributed in maximum courses
- Benefit of grace marks is not applicable for any medal/award.
- Applicable to theory and (Theory + Practical Courses). If is not applicable for Practical courses.
- Scheme for grace marks only can be used when the student will pass in all courses of that semester.

23. CGPA Improvement Policy for Award of Degree:

An opportunity shall be given to a student who has earned all the credits required by the respective program with CGPA greater than or equal to 4.00 but less than 4.75 to improve his/her grade by allowing him/her to appear for ESE examinations of maximum two theory courses of seventh semester. Such examinations shall be scheduled along with re-examinations/make-up examinations. However, CGPA shall be limited to 4.75 even though the performance of a student as calculated through modified CGPA becomes greater than 4.75.

Conclusions:

The academic policies regarding conduct of programs in Sanjay Ghodawat University Kolhapur are published in this document. The Academic Council shall reserve the right to modify these policies as and when required from the point of view of achieving academic excellence. In special and abnormal cases (i.e. the cases not covered through above rules) the decision of the (Chairman, Academic Council shall be final and shall be binding on all concerned.

Chairman
Academic Council

Sanjay Ghodawat University, Kolhapur

(Established as a State University under Government of Maharashtra Act No XL dated 3rd May 2017)

Curriculum Structure and Contents

Sanjay Ghodawat University Kolhapur

Kolhapur - Sangli Highway, A/p Atigre - 416 118, Tal. - Hatkanangale, Dist. Kolhapur, Maharashtra, India

(Implemented from Academic year 2020-21)

Semester III

Course Code	Course Title	L	T	P	C	Component	Evaluation Scheme			
							Exam	WT	Min. Pass	
CST201 (BS | SS) Version: 1.0	Mathematics for Modern Computing	3	-	-	3	Theory 100	FET	20	40	40
							CAT I	15		
							CAT II	15		
							ESE	50	40	40
CST203R1 (PC | ST) Version: 1.0	Discrete Structures	3	1	-	4	Theory 100	FET	20	40	40
							CAT I	15		
							CAT II	15		
							ESE	50	40	40
CST205 (PC | ST) Version: 1.0	Object Oriented Programming	2	-	4	4	Practical 100	FEP	50	40	40
							POE	50	40	
CST207 (PC | ST) Version: 1.0	Data Structures	3	-	-	3	Theory 100	FET	20	40	40
							CAT I	15		
							CAT II	15		
							ESE	50	40	40
CST209 (PC | ST) Version: 1.0	Data Structures Laboratory	-	-	2	1	Practical 100	FEP	50	40	40
							POE	50	40	
CST211 (PC | ST) Version: 1.0	Software Engineering	3	1	-	4	Theory 100	FET	20	40	40
							CAT I	15		
							CAT II	15		
							ESE	50	40	40
CST213 (PC | ST) Version: 1.0	Microprocessors and Microcontrollers	3	-	-	3	Theory 100	FET	20	40	40
							CAT I	15		
							CAT II	15		
							ESE	50	40	40
CST215 (MC) Version: 1.0	Professional Skill Development - I	-	-	2	NC	Practical 100	FEP	100	40	40
CST217 (MC) Version: 1.0	Environmental Science	1	-	2	NC	Practical 100	FEP	100	40	40
	Total	18	02	10	22		Total Hrs: 30, Total Credits: 22 NC: 2			

Sem. IV										
Course Code	**Course Title**	**L**	**T**	**P**	**C**		**Evaluation Scheme**			
						Component	**Exam**	**WT**	**Min. Pass**	
CST202 (PC | ST) Version: 1.0	Theory of Computation	3	1	-	4	Theory 100	FET	20	40	40
							CAT I	15		
							CAT II	15		
							ESE	50	40	40
CST204 (PC | ST) Version: 1.0	Computer Programming Laboratory - I	2	-	4	4	Practical 100	FEP	50	40	40
							POE	50	40	
CST206 (PC | ST) Version: 1.0	Database Management Systems	3	-	-	3	Theory 100	FET	20	40	40
							CAT I	15		
							CAT II	15		
							ESE	50	40	40
CST208 (PC | ST) Version: 1.0	Database Management Systems Laboratory	-	-	2	1	Practical 100	FEP	50	40	40
							POE	50	40	
CST210 (PC| ST) Version: 1.0	Operating Systems	3	-	-	3	Theory 100	FET	20	40	40
							CAT I	15		
							CAT II	15		
							ESE	50	40	40
CST212 (PC| ST) Version: 1.0	Operating Systems Laboratory	-	-	2	1	Practical 100	FEP	100	40	40
CST214 (PC | ST) Version: 1.0	Computer Networks	3	-	-	3	Theory 100	FET	20	40	40
							CAT I	15		
							CAT II	15		
							ESE	50	40	40
CST216 (PC | ST) Version: 1.0	Computer Networks Laboratory	-	-	2	1	Practical 100	FEP	100	40	40
CST218 (PW | ST) Version: 1.0	Mini Project-I	-	-	2	1	Practical 100	FEP	50	40	40
							POE	50	40	
CST220 (MC) Version: 1.0	Professional Skill Development - II	-	-	2	NC	Practical 100	POE	100	40	40
	Total	14	01	14	21		Total Hrs: 29, Total Credits: 21 NC: 1			

CST201: Mathematics for Modern Computing

(Ver 1.0, Basic Science, School of Science)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min Pass	
3	-	-	3	Theory 100	FET	20	40	40
					CAT-I	15		
					CAT-II	15		
					ESE	50	40	

Course Description: This course is at odd semester of Second year B Tech Technology for Computer Science Engineering. It is a foundation course in Numerical method and Fuzzy Mathematics and may be pre requisites for other courses. It covers solution of algebraic and transcendental equation by different methods, Numerical differentiation and Numerical integration, Introduction to fuzzy set and Fuzzy equations.

Course Outcomes: At the end of this course students will able to-

CO1 **Find**[3] numerical solution of equation $f(x) = 0$
CO2 **Evaluate**[5] derivative and integration for tabular values of x and y.
CO3 **Find**[3] probability distribution for random variable.
CO4 **Solve**[3] the fuzzy equation.

Syllabus (Theory)

Units	Description	Hours
I	**A) Error:** Introduction, Types of errors, Rules for estimate errors, **B) Solution of Algebraic and Trancdental Equation:** Roots of Equation by Bisection Method, False position method, Secant method, Newton-Raphson method, multiple roots by Newton method.	8
II	**Numerical differentiation:** Newton forward and backward difference formulae for equally spaced data, Derivative using stirling formula, Newton's divided difference formula for unequally spaced data,	6
III	**Numerical Integration:** Newton's cotes quadrature formula, Trapezoidal rule, Simpson one third rule, Simpsons three eight rule, waddles' formula and Romberg Integration, Gauss quadrature formula.	6
IV	**Probability Distribution:** Random variable, probability density function, Binomial distribution, Poisson distribution and Normal distributions.	6
V	**Introduction to Fuzzy sets:** Basic concepts of fuzzy sets, Crisp set and Fuzzy set, membership functions, Basic operations on fuzzy sets, Properties of fuzzy sets	6

VI	**Fuzzy Arithmetic:** Fuzzy numbers, Fuzzy cardinality, Operations on Fuzzy numbers, Fuzzy equations of type A + X = B and A.X = B	8

Text Book

1) Computer Based Numerical and Statistical Techniques by Manish Goyal, Laxmi Publications (P) Ltd, Third edition [unit 2 , unit 3,unit 5]
2) Fuzzy sets and Fuzzy Logic by George J. Klir, Bo Yuan

References

1) Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publish-ers, Delhi.
2) Advanced Engineering Mathematics by Erwin Kreyszig, Wiley IndiaPvt. Ltd.
3) Numerical Methods by E Balguruswamy, Tata McgrawHill PublicationCompany Ltd.,8th Edition,2002.
4) Numerical Methods by Dr. V.N.Vedamurthy, Vikas Publication
5) Numerical Methods by G. Haribaskaran, Laxmi Publications Pvt.Ltd,New Delhi, 1st Edition,2006.
6) Numerical Analysis Theory and Applications by R.L.Burden and J.D.Faires,Cengage Learning India Pvt.Ltd.,New Delhi,1st Edition,2005.
7) M.Grabish, Sugeno, and Murofushi, Fuzzy Measures and Integrals: the-ory and Applications.
8) M. Hanss, Applied Fuzzy Arithmetic, An Introduction with EngineeringApplications, Springer-Verlag Berlin Heidelberg 2005.

