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.

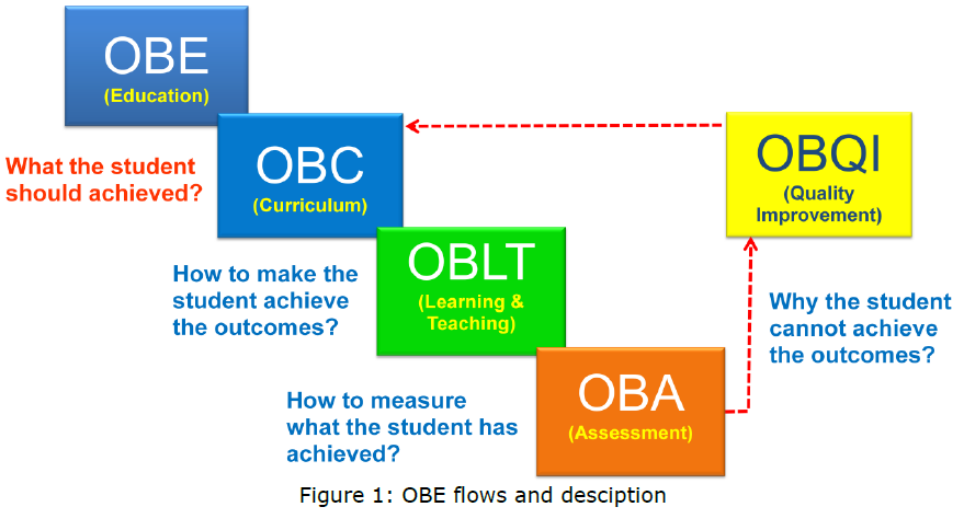
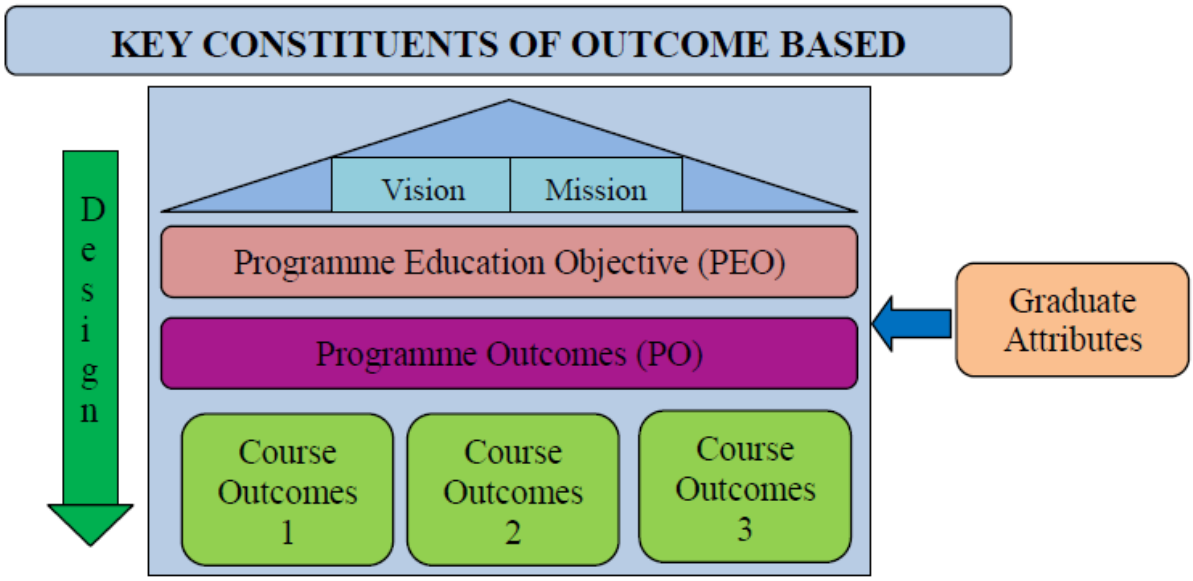


Figure 1: OBE flows and desciption

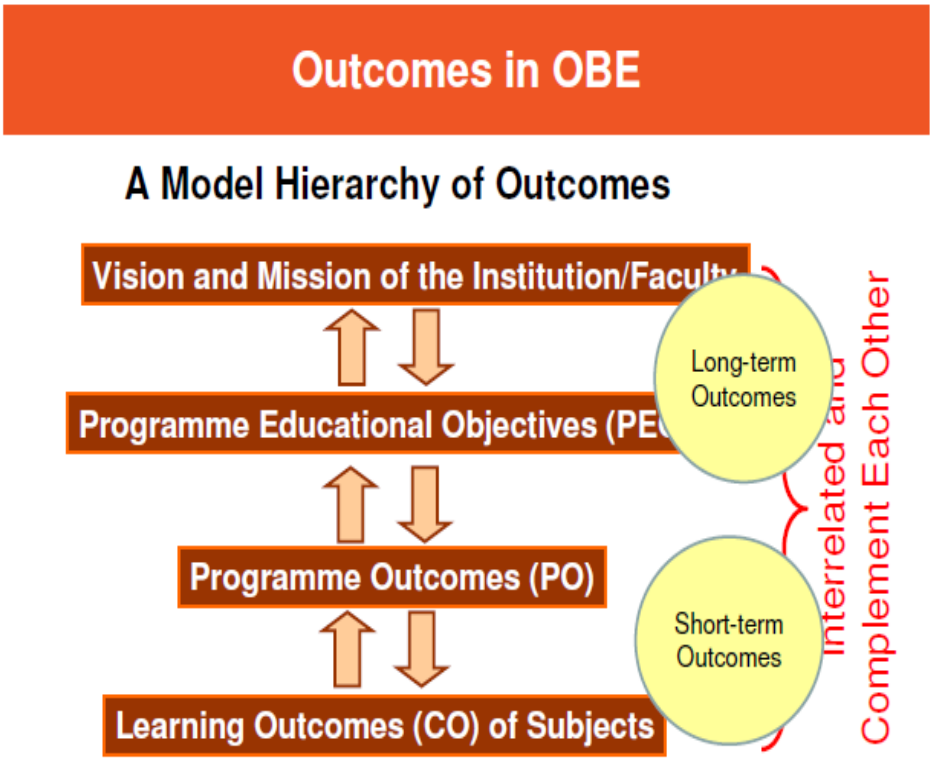


The OBE model measures the progress of the graduate in three parameters, which are

- 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

Approved in the second Academic Council Meeting held on 9th May, 2018
and to be implemented from academic year 2018-19. [Version R0]

Sanjay Ghodawat University Kolhapur

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

(Implemented from Academic year 2018-19)

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 re-register 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.