CST203R1 :Discrete Structures							
Ver 1.1, Program Core, School of Technology							
Lect.	Tut.	Pract.	Credits	Evaluation Scheme			
				Component	Exam	Weightage	Pass %
3	1	-	4	Theory 100 Marks	FET	20	40
					CAT I	15	
					CAT II	15	
					ESE	50	40

Prerequisite: Basics of mathematics

Course Outcomes: After the end of this course students will be able to

CO1 **Relate**[3] logical notation to define mathematical concepts such as logic, set theory, relations, functions, probability.

CO2 **Illustrate**[2] the knowledge and skills obtained to solve a variety of discrete mathematical problems

CO3 **Make use of**[3] the concepts and algorithms of graph theory and elementary combinatorial processes.

CO4 **Apply**[3] the appropriate formulas to calculate permutations & combinations.

Syllabus (Theory)

Units	Description	Hours
I.	**Set theory:** Basic concepts of set theory, types of operations on sets, ordered pairs, Cartesian Product, representation of discrete structures, relation, properties of binary relations, matrix and graph representation, partition and covering of set, equivalence relation, composition, POSET and Hasse diagram, Function – types, composition of functions, Inverse function.	7
II.	**Graph theory:** Basic concepts of graph theory, Storage representation and manipulation of Graphs, PERT and related techniques.	7
III.	**Mathematical Logic:** Statements and notations, connectives – negation, Conjunction, disjunction, conditional, bi-conditional, Statement formulas and truth tables well formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal and principal normal forms, completely parenthesized infix and polish notations, Theory of Inference for statement calculus – validity using truth table, rules of inference, consistency of Premises and indirect method of proof.	7
IV.	**Lattices and Boolean algebra:** Introduction to Lattice, definition, Lattice as POSETs, Properties, Lattice , Boolean algebra definition and examples, Boolean functions, representation and minimization of Boolean functions.	7
V.	**Counting:** The Basics of Counting, Permutations and Combinations, Generalized Permutations and Combinations, Generating Permutations and Combinations	7

VI.	**Discrete Probability:** Discrete Probability, Conditional Probability, Bayes' Theorem, Information and Mutual Information.	**7**

Tutorial

One hour per week per batch tutorial is to be utilized to ensure that students have properly learnt the topics covered in the lectures. It should comprise of minimum 8-10 tutorials. Students of different batches should perform different tutorials based on the following guidelines-

1. Concepts of set theory, operations on sets
2. Function and its types
3. Concepts of graph theory, PERT and related techniques
4. Mathematical logic
5. Permutations, Combinations
6. Discrete Probability

Textbooks:

1. J.P Tremblay, R.Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill Publishing Company Limited, 1997

References :

1. J.L. Mott, A. Kandel, T.P. Baker, "Discrete Maths for Computer Scientists & Mathematicians", Second Edition, Prentice Hall of India Pvt Limited, New Delhi, 2009

CST205: Object Oriented Programming

(Ver 1.0, Program Core, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
2	-	4	4	Practical 100	FEP	50	40	40
					POE	50	40	

Course Description: This course is at odd semester of second year B Tech computer science and engineering. It is a basic foundation course in programming and may be pre requisites for other courses. It covers basics of programming with object oriented concepts and their application.

Prerequisite: Basics of computer programming
Co requisite: None
Course Outcomes: After the end of this course students will able to-

CO1 **Explain**[2] the principles of the object oriented programming concepts.
CO2 **Describe**[1] object oriented programs using arrays, array of objects, pointers, constructors and destructors as required.
CO3 **Demonstrate**[3] the different types of inheritance.
CO4 **Design**[5] C++ program by using features of polymorphism.

Syllabus (Theory)

Units	Description	Hrs
I	**Overview :** Need of Object-Oriented Programming (OOP), Object Oriented Programming Paradigm, Basic Concepts of Object-Oriented Programming, Benefits of OOP, C++ as object oriented programming language, C++ programming Basics, Data Types, Structures, Enumerations, control structures, Class, Object, class and data abstraction, class scope and accessing class members, separating interface from implementation, controlling access to members.	03
II	**Arrays, Pointer and Functions:** Arrays of objects, Pointers to objects, Type checking C++ Pointers, This Pointer, Pointers to derived types, Pointers to class members, Dynamic allocation operators- new & delete operators. Functions- Function, function prototype, accessing function and utility function, Constructors and destructors, Objects and Memory requirements, Static Class members, data abstraction and information hiding, inline function. **Inheritance:** Single Inheritance, Multilevel Inheritance, Multiple Inheritances, Hybrid Inheritance, Hierarchical Inheritance, Virtual base classes.	08
III	**Polymorphism:** Overloading - Function overloading, Overloading constructor function, copy constructors, Operator overloading using friend function, Overloading new & delete operators, overloading some special operators like	05

[],(),->,Comma operator.
Virtual Functions- Pure virtual function, calling virtual function through a base class, Abstract classes, Early vs Late binding.

IV **File and Streams:** Streams, String I/O, Character I/O, Object I/O, I/O with 08 multiple objects, File pointers and redirections. C++ streams, C++ stream classes, RTTI, Namespace fundamentals, STL containers, STL algorithms, STL iterators.
Templates: Templates - Generic classes, Generic functions, Applying generic functions, type name &export keyword, power of templates.
Exception Handling– Fundamentals, Handling derived class exceptions, exception handling options: catching, throwing & handling of the exception.

Practical

Four hours per week per batch practical is to be utilized for writing programs to ensure that students have properly learnt the topics covered in the lectures. This shall include extra problem statements and there implementations to strengthen the programming logic.
It should comprise of minimum 10-12 experiments. Students of different batches should implement different programs based on the following guidelines in UNIX / Linux platform.

1. Write a program to create BOX Class. Write appropriate the volume of a box. Functions to compute declare a static data member and member function to keep track of objects created.
2. Write a C++ program to demonstrate types of Constructor and Destructor.
3. Write a C++ program to dynamically accept numbers and implement matrix multiplication.
4. Define a student class with USN, Name and marks in 3 tests of subject. Declare an array of 10 student objects. Using appropriate functions, find the average of the two better marks for each student. Print the USN, Name and average marks of all the students.
5. Implement a C++ program for set operation –Union and Intersection.
6. Write a C++ program to return maximum of two positive numbers using inline function.
7. Implement a C++ program to add two numbers using friend functions.
8. Write a C++ program to implement single and multilevel inheritance.
9. Implement C++ program to demonstrate hybrid inheritance.
10. Write a C++ program to calculate the area of circle, rectangle and triangle using function overloading
11. Write a C++ program to create a class called STACK using an array of integers. Implement the following operations by overloading the operator '+' and '—'
    i) S1=s1+element; where s1 is an object of the class STACK and element is an integer to be pushed on the top of the stack.
    ii) s1=--s1; where s1 is an object object of the class STACK.'—'.operator pops

the element.

Handle the stack empty and full condition. Also display the contents of the stack after each operation by overloading the << operator.

12. Write a C++ program to understand the need of virtual base class.
13. Write a C++ program to calculate number of lines, words and characters in a file
14. Implement bubble sort technique using function template and virtual function
15. Write a C++ program to implement stack using class template and exception handling.

Text Book

1. The Complete Reference: C++ - Herbert Schildt (TMGH) Fourth Edition.
2. Object-Oriented Programming in C++ - Rajesh K. Shukla (Wiley) India Edition.

References

1. Object Oriented Programming in Turbo C++ - Robert Lafore (Galgotia).
2. Object Oriented Programming with C++ - Sourav Sahay (Oxford) Second Edition.

CST207: Data Structures

(Ver 1.0, Program Core, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
3	-	-	3	Theory 100	FET	20	40	40
					CAT I	15		
					CAT II	15		
					ESE	50	40	40

Course Description: This course is at odd semester of second year B Tech computer science and engineering. It is a foundation course in computer science and may be pre requisites for other courses in computer science. It covers basics of data storages, data access and their application.

Prerequisite: Computer Programming, Basics of mathematics.
Co requisite: None

Course Outcomes: After the end of this course students will able to-

CO1 **Explain**[2] concepts of C and data structures.
CO2 **Examine**[4] different searching and sorting techniques.
CO3 **Describe**[2] concept of stack.
CO4 **Apply**[3] knowledge of queue for its implementation.
CO5 **Demonstrate**[3] implementation of list.
CO6 **Demonstrate**[3] concept of trees.

Syllabus (Theory)

Units	Description	Hrs
I	**Basics of Data Structures**: Overview of C- Basic data types, control structures, array, function, structure, pointers, Time and Space complexity.	04
II	**Searching and Sorting Techniques:** Linear search, binary search, bubble sort, selection sort, insertion sort, merge sort, quick sort, radix sort, heap sort.	06
III	**Stacks:** Definition, representation, operations, applications of stack. **Queues:** Definition, representation, operations, applications of queue, circular queue, priority queue.	08
IV	**Lists:** Definition representation, operations, singly, doubly and circular linked lists.	06
V	**Trees:** Basic terminology, representation, binary tree, traversal methods, binary search tree.	06

VI	**Graphs:** Basic concept of graph theory, storage representation, graph traversal techniques- BFS and DFS, Graph representation using sparse matrix.	06

Text Book

1. Let us C – Yashwant Kanetkar (BPB).
2. Data Structure using C- A. M. Tanenbaum, Y. Langsam, M. J. Augenstein (PHI).

References

1. Schaum's Outlines Data Structures – Seymour Lipschutz (MGH).
2. Data Structures- A Pseudocode Approach with C – Richard F. Gilberg and Behrouz A. Forouzon 2nd Edition.

CST209: Data Structures Laboratory

(Ver 1.0, Program Core, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
-	-	2	1	Practical 100	FEP	50	40	40
					POE	50	40	

Course Description: This course is at odd semester of second year B Tech computer science and engineering. It is a foundation course in computer science and may be pre requisites for other courses in computer science. It covers implementation of searching sorting techniques, basics of data storages, data access and their application.

Prerequisite: Computer Programming, Basics of mathematics.
Co requisite: None

Course Outcomes: After the end of this course students will able to-

CO1 **Experiment**[4] different searching and sorting techniques.
CO2 **Experiment**[4] concept of stack.
CO3 **Apply**[3] knowledge of queue for its implementation.
CO4 **Demonstrate**[3] implementation of list.
CO5 **Demonstrate**[3] concept of trees.

Practical

Two hours per week per batch practical is to be utilized for writing programs to ensure that students have properly learnt the topics covered in the lectures. This shall include extra problem statements and there implementations to strengthen the programming logic.

It should comprise of minimum 10-12 experiments. Students of different batches should implement different programs based on the following guidelines-

1. Program for Searching problem, linear search, binary search.
2. Program for Sorting problem, bubble sort, selection sort.
3. Implementation of insertion sort, merge sort.
4. Implementation of quick sort, radix sort.
5. Write a program for hash functions
6. Program to implement Stacks.
7. Program to implement Queues.
8. Program to implement Circular queue, priority queue.
9. Implementation of singly linked lists.
10. Implementation of doubly linked lists.
11. Implementation of circular linked lists.
12. Implementation of stack using linked lists.
13. Implementation of queue using linked lists.

14. Program to implement binary search tree.
15. Program to implement Breadth First Search (BFS).
16. Program to implement Depth First Search (DFS).

Text Book

3. C the Complete Reference, Herbert Schildt, Tata McGraw Hills, 6th edition.
4. Schaum's Outlines Data Structures – Seymour Lipschutz (MGH).

References

3. Data Structure using C- A. M. Tanenbaum, Y. Langsam, M. J. Augenstein (PHI).
4. Data Structures- A Pseudocode Approach with C – Richard F. Gilberg and Behrouz A. Forouzon 2nd Edition.

CST211: Software Engineering

(Ver 1.0, Program Core, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
3	1	-	4	Theory 100	FET	20	40	40
					CAT I	15		
					CAT II	15		
					ESE	50	40	40

Course Description: This course is at odd semester of second year B Tech computer science and engineering. It is a one of the core course in computer science and may be pre requisites for other courses in computer science. It covers basics of software engineering, software development life cycles and testing strategies.

Prerequisite: This course requires the student should prerequisites with basic concepts of software products; idea about existing software's available in the market and software driven business to all the aspects in day to day life like automation systems, online transactions, online transactions, e-commerce etc. students should know the clear layer between software engineering discipline and other discipline.

Course Outcomes: After the end of this course students will able to-

CO1 **Explain**[2] the requirement of software engineering.
CO2 **Explain**[2] the software life cycle models.
CO3 **Design**[3] the SRS.
CO4 **Distinguish**[4] different roles of software development staffs.
CO5 **Compare**[4] Function Oriented Design & Object Oriented Design.
CO6 **Develop**[5] correct and robust software products.

Syllabus (Theory)

Units	Description	Hrs
I	**Introduction to Software Engineering:** The Evolving Role of Software, Software Characteristics, Categories of Computer Software, The Software Myths.	05
II	**Software Process and Software Development Models:** Software Processes: Software Process Components, The Capability Maturity Model Integration, Process Patterns, Software Development Models: Waterfall Model, Prototyping, Model, Spiral Model, Incremental Model, Time boxing Model, V Model.	07
III	**Requirements Engineering:** Eliciting Requirements, Negotiating Requirements, Validating Requirements, Software Requirement specifications (SRS): Role of SRS, validation of SRS document, Organization of structure, case study.	06

IV Agile Project Management: 06

Core Agile Concepts Overview, Methodologies, The Agile Manifesto Overview, Scrum Methodology, Project (Product; Release) Initiation, Scrum Planning, Scrum Sprint Planning and Executing, Identify Stakeholders.

V **Agile Teams and Team Space**: Overview, Scrum Master/Coach, Product 07
Owner/customer, Team Members/Developers (XP), Develop Epics and Stories, Create Stories, Create Product Backlog, Create Product Roadmap, Sprint Reviews, Closing: Sprint, Release and Product Retrospectives.

VI Testing Strategies: 05

Testing, Unit Testing, Black Box Testing, White Box Testing, Integration Testing, System Testing.