10. Attendance:

10.1 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.

10.2 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.

10.3 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.

10.4 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 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.

10.5 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 alongwith 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.

$$\text{FYPI} = \frac{\sum_{i} C_i g_i}{\sum_{i} C_i}$$

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 form 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 ≥ 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
Curriculum Structure and Syllabus for Second Year B.Tech
Electrical Engineering Program (R1)

Semester III									
Course Code	**Course Title**	**L**	**T**	**Pr**	**C**	Evaluation Scheme for Theory and Practical			
						Component	**Exam**	**WT**	**Pass (%)**
ELE201 (BS)	Differential Equations and Transforms	3	1	-	4	Th	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
ELE203 (PC)	Analog Electronic Circuits	3	-	-	3	Th	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
ELE205 (PC)	Electrical Networks	3	1	-	4	Th	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
ELE207 (PC)	Electrical Measurements	3	-	-	3	Th	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
ELE209 (PC)	Electrical Power Generation	3	1	-	4	Th	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
ELE211 (PC)	Analog Electronics Engineering Lab	-	-	2	1	Pr	FEP	50	40
							POE	50	40
ELE213 (PC)	Electrical Measurements Lab	-	-	2	1	Pr	FEP	50	40
							POE	50	40
ELE215 (HS)	Environmental Studies	1	-	2	NC	Pr	FEP	100	40
ELE217 (HS)	Professional Skill Development- I	-	-	2	NC	Pr	FEP	100	40
	Total	**16**	**03**	**8**	**20**	**Total Hrs.: 27, Total Credits: 20**			

L: Lecture, T: Tutorial, P: Practical, C: Credits, WT: Weight Age PC: Program Core, NC: Non Credit Course (Pass/Fail), AU: Audit Course (Pass/Fail), Th: Theory, WT: Weightage, PC: Program Core, PE: Program Elective, UC: University Core, ST: School of Technology, SS: School of Sciences, SC: School of Commerce, SM: School of Management, SA: School of Arts, FET: Faculty Evaluation Theory, FEP: Faculty Evaluation Practical, POE: Practical Oral Examination, CAT I: Continuous Assessment Test I, CAT II: Continuous Assessment Test II, ESE: End Semester Examination.

Syllabus Contents
ELE 201: Differential Equations and Transforms.
(Ver 1.0, BS, School of Technology)

Lectures	Tutorials	Practical	Credits	Evaluation Scheme			
				Component	Exam	WT%	Pass%
3	1	-	4	Theory	FET	20	Min 40
					CAT I	15	
					CAT II	15	
					ESE	50	40

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

CO1	**Identify**[1] formulate and solve Linear differential equations with constant coefficient.
CO2	**Obtain**[2] Fourier transform and inverse Fourier transform of given function.
CO3	**Find**[5] differentiation of vectors, Divergence, Gradient, Curl and identify irrotational and solenoidal vector field.
CO4	**Apply**[3] numerical methods to study theory of equations and Probability Distribution.

Unit I

Linear Differential Equations with constant coefficients (LDE): Methods to find complementary functions and particular integrals, general method to obtain particular integral, Cauchy's differential equation, Legendre's Linear Differential Equation, Application of differential equation to simple electrical circuit.

(07 Hrs)

Unit II

Fourier Series: Definition, Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, change of interval, expansions of odd and even periodic functions and Half range series.

(07 Hrs)

Unit III

Fourier Transforms: Fourier Transforms, Fourier Sine and Cosine Transforms, Complex form of Fourier Integral, Finite Fourier Sine and Cosine Transform.

(07 Hrs)

Unit IV

Vector Differential Calculus: Differentiation of vectors, Gradient of scalar point function, Directional derivative, Divergence of vector point function, Curl of a vector point function. Irrotational and solenoidal vector field.

(07 Hrs)

Unit V

Numerical Methods: Roots of algebraic and transcendental equationsby Bisection method, method of False Position, Newton-Raphson method, Solution of system of linear equations by Gauss elimination method, Gauss-Jordan method, Gauss- Seidel iterative method.

(07 Hrs)

Unit VI

Probability Distribution: Random variable, discrete and continuous random variables, probability density function, Binomial distribution, Poission and Normal distribution.

(07 Hrs)

List of Tutorials: Students has to solve numerical on the followings

1. Linear differential equations with constant coefficients
2. Cauchy's differential equation, Legendre's Linear Differential Equation and Application of differential equation to simple electrical circuit.
3. Fourier series in various intervals.
4. Expansions of odd and even periodic functions and half range series.
5. Fourier Transforms, Fourier Sine and Cosine Transforms.
6. Complex form of Fourier Integral, Finite Fourier Sine and Cosine Transform.
7. Gradient of scalar point function, Directional derivative, Divergence of vector point function.
8. Curl of a vector point function. Irrotational and solenoidal vector field.
9. Bisection method, Method of false position, NR Method.
10. Gauss elimination method, Gauss-Jordan method, Gauss- Seidel iterative method.
11. Probability density function, Binomial distribution.
12. Poission and Normal distribution

Text Books:

1. P. N. Wartikar& J. N. Wartikar "*A text book of Applied Mathematics, Vol.-I,II,III"* VidyarthiGrihaPrakashan, Pune

Reference Books:

1. Dr. B. S. Grewal "*Higher Engineering Mathematics"* Khanna Publishers,Delhi.
2. Erwin Kreyszig*"Advanced Engineering Mathematics"*Wiley India Pvt. Ltd.
3. H. K. Das *"Advanced Engineering Mathematics"* S. Chand Publication.

ELE 203: Analog Electronic Circuits

(Ver 1.0, PC, School of Technology)

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

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

CO1	**Explain**[2] the basic concepts of electronics components.
CO2	**Describe**[2] various configurations of MOSFET circuits.
CO3	**Explain**[2] ideal Op-Amp characteristics configurations.
CO4	**Illustrate**[3]linear and non linear applications of Op-Amp.