Tutorial

One hour per week per batch tutorial is to be utilized to ensure that students have properly learnt the topics covered in the lectures. It should comprise of minimum 8-10 tutorials. Students of different batches should perform different tutorials based on the following guidelines-

1. Introduction to software engineering.
2. Software process and software development models.
3. Software requirements engineering.
4. Agile Project Management.
5. Agile Teams and Team Space.
6. Design engineering.
7. Software testing strategies.

Text Book

1. Software Engineering: A precise Approach - Pankaj Jalote (Wiley India)
2. Fundamentals of Software Engineering - Rapit Mall (3rd Edition)(PHI)
3. Software Engineering by Jan Sommerville (9th Edition) Pearson
4. Software Engineering Principles & Practices by Rohit Khurana ITLESL (2nd Edition) Vikas Publishing House Pvt. Ltd.
5. Agile Project Management for Dummies by Mark C. Layton

References

1. Software Engineering –A Practitioner's approach Sixth Edition By Roger S. Pressman.
2. Software Engineering - Concepts & Practices -- Ugrasen Suman (Cenage Learning).
3. Software Engineering Fundamentals -Behforooz & Hudson (Oxford : Indian Edition 1st).
4. Agile Project Management: A Complete Beginner's Guide To Agile Project Management by Marcus Ries and Diana Summers.

CST213: Microprocessors and Microcontrollers

(Ver 1.0, Program Core, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
3	-	-	3	Theory 100	FET	20	40	40
					CAT I	15		
					CAT II	15		
					ESE	50	40	40

Course Description: This course is at odd semester of second year B Tech computer science and engineering. The purpose of this course is to the students can learn the fundamental concepts of microprocessor and microcontroller systems. The student will be able to incorporate these concepts into their electronic designs for other courses where control can be achieved via a microprocessor/controller implementation.

Prerequisite: Basics of digital systems/circuits.

Co requisite: None

Course Outcomes: After the end of this course students will able to-

CO1 **Explain**$_2$ basic 8085 and 8086 microprocessors architecture.
CO2 **Discuss**$_2$ 8086 microprocessor architecture with software aspects.
CO3 **Classify**$_2$ microprocessor configurations.
CO4 **Discuss**$_2$ memory interfacing and I/O interfacing with 8085.
CO5 **Explain**$_2$ basics of 8051 microcontrollers.
CO6 **Describe**$_2$ programming aspects of 8051 real time control.

Syllabus (Theory)

Units	Description	Hrs
I	**The 8085 and 8086 Microprocessors:** 8085 Microprocessor architecture- 05 Addressing modes- Instruction set-Programming the 8085	
II	**8086 Software Aspects:** Intel 8086 microprocessor - Architecture - Signals- Instruction Set-Addressing Modes- Assembler Directives- Assembly Language Programming-Procedures-Macros-Interrupts And Interrupt Service Routines- BIOS function calls.	07
III	**Microprocessor Configurations:** Coprocessor Configuration – Closely Coupled Configuration – Loosely Coupled Configuration –8087 Numeric Data Processor – Data Types – Architecture –8089 I/O Processor –Architecture –Communication between CPU and IOP.	06
IV	**I/O Interfacing:** Memory interfacing and I/O interfacing with 8085 – parallel communication interface – serial communication interface – timer-keyboard/display controller – interrupt controller – DMA controller (8237) –	07

applications – stepper motor – temperature control.

V	**Microcontrollers:** Overview of 8051 microcontrollers, Architecture, I/O ports, memory organization, Addressing modes, Instruction set of 8051, Simple programs.	05
VI	**8051 Real Time Control:** Programming timer interrupts, Programming external hardware interrupts. Programming the serial communication interrupts, Programming 8051 timers/counters.	06

Text Book

2. Ramesh S. Gaonkar, "Microprocessor – Architecture, Programming and Applications with the 8085" Penram International Publisher, 5th Ed., 2006.
3. Yn-cheng Liu, Glenn A. Gibson, "Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design", second edition, Prentice Hall of India, 2006.
4. Kenneth J. Ayala, "The 8051 microcontroller Architecture, Programming and applications" second edition, Penram international.

References

1. Douglas V.Hall, "Microprocessors and Interfacing: Programming and Hardware", second edition, Tata Mc Graw Hill, 2006.
2. A.K.Ray & K.M Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Tata Mc Graw Hill, 2006.
3. Peter Abel, "IBM PC Assembly language and programming", fifth edition, Pearson education / Prentice Hall of India Pvt.Ltd, 2007.
4. Mohamed Ali Mazidi, Janice Gillispie Mazidi, "The 8051 microcontroller and embedded systems using Assembly and C", second edition, Pearson education /Prentice hall of India, 2007.

CST215: Professional Development Skills- I

(Ver 1.0, Sem-III of Second Year B. Tech (Common for All Branches)

Course Description: This course aims to prepare the students for soft skills. The course will help them to understand their potential and set goals accordingly and organize their activities to achieve their set goals. The course also focuses on presentation and public speaking.

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

CO01 : apply[3] self analysis techniques.
CO02 : plan[4] and execute SMART goals.
CO03 : demonstrate[3] team building skills.
CO04 : prepare time table and action plan to achieve set goals.
CO05 : exhibit[3] presentation and public speaking skills.

Syllabus

Units	Description	Hrs
I	**Soft Skills:** What are soft skills? Importance of soft skills, selling your soft skills, identifying and improving your soft skills **Self Analysis:** Importance of knowing yourself, SWOT Analysis, Importance of Self Confidence, Self Esteem	04
II	**Goal Setting:** SMART Goals, Short Term goals, Moderate term goals, Long Term, Life Time Goals	04
III	**Team Building and Teamwork:** Introduction-meaning–aspects of team building, team Vs group, Stages of team building, Characteristics of effective team, role of a team leader, role of team members	04
IV	**Time Management:** Value of time, Diagnosing Time Management, Preparing to do list, Prioritizing work	04
V	**Presentation skills and Public Speaking:** Elements of an effective presentation, Structure of a presentation, Presentation tools, Audience analysis, Language: Articulation, Good pronunciation, Voice quality, Modulation, Accent and Intonation. Extempore and Prepared speeches	04

Note: During the practical sessions, it is expected that the contents of all modules should be delivered to the students of different batches and assignments be given based on the activities discussed as per the modules. Students must demonstrate the acquired skills by means of giving presentations, delivering public speeches, group discussions etc.

References:

1. Wallace & Masters, Personal development for Life & work, Thomson Learning.

2. Barun K. Mitra, Personality Development and Soft- Skills, Oxford University Press.

3. Fred Luthans, Organizational behavior, McGraw Hill.

4. Asa Don Brown, Interpersonal skills in the Workplace, Tate publishing and Enterprises.

CST 217: Environmental Studies (Audit Course)
S. Y. (B. Tech) (Semester III/IV)

Course Code	Course Title	L	T	Pr	C	Evaluation Scheme				
						Component	Exam	WT	Min Passing	
(UC|SS) Version: 10	Environmental Studies	3	-	-	3	Th (100)	FET	20	40	40
							CAT	30		
							ESE	50	40	
(UC|SS) Version: 1.0	Environmental Studies Project	-	-	2	1	Pr (100)	FEP	100	40	40

Contents

Units	Description	Hours
	a) Introduction to environmental studies:	
I	Multidisciplinary nature of environmental studies; Scope and importance; Concept of sustainability and sustainable development.	1
	b) Ecosystem:	
	Concept of ecosystem, Structure and function of ecosystem; Energy flow in an ecosystem.	
	Food chains, food webs and ecological succession.	2
	Structure and function of the following ecosystems: Examples	
	a) Natural Resources: Renewable and Non- Renewable Resources	
II	Land resources and land use change; Land degradation, soil erosion and desertification.	2
	Deforestation: Causes and impacts due to mining, dam building on environment and forests	
	Water: Use and over-exploitation of surface and ground water, floods, droughts	
	Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies	
	a) Biodiversity and Conservation	
	Levels of biological diversity: genetic, species and ecosystem diversity;	3
	Global biodiversity hot spots. India as a mega-biodiversity nation; Endangered and endemic species of India	
	Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions.	
	Conservation of biodiversity In-situ and Ex-situ conservation of biodiversity.	
	Ecosystem and biodiversity services: Ecological, economic, social, ethical, Aesthetic and Informational value.	

Sanjay Ghodawat University Kolhapur

Structure and Contents for Second Year B. Tech. Computer Science and Engineering Program R0

III	**a) Environmental Pollution** • Environmental pollution: types, causes, effects and controls; Air, water, Noise pollution • Nuclear hazards and human health risks • Solid waste management: Control measures of urban and industrial waste.	3
	b) Environmental policies and practices • Global issues: Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture. • Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act	3
IV	**a) Human Communities and the Environment** • Human population growth: Impacts on environment, human health and welfare • Disaster management: floods, earthquake, cyclones and landslides. • Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan. • Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).	3

Environmental Studies Project (Field Work)

(Ver 1.0, Program Core, School of Sciences)

Lect.	Tut.	Practical.	Credits	Evaluation Scheme			
				Component	Exam	WT	Pass
-	-	2	0	Practical (100)	PET	100	Min 40

Field Work

Description

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
- Visit to a local polluted Site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems-pond, river, etc.

References

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
7. McCully, P. 1996. Rivers no more: the environmental effects of dams (pp. 29-64). Zed Books.
8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Deeksha Dave, S.S. Katewa, Textbook of Environmental Studies.
10. B.K. Sharma, Environmental Chemistry.
11. Bharucha Erach, The Biodiversity of India, Mapin Publishing pvt. Ltd., Ahmedabad 380013, India, Email:mapin@icenet.net (R)
12. De A.K., Environmental Chemistry, Wiley Wastern Ltd.
13. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. I anfd II, Environmental Media (R)

CST202: Theory of Computation

(Ver 1.0, Program Core, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
3	1	-	4	Theory 100	FET	20	40	40
					CAT I	15		
					CAT II	15		
					ESE	50	40	40

Course Description: This course is at even semester of second year B Tech computer science and engineering. It is a one of the core course in computer science and may be pre requisites for other courses in computer science. It covers basics of regular languages, finite automata, grammar, languages and concepts Turing machines.

Prerequisite: Discrete structures and basics of mathematics
Co requisite: None

Course Outcomes: After the end of this course students will able to

CO1 **Construct**[3] regular expressions and regular grammars that produce regular languages.
CO2 **Construct**[3] PDA, CFG for regular expression.
CO3 **Design**[3] specify and test deterministic and non deterministic finite automata that recognize regular languages.
CO4 **Illustrate**[3] the concepts of Turing machines and grammars.

Syllabus (Theory)

Units	Description	Hrs
I	**Mathematical Induction, Regular Languages & Finite Automata:** The Principle of Mathematical Induction Recursive Definitions, Definition & types of grammars & languages, Regular expressions and corresponding regular languages, examples and applications, unions, intersection & complements of regular languages, Finite automata-definition and representation, Non-deterministic F.A.,NFA with null transitions, Equivalence of FA's , NFA's and NFA's with null transitions.	07
II	**Kleene's Theorem:** Part I and II statements and proofs, minimum state of FA for a regular language, minimizing number of states in Finite Automata.	03
III	**Grammars and Languages:** Derivation and ambiguity, BNF and CNF notations, Union, Concatenation and *'s of CFLs, Eliminating production and unit productions from CFG, Eliminating useless variables from a context Free Grammar. **Parsing:** Top-Down, Recursive Descent and Bottom-Up Parsing	9
IV	**Push Down Automata:** Definition, Deterministic PDA and types of acceptance, Equivalence of CFG's	05

and PDAs.

V	**CFL's and non CFL's:** Pumping Lemma and examples, intersections and complements.	03
VI	**Turing Machines:** Models of computation, definition of Turing Machine as Language acceptors, combining Turing Machines, Computing a function with a TM **Variations in Turing Machines :** Turing machines with doubly-infinite tapes, more than one tape, Non-deterministic TM and Universal TM.	09

Tutorial

One hour per week per batch tutorial is to be utilized to ensure that students have properly learnt the topics covered in the lectures. It should comprise of minimum 8-10 tutorials. Students of different batches should perform different tutorials based on the following guidelines-

1. Finite automata, NFA, DNFA
2. Kleene's Theorem,
3. Minimum state of FA for a regular language, minimizing number of states in FA
4. BNF and CNF notations
5. Eliminating production and unit productions from CFG
6. Top-Down, Recursive Descent and Bottom-Up Parsing
7. PDA and types of acceptance
8. Pumping Lemma and examples, CFL's and non CFL's
9. Computing a function with a TM
10. Variations in Turing Machines

Text Book

1. Introduction to Languages & theory of computations—John C. Martin (MGH).

References

1. Discrete Mathematical Structures with applications to Computer Science—J .P.Trembley & R.Manohar (MGH)
2. Hopcroft J.E., Motwani R. and Ullman J.D, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2008.
3. John.C.Martin, "Introduction to Languages and the Theory of Computation" McGraw-Hill Education, 01-May-2010.
4. Michael Sipser, "Introduction to the Theory of Computation" Cengage Learning, 2012.
5. Peter Linz, "An introduction to formal languages and automata", Jones & Bartlett Learning, 2001.

CST204: Computer Programming Laboratory - I

(Ver 1.0, Engineering Science, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
2	-	4	4	Practical 100	FEP	50	40	40
					POE	50	40	

Course Description: This course is at even semester of second year B Tech computer science and engineering. It is a foundation course in programming and may be pre requisites for other courses. It covers basics of java programming with object oriented concepts and their application.

Prerequisite: Object Oriented programming concepts.
Co requisite: None
Course Outcomes: After the end of this course students will able to-

CO1 **Explain**[2] Fundamental and object oriented concepts of Java.
CO2 **Analyze**[4] Application of Interface, inheritance and packaging in Java.
CO3 **Express**[2] Writing code with Exception handing and I/O programming features.
CO4 **Demonstrate**[3] Architecture and components of GUI development in Java.
CO5 **Demonstrate**[3] Fundamental concept of multithreading and Network Programming in Java.
CO6 **Demonstrate**[3] Collection and database programming in Java.

Syllabus (Theory)

Units	Description	Hrs
I	**Fundamental Programming in Java:** The Java Buzzwords, The Java Programming Environment- JVM, JIT Compiler, Byte Code Concept, HotSpot, A Simple Java Program, Source File Declaration Rules, Comments, Data Types, Variables, Operators, Strings, Input and Output, Control Flow, Big Numbers, Arrays- Jagged Array. **Objects and Classes:** Object-Oriented Programming Concepts, Declaring Classes, Declaring Member Variables, Defining Methods, Constructor, Passing Information to a Method or a Constructor, Creating and using objects, Controlling Access to Class Members, Static Fields and Methods, this keyword, Object Cloning, Class Design Hints.	04
II	**Interface, Inheritance and Packaging:** Interfaces: Defining an Interface, Implementing an Interface, Using an Interface as a Type, Evolving Interfaces and Default Methods. **Inheritance:** Definition, Superclasses, and Subclasses, Overriding and Hiding Methods, Polymorphism, Inheritance Hierarchies, Super keyword, Final Classes and Methods, Abstract Classes and Methods, casting, Design	05

Hints for Inheritance, Nested classes & Inner Classes, finalization and garbage collection.
Packages: Class importing, Creating a Package, Naming a Package, Using Package Members, Managing Source and Class Files. Developing and deploying (executable) Jar File.