Unit I

Components: Characteristics of special diode: LED, , Photo diode, Tunnel diode, diode, Zener diodes,Gunn Diode, Laser Diode, clamping and clipping circuits, Operating point of a BJT, Transistor as a switch, BJT as an amplifier: RC phase shift.

(07 Hrs)

Unit II

MOSFET circuits: Structure and I-V characteristics, MOSFET as a switch, MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common gate and commondrain amplifiers, small signal equivalent circuit gain, input and output impedances, trans conductance, high frequency equivalent circuit.

(07 Hrs)

Unit III

Feedback amplifiers: Barkhausen criterion, Stability, Distortion Voltage /current, series / shunt feedback amplifiers, Operation and analysis of RC phase shift, WienBridge, Hartely, colpitts and crystal oscillators.

(07 Hrs)

Unit IV

Differential, multi-stage and operational amplifiers : Differential amplifier; Power amplifier; Direct coupled multi-stage amplifier, Internal structure of an operational amplifier, Ideal op-amp, non-ideal op-amp (Output offset voltage, Input bias current, Input offset current, Slew rate, Gain bandwidth product. (07 Hrs)

Unit V

Linear applications of op-amp: Idealized analysis of op-amp circuits, Inverting and non-inverting amplifier, Differential amplifier, Instrumentation amplifier, Voltage Regulator, Active Filters, Oscillators, Analog to Digital Conversion.

(07 Hrs)

Unit VI

Nonlinear applications of op-amp: Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, Peak detector, Clipper Clamper with op-amp.

(07 Hrs)

Text Books:

1. Robert L. Boylestad and Louis Nashelsky, *"Electronic Devices and Circuit Theory",*PHI/Pearson Education*",* Pearson Publications, Eleventh Edition Jan 2015
2. GayakwadR. A., *"Op-amps & Linear Integrated Circuits",* Pearson Publications, 4th Edition, May 2015.

Reference Books:

1. David A.Bell, "*Electronic Devices and Circuits"*, Prentice Hall of India Private Limited, New Delhi, 2007.
2. U. B. Mahadevaswamy "*Analog Electronics Circuits: A Simplified Approach"*, Pearson/Saguine, 2007.
3. Malvino, "*Electronic Principles"*, Tata McGraw Hill, 6th edition, Year 2000.

ELE 205: Electrical Networks

(Ver 1.0, PC, School of Technology)

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

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

CO1	**Explain**[2]basic analysis techniques of Network & Graph.
CO2	**Apply**[3] network theorems to DC & AC circuits.
CO3	**Analyze**[4] networks by using Laplace transform andbehavior of network under transient conditions.
CO4	**Evaluate**[5] network parameters for two port network and synthesis of network.

Unit I

Introduction to Network & Graph Theory: Electrical Network, Network elements & properties, Types of Sources, Source transformation, Star delta transformation, Mesh & Node analysis (application to DC & AC circuits), Graph theory, Incidence matrix, Cut-set matrix, Tie-set matrix, Duality.

(07 Hrs)

Unit II

Network Theorems (applications to DC circuits):Superposition Theorem, Norton's Theorem, Thevenin's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Millman's Theorem.

(07 Hrs)

Unit III

Network Theorems (applications to AC circuits): Superposition Theorem, Norton's Theorem, Thevenin's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, and Millman's Theorem.

(07 Hrs)

Unit IV

Laplace transform analysis & Transient analysis:Introduction, properties of Laplace Transform, The inverse Laplace Transform, Circuit Element Model, Application of Laplace Transform to Electric Circuits, Behavior of circuit element under switching condition and their representation, Evaluation of initial and final conditions in RL, RC and RLC circuit.

(07 Hrs)

Unit V

Two Port Network: Open circuit impedance (Z) parameters, Short circuit admittance (Y) parameters, Hybrid (H) parameter, Transmission parameters (ABCD), Interrelation of different parameters, Interconnections of two port network.

(07 Hrs)

Unit VI

Introduction to Network Synthesis & Filter Synthesis: Hurwitz Polynomials, Positive Real Function, Synthesis of Driving point Immitance Function, Synthesis of Driving point Impedance Function, Introduction to filter, Characteristics Impedance, Basic Types of Filters, Passive Filters, Design of low pass, high-pass, band- pass and band-stop filter.

(07 Hrs)

List of Tutorials: Students has to solve numerical on the followings

1. Mesh and Node analysis.
2. Graph Theory
3. Superposition Theorem, Norton's Theorem, Thevenin's Theorem for DC circuits
4. Maximum Power Transfer, Reciprocity and Millman's Theorem for DC circuits.
5. Superposition Theorem, Norton's Theorem, Thevenin's Theorem for AC circuits
6. Maximum Power Transfer, Reciprocity and Millman's Theorem for AC circuits.
7. Applications of Laplace Transform to electrical circuits.
8. Transient analysis of electrical circuits.
9. Z and Y Parameters
10. ABCD and H Parameters.
11. Network synthesis.
12. Filter synthesis.

Text Books:

1. Ravish R. Singh, *"Electrical Networks",* McGraw Hill,8th Edition. 2010.

Reference Books:

1. M.E. Van Valkenburg, *"Network Analysis",* Pearson India Education, 3rd Edition 2015.
2. C. K. Alexander, Mathew N.O. Sadiku,*"Electric Circuits"*, TMH 5th Edition 2013.
3. D. Roy Choudhary, *"Networks and Systems"* Wiley Eastern Ltd 2nd Edition 2009.
4. C.L Wadhwa, *"Network Analysis and Synthesis"*, New Age International Publishers 2007.

ELE 207: Electrical Measurement

(Ver 1.0, PC, School of Technology)

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

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

CO1	**Explain**[2] the basics measuring instruments and methods.
CO2	**Relate**[3]the Power and Energy measurement.
CO3	**Determine**[4] the unknown resistance.
CO4	**Compare**[4] the process of measuring L, C parameter.

Unit I

Basics of Measurements: Performance characteristics of measuring instruments- static & dynamics Accuracy, Precision, Resolution, Reliability, Repeatability, Sensitivity, Errors, classifications of error (Numerical), System of electrical units, Extension of Ranges: Shunts, Multipliers (Numerical).