III	**Exception and I/O Streams:** Exception: Definition, Dealing with Errors, The Classification of Exceptions, Declaring Checked Exceptions, Throw an Exception, Creating Exception Classes, Catching Exceptions, Catching Multiple Exceptions, Re-throwing and Chaining Exceptions, finally clause, Advantages of Exceptions, Tips for Using Exceptions. **I/O Streams:** Byte Stream – InputStream, OutputStream, DataInputStream, DataOutputStream, FileInputStream, FileOutputStream, Character Streams, BufferedStream, Scanner, File, RandomAccesFile.	05
IV	**Graphical User Interfaces using Swing:** Introduction to the Swing, Swing features, Swing Top Level Containers-Creating a Frame, Positioning a Frame, Displaying Information in a Panel, The Model-View-Controller Design Pattern, The JComponent Class. **Layout Management:** Introduction to Layout Management, APIs for Border Layout, Flow Layout, Grid Layout **Event Handling:** Basics of Event Handling, The AWT Event Hierarchy, Semantic and Low- Level Events in the AWT, Low-Level Event Types **User Interface Components:** Text Input, Choice Components, Menus, Dialog Boxes. Setting the Look and Feel of UI, Introduction to JApplet	04
V	**Networking and Multithreading:** **Networking:** Overview of Networking, Networking Basics, Working with URLs, Creating a URL, Parsing a URL, Reading Directly from a URL, Connecting to a URL, Reading from and Writing to a URL Connection, Sockets, Reading from and Writing to a Socket, Writing the Server Side of a Socket, Datagrams, Writing a Datagram Client and Server. **Multithreading:** Processes and Threads, Runnable Interface and Thread Class , Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Thread States, Thread Properties, Joins, Synchronization	04
VI	**Collection and Database Programming:** **Collections:** Collection Interfaces, Concrete Collections- List, Queue, Set, Map, the Collections Framework. **Database Programming:** The Design of JDBC, The Structured Query Language, JDBC Installation, Basic JDBC Programming Concepts, Query Execution, Scrollable and Updatable Result Sets, Metadata, Row Sets, Transactions.	02

Practical

Four hours per week per batch practical is to be utilized for writing programs to ensure that students have properly learnt the topics covered in the lectures. This shall include extra problem statements and there implementations to strengthen the programming logic.
It should comprise of minimum 10-12 experiments. Students of different batches should implement different programs based on the following guidelines-

1. Implement a program based on constructor.
2. Implement a program using static variable and static method.
3. Implement a program based on interface.
4. Implement a program based on inheritance.
5. Implement a program based on package.
6. Implement a program to solve arithmetic equations with exception handling.
7. Implement a program to perform string conversion with exception handling.
8. Implement a simple file handling program.
9. Implement a program using command line arguments.
10. Implement a program using Swing.
11. Implement a program based on event handling.
12. Implement a program based on multithreading.
13. Implement a program using Database handling.

Text Book

1. Core Java- Volume I Fundamentals: Cay Horstmann and Gary Cornell, Pearson, Eight edition.
2. Core Java- Volume II Advanced Features: Cay Horstmann and Gary Cornell, Pearson, Eight edition.

References

1. JAVA-The Complete Reference: Herbert Schildt, Oracle Press, Mcgraw Hill, Ninth edition.
2. JAVA™ HOW TO PROGRAM, By Deitel Paul , Deitel Harvey.10th Edition, Publisher: PHI Learning.
3. Thinking in Java by Bruce Eckel, Prentice Hall, 4th Edition.
4. A Programmer's guide to JAVA SCJP Certification: Khaleed Mughal and Rolf W. Rasmussen, Addison Wesley, Third edition.

CST206: Database Management System

(Ver 1.0, Program Core, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
3	-	-	3	Theory 100	FET	20	40	40
					CAT I	15		
					CAT II	15		
					ESE	50	40	40

Course Description: This course is at even semester of second year B Tech computer science and engineering. It is a one of the core course in computer science and may be pre requisites for other courses. It covers basics of database management systems, SQL, database transactions and their application.

Prerequisite: OO Programming
Co requisite: None

Course Outcomes: After the end of this course students will able to

CO1 **Explain**[2] Fundamental Concepts and algorithms related to database.
CO2 **Summarize**[U] familiarity with SQL & DBMS.
CO3 **Apply**[3] basic concepts of Database Design.
CO4 **Illustrate**[3] to organize data in specific order to improve performance.
CO5 **Develop**[3] database transaction, concurrency control and their properties.
CO6 **Discuss**[2] to maintain the integrity of data.

Syllabus (Theory)

Units	Description	Hrs
I	**Introduction:** Purpose of Database System – Views of data – Data Models – Database Languages — Database System Architecture – Database users and Administrator – Entity– Relationship model (E-R model) – E-R Diagrams -- Introduction to relational databases.	06
II	**Relational Model:** The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals - Integrity – Triggers – Security.	06
III	**Database Design:** Functional Dependencies – Non-loss Decomposition – Functional Dependencies –	07

First, Second, Third Normal Forms, Dependency Preservation – Boyce Normal Form Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

IV **Transaction Management & Concurrency Control:** 06

Transaction- Concurrency Control- Concurrency Control with Locking Methods- Concurrency Control with Times tamping Methods- Concurrency Control with Optimistic Methods.

V **Data Storage & Indexing:** 06

File Organization- Organization of records in File- Data Dictionary Storage- Database Buffer- Basic Concepts indexing & hashing- Ordered Indices-Multiple-Key Access- Static Hashing- Dynamic Hashing- Bitmap Indices- Index Definition in SQL.

VI **Recovery System:** 05

Failure Classification- Storage-Recovery & atomicity-Recovery Algorithm- Buffer Management-Failure with loss of non- volatile Storage.

Text Book

1. Database Systems- A practical approach to Design, Implementation and Management by Thomos Connolly, Carolyn Begg, 3rd Edition, Pearson Education.
2. Database System Concepts by A. Silberschatz, H.F. Korth, S. Sudarshan, 6th edition, Mc Graw Hill Education.

References

1. C. J. Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.

CST208: Database Management Systems Laboratory

(Ver 1.0, Program Core, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
-	-	2	1	Practical 100	FEP	50	40	40
					POE	50	40	

Course Description: This course is at even semester of second year B Tech computer science and engineering. It is a one of the core course in computer science and may be pre requisites for other courses. It covers study and implementation of database management systems, SQL, database transactions and their application.

Prerequisite: OO Programming
Co requisite: None

Course Outcomes: After the end of this course students will able to

CO1 **Operate**3 SQL queries and DBMS.
CO2 **Illustrate**3 to organize data in specific order to improve performance.
CO3 **Develop**5 database transaction, concurrency control and their properties.
CO4 **Experiment**4 to maintain the integrity of data.

Practical

Two hours per week per batch practical is to be utilized for writing programs to ensure that students have properly learnt the topics covered in the lectures. This shall include extra problem statements and there implementations to strengthen the programming logic.
It should comprise of minimum 10-12 experiments. Students of different batches should implement different programs based on the following guidelines-

1. Program to implement Data Definition, Table Creation and Constraints.
2. Program to implement Insert, Select, Update & Delete Commands
3. Program to implement Nested Queries & Join Queries.
4. Program to implement Views.
5. Program to implement High level programming language extensions (Control structures, Procedures and Functions).
6. Program to implement Front end tools.
7. Program to implement Forms.
8. Program to implement Triggers.
9. Program to implement Menu Design.
10. Program to implement Reports.
11. Program to implement Database Design and implementation (Mini Project).