(07 Hrs)

Unit II

Analog Electromechanical Instruments: Classification of analog instruments, principle of operation, operating forces, errors in ammeters and voltmeters, permanent magnet moving coil, moving iron, dynamometer type, induction type, electrostatic type instruments, C.T, P.T construction, working & errors.

(07 Hrs)

Unit III

Measurement of Power and Energy: Electrodynamometer type wattmeter, measurement of power in three phase circuits, three phase wattmeter, measurement of reactive power, energy meter for A.C. circuits.

(07 Hrs)

Unit IV

Measurement of Resistance: Measurement of low, medium & high resistances, whetstone's bridge,Kelvin's bridge, insulation resistance measurement(Numerical).

(07 Hrs)

Unit V

Measurement of Inductance and Capacitance: A. C. bridges for inductance measurementMaxwell, Hays, Anderson and Owen Bridge, Capacitance measurement – Desauty and Schering Bridge. Measurement of frequency by Wien's bridge. (Numerical).

(07 Hrs)

Unit VI

Measuring Devices: Meggar, Measurement of Earth Resistance, Digital Multimeter, LCR Meter, Digital storage Oscilloscope, Digital energy meter, Overview of Power analyzer.

(07 Hrs)

Text Books:

1. Albert D.Helfrick and William D.Cooper, "*Modern Electronics Instrumentation & Measurement Techniques*", PHI.
2. J. B. Gupta, "*A course in Electronic and Electrical measurements and Instrumentation*", S. K. Kataria Publication, 13th edition 2013
3. R. K. Rajput, "*Electrical and Electronic Measurements and Instrumentation*", S Chand publications.

Reference Books:

1. A K.Sawhney, "*A course in Electrical and Electronic Measurements and Instrumentation*", DhanpatRai& Sons. 19th Edition.
2. E.W Golding, F.C Widdis, "*Electrical Measurements and Measuring Instruments*", Reem Publications, 5th edition 2013.
3. David Bell, "*Electronic Instrumentation & Measurements*", Oxford University Press, 3rd edition 2015.

ELE 209: Electrical Power Generation

(Ver 1.0, PC, School of Technology)

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

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

CO1	**Enumerate**[1] different methods of electrical power generation.
CO2	**Explain**[2] the operations involved in hydroelectric power plants.
CO3	**Explain**[2]the working of Thermal& Nuclear power plants.
CO4	**Summarize**[2] the contribution of renewable energy sources inelectric power sector.

Unit I

Introduction to energy resources: Introduction to Electrical power systems, Classification of Energy resources, Comparison between conventional and non-conventional power plants, Types of Power plants, Introduction of Hydro, Thermal, Nuclear and Diesel Electric power plants, Importance of renewable energy power plants, Introduction to Wind, Solar, Tidal, Geothermal power plants, Comparison between conventional and non-conventional power generation.

(07 Hrs)

Unit II

Hydro-Electric power generation: Classification of hydro power plants, Components of hydro power station, Low, Medium and High head power plants, Types of hydraulic turbines, Hydrograph, Flow duration curve, Water Power, Site selection for Hydro power plants, Challenges involved in hydropower development.

(07 Hrs)

Unit III

Thermal-Electric power generation: Layout of Thermal power plant, Main parts and working, Site selection factors for thermal power plants, Types of coals, Types of steam turbines, Challenges in thermal power plants, feed water treatment, Turbo alternators.

(07 Hrs)

Unit IV

Nuclear power plants: Introduction to Nuclear energy, Layout of nuclear power plant. Main equipments, Site selection factors for nuclear power plants, Types of nuclear reactors, Shielding of reactors, Challenges in nuclear power plants, Nuclear power plants in India.

(07 Hrs)

Unit V

Solar and Wind electric power plants:

Solar power plant: Introduction to solar energy, Types of solar collectors, Solar power towers, Photovoltaic cell, Photovoltaic power generation, Types of photovoltaic power generation systems.

Wind electric power plant: Introduction to Wind energy, Layout of wind power plants, site selection factors for wind power plants, Hybrid wind power plants.

(07 Hrs)

Unit VI

Economic aspects in Power generation: Tariff, Types of tariff, Characteristics of tariff, Load curve, Load duration curve, Load factor, Demand factor, Diversity factor, Plant capacity factor, Significance of high demand factor and plant capacity factor.

(07 Hrs)

List of Tutorials: Students has to Draw Layout diagram and solve numerical on following.

1. Hydro Electric power plant.
2. Thermal Electric power plant.
3. Nuclear Power plant.
4. Wind power plant.
5. Solar collectors and solar power plants.
6. Types of Boilers.
7. Types of Heat exchangers.
8. Types of Nuclear reactors.
9. Design of single line diagram of Substation.
10. Types of Tariff.
11. Calculation of Plant factors.
12. Compulsory visit to any Power generation plant and submission of report.

Text Books:

1. S.N Singh, "*Electric Power Generation, Transmission and Distribution*", 2nd Edition PHI, 2010.
2. C L Wadhwa, " *Electrical Power System*", 04th Edition, New Age Publishers, 2014

Reference Books:

1. A. Chakrabarti, M.L Soni, P.V Gupta, U.S Bhatnagar, *" Power system Engineering"*, 9th Edition, DhanpatRai& Co., 2014.
2. Dr. B.R Gupta, "*Generation of Electrical Energy*", 06th Edition, S. Chand Publishers, 2014.
3. C L Wadhwa, "*Generation Distribution and Utilization of Electrical Energy*", 3rd Edition, New age publishers, 2014.

ELE211: Analog Electronic Circuits lab

(Ver 1.0, PC, School of Technology)

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

Learning Outcomes: At the end of this lab, students will able to

CO1	**Analyze[4]** the working of diode and transistor.
CO2	**Analyze[4]** MOSFET Characteristics.
CO3	**Apply[3]** Op-amp applications to different configurations.

List of Experiments:

1. Study of electronic components, multimeter, oscilloscope & signal generator.
2. Color code & testing of components. (Study experiment).
3. Design and Testing of Half wave, Full wave and Bridge Rectifier circuits.
4. Study of Diode clipping and clamping circuit.
5. Design of simple amplifiers (common emitter).
6. Study of RC coupled Single stage FET / BJT amplifier and determination of the gain-frequency response, input and output impedances.
7. Study of BJT-RCPhase shift /Wien Bridge Oscillator.
8. Design of Op-Amp as Inverting & Non Inverting amplifier.
9. Design of Op-Amp as summing amplifier - Difference amplifier.
10. Design of Op-Amp as Voltage follower.
11. Design of Op-Amp as Differentiator – Integrator.