Text Book

1. The Complete Reference: C++ - Herbert Schildt (TMGH) Fourth Edition.
2. Database Systems- A practical approach to Design, Implementation and Management by Thomos Connolly, Carolyn Begg, 3rd Edition, Pearson Education.
3. Database System Concepts by A. Silberschatz, H.F. Korth, S. Sudarshan, 6th edition, Mc Graw Hill Education.

References

1. C. J. Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.

CST210: Operating Systems

(Ver 1.0, Program Core, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
3	-	-	3	Theory 100	FET	20	40	40
					CAT I	15		
					CAT II	15		
					ESE	50	40	40

Course Description: This course is at even semester of second year B Tech computer science and engineering. It is a core course in computer science and may be pre requisites for other courses. It covers basics of operating systems, Linux basics, Linux networking and Linux security.

Prerequisite: Computer fundamentals
Co requisite: None

Course Outcomes: After the end of this course students will able to-

CO1 **Identify**[1] different types of operating system.
CO2 **Explain**[2] process management done by operating system.
CO3 **Explain**[2] scheduling of multiple processes by operating system.
CO4 **Discuss**[2] process synchronization.
CO5 **Define**[1] key terms of deadlock and its prevention.
CO6 **Discuss**[2] the memory management done by operating systems.

Syllabus (Theory)

Units	Description	Hrs
I	**Operating Systems Overview** What is an Operating system?, services given by operating system, types of operating system, Batch Processing System, Multiprogramming System, The Time Sharing System, The Real Time Operating System, Distributed operating system	05
II	**Process management and Scheduling**: process overview, process scheduling, operations on processes, inter-process communication, Scheduling, scheduling criteria ,scheduling algorithms	06
III	**Process synchronization:** Critical section problem, semaphores and its implementation, classical problems of synchronization, monitors**.**	05
IV	**Linux Basics:** Introduction to Linux, Linux File System, General usage of Linux kernel & basic commands, Linux users and group, Permissions ior file directory and' users, Searching a file & directory, zipping and unzipping concepts.	06
V	**Linux Networking**: Introduction to Networking in Linux, Network basics &	07

tools, File transfer protocol in Linux, Network File system, Domain Naming Services (DNS).

VI **Linux Security:** Configure and troubleshoot lpv4 and lPv6 address in Linux, 07 Linux Network Namespaces, Dynamic Hosting configuration protocol (DHCP) basics and configuration, Security tasks and Auditing source code, Securing SSH, port scanning with suitable tools.

Text Book

1. Operating System concepts – 5th Edition –by Silberschatz Galvin, John Wiley.
2. Operating Systems a concept based approach by Dhananjay M Dhamdhere, TMGH.
3. The Complete Reference Linux, Sixth Edition, Richard Peterson, TMGH.

References

1. Harvey M. Deitel, “Operating Systems”, Second Edition, Pearson Education Pvt. Ltd, 2002.
2. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall of India Pvt. Ltd, 2003.
3. William Stallings, “Operating System”, Prentice Hall of India, 4th Edition, 2003.
4. Linux Fundamentals, Paul Cobbaut, CEST, 2015.

CST212: Operating Systems Laboratory

(Ver 1.0, Program Core, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
-	-	2	1	Practical 100	FEP	100	40	40

Course Description: This course is at even semester of second year B Tech computer science and engineering. It is a core course in computer science and may be pre requisites for other courses. It covers the study and implementation of basics concepts of operating systems, Linux, Linux networking and Linux security.

Prerequisite: Computer fundamentals, Programming Basics
Co requisite: None

Course Outcomes: After the end of this course students will able to-

CO1 **Experiment**$_4$ process management done by operating system.
CO2 **Analyze**$_2$ scheduling of multiple processes by operating system.
CO3 **Practice**$_3$ process synchronization.
CO4 **Demonstrate**$_3$ key terms of deadlock and its prevention.
CO5 **Experiment**$_4$ the memory management done by operating systems.

Practical

Two hours per week per batch practical is to be utilized for writing programs to ensure that students have properly learnt the topics covered in the lectures. This shall include extra problem statements and there implementations to strengthen the programming logic.
It should comprise of minimum 10-12 experiments. Students of different batches should implement different programs based on the following guidelines-

1. Linux commands (basic, file & directory, zip & unzip, networking)
2. Process control system calls (fork (), execv () and wait () system call)
3. Thread management (using pthread library)
4. CPU Scheduling algorithms (FCFS/SJF/ RR/ Priority/Multilevel queue)
5. Interprocess communication (using pipes, FIFO, signal)
6. Process synchronization (Producer-consumer problem using semaphore)
7. Deadlock management technique (Banker's algorithm for deadlock avoidance)
8. File allocation strategies (sequential/indexed/linked)
9. Simulate file organization technique(single level/two level/hierarchical)
10. Memory management algorithm (worst-fit, best fit, first-fit)

Text Book

1. Operating System concepts – 5th Edition –by Silberschatz Galvin, John Wiley.
2. Operating Systems a concept based approach by Dhananjay M Dhamdhere, TMGH.
3. The Complete Reference Linux, Sixth Edition, Richard Peterson, TMGH.

References

1. Harvey M. Deitel, “Operating Systems”, Second Edition, Pearson Education Pvt. Ltd, 2002.
2. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall of India Pvt. Ltd, 2003.
3. William Stallings, “Operating System”, Prentice Hall of India, 4th Edition, 2003.
4. Linux Fundamentals, Paul Cobbaut, CEST, 2015.

CST214: Computer Networks

(Ver 1.0, Program Core, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
3	-	-	3	Theory 100	FET	20	40	40
					CAT I	15		
					CAT II	15		
					ESE	50	40	40

Course Description: This course is at even semester of second year B Tech computer science and engineering. It is a basic core course in computer science and may be pre requisites for other courses. It covers basics of data communication, networking, network modeling layers and protocols.

Prerequisite: Basics of data communication and computer programming
Co requisite: None
Course Outcomes: After the end of this course students will able to

CO1 **Explain**[2] of the basic networking terms.
CO2 **Analyze**[4] different computer network modeling layers and addressing schemes.
CO3 **Apply**[3] networking algorithm to find the shortest path in network/ subnet.
CO4 **Demonstrate**[3] performance of TCP & UDP.
CO5 **Examine**[4] different application layer protocols.

Syllabus (Theory)

Units	Description	Hrs
I	**Data Communications** Data Transmission, fiber optics backbones and components, multiplexing.	04
II	**Data Link Layer** Channel access on links, SDMA, TDMA,FDMA ,CDMA, Hybrid Multiple Access, Techniques, Issues in the Data Link Layer ,Framing , Error correction and detection ,Link Level Flow Control ,Medium Access ,Ethernet ,Token Ring , FDDI ,Wireless LAN, Bridges and Switches.	07
III	**Network Layer** Circuit Switching, Packet Switching Virtual Circuit Switching, IP, ARP, DHCP, ICMP, Routing, RIP, OSPF, Sub netting, CIDR, Inter domain Routing – BGP.	06
IV	**Logical Addressing** IPV4 Addressing & IPV6, Basic Features, Inter Domain Multicast, Congestion Avoidance in Network Layer.	07
V	**Transport Layer** User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Flow	06

Control, Congestion Control, Queuing, Discipline Introduction to Quality of services (QOS). Reduction Algorithms, Ensemble Algorithms

VI **Application Layer** 06

Network Architecture, Layers, HTTP, DNS, E-Mail (SMTP, MIME, POP3, IMAP, Web (WWW), FTP, Telnet, SNMP.

Text Book

1. William Stallings, "Data and Computer Communications", Eighth Edition, Pearson Education, 2011.
2. James F. Kurose, Keith W. Ross, "Computer Networking, A Top, Down Approach Featuring the Internet", Third Edition, Pearson Education, 2006.

References

1. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers Inc., 2011.
2. Nader F. Mir, "Computer and Communication Networks", First Edition, Pearson Education, 2007.
3. Ying,Dar Lin, Ren,Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach ", McGraw Hill Publisher, 2011.
4. Behrouz A. Forouzan, "Data communication and Networking", Tata McGraw, Hill, 2004.

CST216: Computer Networks Laboratory

(Ver 1.0, Program Core, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
-	-	2	1	Practical 100	FEP	100	40	40

Course Description: This course is at even semester of second year B Tech computer science and engineering. It is a basic core course in computer science and may be pre requisites for other courses. It covers study and implementation of basics of data communication, networking, network modeling layers and protocols.

Prerequisite: Basics of data communication and computer programming
Co requisite: None
Course Outcomes: After the end of this course students will able to

CO1 **Analyze**$_4$ different computer network modeling layers and addressing schemes.
CO2 **Apply**$_3$ networking algorithm to find the shortest path in network/ subnet.
CO3 **Demonstrate**$_5$ performance of TCP & UDP.
CO4 **Examine**$_4$ different application layer protocols.

Practical

Two hours per week per batch practical is to be utilized for writing programs to ensure that students have properly learnt the topics covered in the lectures. This shall include extra problem statements and there implementations to strengthen the programming logic.
It should comprise of minimum 10-12 experiments. Students of different batches should implement different programs based on the following guidelines-

1. Implementation of file transmission using RS-232.
2. Implementation of file transmission using Stop and Wait / Go Back n / Selective Repeat protocol.
3. Implementation of Hamming code / CRC for error detection / recovery.
4. Developing a file transfer application using TCP (socket program).
5. Developing a file transfer application using and UDP (socket program).
6. Develop applications to demonstrate Congestion control algorithms.
7. Implementation of Cryptographic algorithms.
8. Develop a network application to identify host id and network id of a remote machine in an IPv4 network.
9. Develop a simple email application.
10. Study of DNS, Remote login.
11. Use of dig, ftp, SSH, etc.

Text Book

1. William Stallings, “Data and Computer Communications”, Eighth Edition, Pearson Education, 2011.
2. James F. Kurose, Keith W. Ross, “Computer Networking, A Top, Down Approach Featuring the Internet”, Third Edition, Pearson Education, 2006.

References

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers Inc., 2011.
2. Nader F. Mir, “Computer and Communication Networks”, First Edition, Pearson Education, 2007.
3. Ying,Dar Lin, Ren,Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach “, McGraw Hill Publisher, 2011.
4. Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw, Hill, 2004.

CST218: Mini Project-I

(Ver 1.0, Program Core, School of Technology)

Lect.	Tut.	Pract.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min. Pass	
-	-	4	2	Project 100	FEP	50	40	40
					POE	50	40	

Course Description: This course is at even semester of second year B Tech computer science and engineering. It is a project work and may be pre requisites for other project work.

Prerequisite: Computer programming fundamentals, software engineering
Co requisite: None

Course Outcomes: After the end of this course students will able to

CO1 **Develop**5 the students to use the engineering approach to solve the real time problems.
CO2 **Use**3 of the skills of team building and team work
CO3 **Develop**5 the logical skills and use of appropriate data structures for solving the engineering problems and puzzles.

Syllabus (Practical)

Description	Hrs
The mini project should be undertaken preferably by a group of 3-4 students who will jointly work and implement the project. The mini project must be based upon the problem statements as that of programming contest (Advanced Computing Machines – Inter-Collegiate Programming Contest: ACM-ICPC). The problems can be referred from the web links concerned with ACM-ICPC. The group will select a problem with the approval of the guide and prepare the solution guidelines for its implementation. The same should be put in the form of synopsis (3 to 5 pages), stating the usage of logic, algorithms and suitable data structures necessary for implementation of the solution. Further the group is expected to complete analysis of problem by examining the possible different inputs to the system and the corresponding outputs. The term work submission is to be done in the form of a report containing the details of the problem, solution techniques, implementation details, input-output scenarios and the conclusion. The project must be implemented in C/C++/Java. Graphics is optional for GUI.	26

Practical

Two hours per week per batch practical is to be utilized for project work. Students of different batches should follow following sequence of guidelines-

1. Project topic and title finalization.
2. Submission of proposal for project work (Synopsis).
3. First presentation includes a) Requirements analysis b) Architecture c) Data design d) Algorithm design e) Module identification f) Class properties d) Method identification

(if applicable) g) Level 0 & Level 1 DFD h) Object oriented analysis (UML diagrams).

4. Second presentation.
5. End Semester Review in 3rd Presentation (after 100 % implementation of all modules).
6. Project report preparation.

Text Book

1. Software Engineering : A precise Approach - Pankaj Jalote (Wiley India)
2. Fundamentals of Software Engineering - Rapit Mall (3rd Edition)(PHI)
3. Let Us C- Yashvant Kanetkar (BPB Publications)
4. Object-Oriented Programming in C++ - Rajesh K. Shukla (Wiley) India Edition
5. Core Java- Volume I Fundamentals: Cay Horstmann and Gary Cornell, Pearson, Eight Edition
6. Core Java- Volume II Advanced Features: Cay Horstmann and Gary Cornell, Pearson, Eight edition

Reference

1. C The Complete Reference – Herbert Schildt (Tata McGraw-Hill Edition)
2. The Complete Reference: C++ - Herbert Schildt (TMGH) Fourth Edition
3. JAVA-The Complete Reference: Herbert Schildt, Oracle Press, Mcgraw Hill, Ninth edition.

CST 220: Professional Development Skill - II

(Ver 1.0, Sem-IV of B. Tech (Common for All Branches))

Course Description: This course is the extension of the Professional Development – I course of third semester. The course aims to develop leadership skills and sharpen their decision making skills. The major focus of the course is to prepare students for job.

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

CO01 : demonstrate[3] leadership skills
CO02 : evaluate[6] process and practical ways of decision making
CO03 : judge[6] causes of stress and find remedies to reduce stress
CO04 : apply[3] business etiquettes and ethics
CO05 : exhibit[3] group discussion and Interview skills

Syllabus

Units	Description	Hrs.
I	**Leadership:** Skills for a good Leader, Assessment of Leadership Skills	4
	Creativity: Lateral thinking, vertical thinking, Out of box thinking	
II	**Decision Making:** Importance and necessity of Decision Making, Process and practical way of Decision Making, Weighing Positives & Negatives.	4
III	**Stress Management**: Causes of Stress and its impact, how to manage & distress, Circle of control, Stress Busters.	4
	Emotional Intelligence: What is Emotional Intelligence, dealing with feelings, emotional quotient, Why Emotional Intelligence matters, Emotion Scales? Managing Emotions.	
IV	**Adapting to corporate life**: Corporate Grooming and dressing, Business Etiquette Business Ethics, Dinning Etiquette, Ethics policy	4
V	**Group Discussion:** Group discussions as part of selection process. Structure of a group discussion, Dynamics of group behavior, techniques for effective participation, Team work and use of body language.	4
	Interview: Process, techniques, Pre-In-After the interview preparation.	

References:

1. Wallace & Masters, Personal development for Life & work, Thomson Learning.
2. Barun K. Mitra, Personality Development and Soft- Skills, Oxford University Press.
3. Fred Luthans, Organizational behavior, McGraw Hill.
4. Asa Don Brown, Interpersonal skills in the Workplace, Tate publishing and Enterprises.