ELE 213: Electrical Measurements Lab

(Ver 1.0, PC, School of Technology)

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

Learning Outcomes: At the end of this lab, students will able to

CO1	**Demonstrate**[2] working of various types of transducers, their applications.
CO2	**Illustrate**[3] various measuring instruments used to detect electrical quantities.
CO3	**Compare**[2] various types of errors in measurements.

List of Experiments:

1. Demonstration of various analog, digital measuring instruments &explanation of symbols & notations used on instruments.
2. Measurement of Active & reactive power in three phase circuit using two wattmeter method.
3. Calibration of Single phase Digital energy meter at different power factors.
4. Measurement of Reactive Power by one wattmeter with all possible connections of current coil and pressure coil.
5. Measurement of resistance by ammeter voltmeter method.
6. Measurement of voltage, current, time period & frequency using CRO.
7. Measurement of earth resistance by using Meggar.
8. Measurement of Inductance using appropriate bridge.
9. Measurement of Capacitance using appropriate bridge.
10. Demonstration of Power Analyzer.

ELE 215: Environmental Studies
(Ver 1.0, HS, School of Technology)

Lecture	Tutorial	Practical	Credits	Evaluation Scheme			
				Component	Exam	WT%	Pass %
2	-	2	NC	Practical	FEP	100	40

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

CO1	**Define**[1] Environmental science and chemistry.
CO2	**Concept**[2] ecosystem and functions of ecosystem.
CO3	**Discuss**[2] Natural resources.
CO4	**Understand**[2] courses of pollution and effects.
CO5	**Discuss**[2] Functional elements of solid waste management and method of disposaland management of solid waste.
CO6	**Concept**[2] E-waste management and treatment, disposal of waste.

Unit I

Nature Of Environmental Science And Chemistry: Definition, principles and scope of environmental science. Multidisciplinary nature of environmental studies, Need for public awareness. Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere, first and second law of thermodynamics, Scale of Metrology, Pressure, temperature, precipitation, Humidity, radiation and wind, Atmosphere stability, inversions and mixing height, wind rose.

(04 Hrs)

Unit II

Ecosystem: Concept of an ecosystem, structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem, .Ecological succession. Food chains, food webs and ecological pyramids, Structure& function of the ecosystem.

(04 Hrs)

Unit III

Natural Resources and Associated Problems:
Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people.
Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
Energy resources: Growing energy needs, renewable and nonrenewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy.

(04 Hrs)

Unit IV

Pollution: Definition: Causes, effects and control measures of: Airpollution Water pollution, soil pollution, Marine pollution, Noise pollution
Global issue: Global warming, Acid rain, Ozone depletion and photochemical smog.

(04 Hrs)

Unit V

Solid Waste Management: Functional elements of solid waste management, Sources, generation and collection of solid waste, their characteristics. Different method of disposal and management of solid waste: composting, Incineration, Pyrolyisis and sanitary land filling. Concept of hazardous waste management.

(04 Hrs)

Unit VI

E-Waste Management: Definition, source and necessity of management, Impact of E-waste on air, water and soil, Treatment and disposal of e waste and environmental protection acts.

(04 Hrs)

Textbook:

1. Agarwal, K.C.2001, "*Environmental Biology"*, Nidi Pub. Ltd.,Bikaner.

Reference Books:

1. BharuchaErach, "*The Biodiversity of India"*,Mapin Publishing Pvt. Ltd. Ahmedabad 380013, India, Email:mapin@icenet.net(R).
2. Brunner R.C., 1989, "*Hazardous Waste Incineration"*, McGraw Hill Inc.480p.
3. Cunningham, W.P. Cooper, T.H.Gorhani, E. &Hepworth,"*Environmental Encyclopedia"*,Jaico Pub. Mumbai,1196p.
4. De A.K, "*Environmental Chemistry"*, Wiley WasternLtd.

Sanjay Ghodawat University Kolhapur
Curriculum Structure and Syllabus for Second Year B.Tech
Electrical Engineering Program (R1)

ELE 217: Professional Skill Development- I

(Ver 1.0, HS, School of Technology, Common for All Branches)

Lecture	Tutorial	Practical	Credits	Evaluation Scheme			
				Component	Exam	WT%	Pass %
-	-	2	NC	Practical	FE P	100	40

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:

CO1	**Apply**^{3} self-analysis techniques.
CO2	**Plan**^{4} and execute SMART goals.
CO3	**Demonstrate**^{3} team building Skills.
CO4	**Prepare**^{4} time table and action plan to achieve set Goals.
CO5	**Exhibit**^{3} presentation and public speaking skills.

Unit 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 Hrs)

Unit II

Goal Setting: SMART Goals, Short Term goals, Moderate term goals, Long Term, Life Time Goals.

(04Hrs)

Unit 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.

(04Hrs)

Unit IV

Time Management: Value of time, Diagnosing Time Management, Preparing to do list, Prioritizing work.

(04Hrs)

Unit 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.

(04Hrs)

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.

Reference Books:

1. Wallace &Masters, "*Personal development for Life & work"*, ThomsonLearning.
2. BarunK. Mitra, "*Personality Development and Soft- Skills"*, Oxford UniversityPress.
3. Fred Luthans, "*Organizational behavior"*, McGrawHill.
4. AsaDon Brown, "*Interpersonal skills in the Workplace"*, Tate publishing and Enterprises.

Sanjay Ghodawat University Kolhapur
Curriculum Structure and Syllabus for Second Year B.Tech
Electrical Engineering Program (R1)

Curriculum Structure

Semester IV									
Course Code	**Course Title**	**L**	**T**	**Pr**	**C**	Evaluation Scheme for Theory and Practical			
						Compo -nent	**Exam**	**WT (%)**	**Pass Marks (%)**
ELE202 (PC)	Digital Electronics	3	-	-	3	Th	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
ELE204 (PC)	Electromagnetic Theory	3	1	-	4	Th	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
ELE206 (PC)	DC Machines and Transformers	3		-	3	Th	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
ELE208 (PC)	Power Electronics	3	-	-	3	Th	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
ELE210 (PC)	Transmission & Distribution of Electrical Power	3	-	-	3	Th	FET	20	40
							CAT I	15	
							CAT II	15	
							ESE	50	40
ELE212 (PC)	DC machines and Transformers Lab	-	-	2	1	Pr	FEP	50	40
							POE	50	40
ELE214 (PC)	Digital Electronics Lab	-	-	2	1	Pr	FEP	50	40
							POE	50	40
ELE216 (PC)	Power Electronics Lab	-	-	2	1	Pr	FEP	50	40
							POE	50	40
ELE218 (HS)	Professional Skill Development- II	-	-	2	NC	Pr	FEP	100	40
ELE220 (PC)	Mini Project	-	-	2	1	Pr	FEP	100	40
Total		**15**	**01**	**10**	**20**	**Total Hrs.: 26, Total Credits: 20**			

L: Lecture, T: Tutorial, P: Practical, C: Credits, WT: Weight Age PC: Program Core, NC: Non Credit Course (Pass/Fail), AU: Audit Course (Pass/Fail), Th: Theory, WT: Weightage, PC: Program Core, PE: Program Elective, UC: University Core, ST: School of Technology, SS: School of Sciences, SC: School of Commerce, SM: School of Management, SA: School of Arts FET: Faculty Evaluation Theory, FEP: Faculty Evaluation Practical, POE: Practical Oral Examination, CAT I: Continuous Assessment Test I, CAT II: Continuous Assessment Test II, ESE: End Semester Examination.

Syllabus Contents

ELE202: Digital Electronics

(Ver 1.0, PC, School of Technology)

Lect.	Tut.	Practical	Credits	Evaluation Scheme			
				Component	Exam	WT%	Pass (%)
3	-	-	3	Theory	FET	20	40
					CAT-I	15	
					CAT-II	15	
					ESE	50	40

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

CO1	**Demonstrate**[3] understanding of the different logic families.
CO2	**Explain**[4]number systems and logic gates.
CO3	**Analyze**[4] combinational logic circuits.
CO4	**Design**[6] sequential logic circuits.

Unit I

Digital Logic Family: Characteristics of digital ICs-Speed of operation, power dissipation, figure of merit, fan in, fan out, current & voltage parameters, noise immunity, operating temperatures & power supply requirements, TTL & CMOS logic family characteristics.

(08 Hrs)

Unit II

Number Systems And Logic Gates: Introduction to number system- binary, octal, decimal, hexadecimal. Inter conversion between number system, 2's complement arithmetic, 1's complement arithmetic, Logic gates and truth tables.

(08 Hrs)

Unit III

Boolean Algebra: Binary logic functions, Boolean laws, truth tables, associative and distributive properties, De Morgans theorems, realization of switching functions using logic gates.

(06 Hrs)

Unit IV

Design of Combinational Logic: Introduction to combinational logic, canonical logic forms, sum of product & product of sums, Karnaugh maps, two, three and four variable Karnaugh maps, simplification of expressions, Decoders-BCD decoders, Digital multiplexers, adders &subtractors, Comparators.

(08 Hrs)

Unit V

Sequential Logic: Basic bistable elements, clocked and edge triggered flip-flops-D, S-R, J-K and T, shift registers-SISO, SIPO, PISO, PIPO, and Bidirectional.

(08 Hrs)

Unit VI

Design of Sequential Circuits: Asynchronous and synchronous counters, Up counter, Down counter, up-down counter, counter design with state equations, State diagrams and tables, transition table, excitation table and equations. (04 Hrs)

Text Books:

1. A. Anand Kumar, *"Fundamentals of Digital Circuits"* PHI Publication, 4th edition, 2017.
2. R. P. Jain, *"Modern Digital Electronics*", TMH Publication, 4th edition, 2010.

Reference Books:

1. M. Morris Mano, *"Digital Design"* Pearson Education, 6th Edition, 2018.
2. Leach &Malvino, *"Digital Principles"* TMH, 7th Edition, Special Indian Edition, 2011.
3. Anil K. Maini, *"Digital Electronics Principles and Integrated Circuits"* Wiley Publications, 2007.
4. Charles H. Roth, Jr. and Larry L. Kinney, *"Fundamentals of Logic Designs",*Cengage Learning, 6th edition.

ELE204: Electromagnetic Theory.
(Ver 1.0, PC, School of Technology)

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

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

CO1	**Explain**[2] Vector representation & Transformation in all coordinate system.
CO2	**Describe**[1] Coulomb's Law and Expression of Electric Field Intensity.
CO3	**Remember**[1] fundamentals of Energy and Potential.
CO4	**Explain**[2]various forms of Maxwell's Equations and Uniform Plane wave.

Unit I

Vector Analysis: Scalar and Vectors, Vector Algebra, Vector components and Unit Vector, Vector representation in Cartesian coordinate system, cylindrical coordinate system and Spherical coordinate system. Coordinate system transformations, The Dot product, Cross product.

(08 Hrs)

Unit II

Coulomb's Law and Electric Field Intensity: The experimental law of Coulomb's, Electric field intensity due to point Charge, Electric field intensity due to line charge, Electric field intensity due to surface charge and Electric field intensity due to volume charge distribution (Numerical based on Coulomb's Law and Electric field intensity are expected).

(08 Hrs)

Unit III

Electric Flux Density, Gauss Law & Divergence: Electric Flux Density, Gauss Law, applications of Gauss law, Divergence, Maxwell's First Equation (Electrostatics), The Vector operator and the Divergence theorem.

(06 Hrs)

Unit IV

Energy, Potential, Poisson's & Laplace Equation: Energy and Potential in a moving point charge in an Electric field, The line integral, Definition of Potential difference and Potential, Potential Gradient, The Dipole, Energy Density in Electric field, Poisson's & Laplace Equation.

(06 Hrs)

Unit V

The Steady Magnetic Field: Biot-Savart Law, Ampere Circuital Law, Curl, Stokes Theorem, Magnetic Flux and Magnetic Flux Density, The Scalar and Vector Magnetic Potentials.

(08 Hrs)

Unit VI

Time Varying Field & Uniform Plane Waves: Faraday's Law, Maxwell's Equations in point form, Maxwell's equations in Integral form, The Retarded Potential, Wave Propagation in free space, Wave Propagation in Dielectrics, Propagation in Good conductors: Skin Effect, Wave Polarization.

(06 Hrs)

Tutorial list:

Students have to solve Numerical on

1. Vector algebra.
2. Different coordinate system
3. Coulombs law
4. Electric field intensity
5. Electric flux density
6. Gauss law
7. Energy and potential
8. Dipole and Laplace equation
9. Biot Savart law
10. Scalar and vector magnetic potential
11. Time varying field
12. Maxwell equation

Text Book:

1. Matthew N. O. Sadiku & S.V. Kulkarni*"Principles of Electromagnetics"*Oxford university Press 6th edition 2015.

Reference Books:

1. Hayt& Buck, *"Engineering Electromagnetics"*, 7th Edition, Tata McGraw-Hill 2011.
2. Edminister J.A, *"Electromagnetics"*, Tata McGraw-Hill 2nd edition 2006.
3. Matthew N.O. Sadiku, *"Elements of Electromagnetic",* Oxford university Press 4th edition 2010.

ELE206: DC Machines and Transformers

(Ver 1.0, PC, School of Technology)

Lect.	Tut.	Practical	Credits	Evaluation Scheme			
				Component	Exam	WT %	Pass (%)
3	-	-	3	Theory	FET	20	40
					CAT-I	15	
					CAT-II	15	
					ESE	50	40

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

CO1	**Describe**[1] the basics of Magnetic circuits and magnetic materials.
CO2	**Demonstrate**[2] the characteristics of DC Generators and parallel operation.
CO3	**Analyze**[4] the characteristics of DC Motors and its performance.
CO4	**Explain**[2] the basics and operation of single phase and three phase transformers.

Unit I

Magnetic circuits and magnetic materials: Magnetic circuits –Laws governing magnetic circuits – Flux linkage, Inductance and energy – Statically and dynamically induced EMF – Torque – Properties of magnetic materials, Hysteresis and Eddy Current losses – AC excitation, introduction to permanent magnets- Transformer as a magnetically coupled circuit.

(06 Hrs)

Unit II

Electromechanical energy conversion and concepts in rotating machines: Introduction, Flow of Energy in Electromechanical devices, Energy in Magnetic Systems, Singly Excited System, Determination of Mechanical Force, Mechanical Energy, Torque Equation, Doubly Excited System, energy stored in magnetic field, Electromagnetic Torque, Generated EMF in Machines, Torque in Machines with Cylindrical air-gap, General classifications of Electrical Machines.

(06 Hrs)

Unit III

DC generator: Parts of generator, Armature Winding, Coil pitch, back pitch, front pitch, Resultant pitch, Commutator pitch, Single layer winding, Two layer winding, Multiplex winding, Lap & wave winding, Dummy coils, Types of generators, Equalizer connections, EMF & Torque Equation, total losses and efficiency, Armature reaction, Demagnetizing and Cross Magnetizing Effects, Inter poles, Performance Characteristics of DC generators, Critical speed, Parallel operation, Application of DC Generator.

(08 Hrs)

Unit IV

DC motors: Principle of Motor, comparison of generator and motor action, Back Emf, Power & torque, Shaft torque, Performance characteristics of DC Motors, Losses & efficiency, power stages, speed control of DC motors, Electric Braking, Necessity of a starter, Three point & four point starters, Starting of DC motors, Applications of DC Shunt motor, DC Series motor, DC Compound motors.

(06 Hrs)

Unit V

Single phase transformer: Construction and principle, Types & Classification, operation at no load and on load, vector diagrams, equivalent circuit, losses, efficiency and regulation, determination of regulation and efficiency by direct load test and indirect test methods, Sumpners test, Parallel operation, Auto transformer, condition for maximum efficiency, All day efficiency, Applications of Single phase Transformer.

(08 Hrs)

Unit VI

Three phase transformer: Star/star, Star/delta, Delta/delta, Delta/Star, delta/zigzag, terminal marking, Nomenclature, Vector diagram, Phase groups, Parallel operation of 3-phase Transformer, Scott connection, V-V connections, tertiary winding, Testing of transformers. Applications of Three Phase Transformer.

(08 Hrs)

Text Books:

1. P. C. Sen., "*Principles of Electrical Machines and Power Electronics*", John Wiley & Sons.
2. Deshpande M. V."*Electrical Machines*" PHI Learning Pvt. Ltd., New Delhi, 2011.
3. S.Sarma&K.Pathak "*Electric Machines*", Cengage Learning India (P) Ltd., Delhi, 2011.
4. TuranGonen, " *Electrical Machines with MATLAB",*CRC Press, 2nd Edition.

Reference Books:

1. Bimbhra, P.S., "*Electrical Machinery*", Khanna Publishers 7th Edition.
2. Nagarath& Kothari "*Electrical Machines*", TMH Publications, 5th Edition.
3. J. B. Gupta "*Electrical Machines*", Kataria Publications, 6th Edition, 2013.
4. B. L. Theraja "*Electrical Technology*Vol II", S .Chand Publications.

ELE208: Power Electronics

(Ver. 1.0, PC, School of Technology)

Lect.	Tut.	Practical	Credits	Evaluation Scheme			
				Component	Exam	WT %	Pass (%)
3	-	-	3	Theory	FET	20	40
					CAT-I	15	
					CAT-II	15	
					ESE	50	40

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

CO1	**Examine**[1] the differences between signal level and power level devices.
CO2	**Explain**[2]controlled rectifier circuits.
CO3	**Illustrate**[4] the operation of DC-DC choppers and cyclo converters.
CO4	**Design**[6] the power electronics circuits to some applications.

Unit I

Power Switching Devices: Power Diode, Thyristor, MOSFET, IGBT: I-V Characteristics; Firing circuit for thyristor; Voltage and current commutation of a thyristor; Gate drive circuits for MOSFET and IGBT.

(06 Hrs)

Unit II

Thyristor rectifiers: Single-phase half-wave and full-wave rectifiers, Single-phase full-bridge thyristor rectifier with R-load and highly inductive load; Three-phase full-bridge thyristor rectifier with R-load and highly inductive load; Input current wave shape and power factor, Effect of source inductance on performance of single phase and three phase converter.

(08 Hrs)

Unit III

Chopper: Introduction, voltage control strategies, step up and step down chopper, Type A,B,C,D,E chopper, applications of chopper to speed control.

(08 Hrs)

Unit IV

AC voltage controllers: Single phase and three phase ac voltage controllers with R, RL and RLE loads, Voltage control, Harmonic analysis, operation waveforms PWM, Matrix converter, Operation of thee phase buck-boost converter.

(06 Hrs)

Unit V

Inverters: Introduction, principle of operation, performance parameters, single phase inverter, three phase inverter, PWM Techniques – single pulse width modulation , multiple pulse width modulation, sinusoidal pulse width modulation, modified sinusoidal pulse-width modulation and phase displacement control techniques, Current source inverter, ASCI, Multilevel inverter.

(08 Hrs)

Unit VI

Power Electronics Applications: UPS, SMPS, HVDC, Switch mode welding, Electronic lamp ballast, battery charger, Emergency light system, zero current switching, zero voltage switching.

(06 Hrs)

Reference Books:

1. Rashid Muhammad, H., "*Power Electronics: Circuits, Devices and Applications*", 2nd Edition, Prentice-Hall, 1998.
2. Mohan Ned, Undeland Tore, M. and Robbins William, P., "*Power Electronics: Converter, Applications and Design*", John Wiley & Sons, 1994.
3. Mohan Ned, Undeland Tore, M. and Robbins William, P., "*Power Electronics: Converter, Applications and Design*", John Wiley & Sons, 2011.
4. LandevCyrill, W., "*Power Electronics*", McGraw Hills, London, 1981.

Text Books:

1. M.H.Rashid, "*Power Electronics: Circuits, Devices and Applications*", Third Edition, PHI publishers, 2005.
2. M.D.Singh, Khanchandhani K.B, "*Power Electronics*", TMH, 2006

ELE210: Transmission and Distribution of Electrical Power

(Ver 1.0, PC, School of Technology)

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

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

CO1	**Enumerate**[1] the structure and components of Electrical power system.
CO2	**Evaluate**[4] the performances of different types of transmission lines.
CO3	**Describe**[1] the types of underground cables.
CO4	**Illustrate**[2] the importance of Distribution systems and Power factor improvement.

Unit I

Introduction to supply systems: Single line diagram of electric supply system, Power system components, Importance of High voltage transmission, Elements of transmission lines. Types of Electrical power transmission system, Single line diagram of HVDC system, Comparison between AC and DC power transmission systems.

(06 Hrs)

Unit II

Overhead lines and mechanical aspects: Components of overhead lines, Line supports, Types of conductors, Sag, Effects of Wind and Ice on conductors, Insulator materials, Types of insulators, String efficiency, Methods of improving string efficiency, Corona effect, Corona power loss, Critical disruptive voltage, Factors affecting corona loss, Methods of reducing corona effects, Advantages and drawbacks of corona effect.

(08 Hrs)

Unit III

Performance analysis of Transmission lines: Transmission line constants, Skin effect, Proximity effect, GMD and GMR for symmetrical and unsymmetrical conductor spacing, Transposition of conductors, Classification of transmission lines, effects of voltage regulation and efficiency, Performance of transmission lines, Ferranti effect, Surge impedance loading.

(08 Hrs)

Unit IV

Underground cables: Construction of Underground cables, Insulating material for cables, Classification of cables, Grading of cables, Methods of laying, Failure of cables, Testing of cables.

(06 Hrs)

Unit V

Distribution systems: Introduction to distribution systems, Types of distribution systems, Types of feeders, Types of loading, Power system Earthing, Solid grounding, Resistance grounding, Reactance grounding.

(06 Hrs)

Unit VI

Power factor improvement: Signification of power factor, Need for power factor improvement, causes of low power factor, calculation of required reactive power, methods of improving power factor, Economical power factor equation, Advantages of power factor improvement.

(08 Hrs)

Reference Books:

1. Ashfaq Husain, "*Electrical Power systems",* 05th Edition, CBS Publishers, 2014.
2. J. B. Gupta, "A Course in Power Systems", 11th Edition, Katson Publications, 2015.
3. Dr. S.L Uppal, Prof. S. Rao, "*Electrical Power systems*", 04th Edition, Khanna Publishers, 2010.
4. S.N. Singh, "*Electric Power Generation, Transmission and Distribution*", 2nd Edition PHI, 2010.
5. C.L.Wadhwa, " *Electrical Power System*", 04th Edition, New Age Publishers, 2014

Text Books:

1. D P Kothari, I J Nagrath, "*Modern power system analysis*", 4th edition, TMH publishers, 2012.
2. A. Chakrabarti, M.L Soni, P.V Gupta, U.S Bhatnagar, *" Power system Engineering"*, 9thEdition, DhanpatRai& Co., 2014.

ELE212: DC Machines and Transformers Lab

(Ver 1.0, PC, School of Technology)

Lect.	Tut.	Practical	Credits	Evaluation Scheme			
				Component	Exam	WT %	Pass (%)
-	-	2	1	Practical	FEP	50	40
					POE	50	40

Course Outcomes: At the end of this lab, students will able to

CO1	**Explain**[2] working of DC Generators.
CO2	**Illustrate**[3] working of DC Motors.
CO3	**Determine**[4] various losses in a single phase Transformer.

List of Experiments:

1. Study of External and Internal characteristic of DC Generator.
2. Load Characteristics of D.C. Motor.
3. Speed Control Methods of DC shunt motors.
4. O.C. / S.C. Test on single Phase Transformer.
5. Polarity & Voltage ratio Test on Single Phase Transformer.
6. Load Test on Single Phase Transformer.
7. Parallel operation of Single Phase Transformer.
8. Sumpners Test on Single Phase Transformer.
9. Three phase Transformer Connections. (Phase Groups).
10. Load test on three phase transformer.

EET214: Digital Electronics Lab

(Ver 1.0, PC, School of Technology)

Lect.	Tut.	Practical	Credits	Evaluation Scheme			
				Component	Exam	WT %	Pass (%)
-	-	2	1	Practical	FEP	50	40
					POE	50	40

Course Outcomes: At the end of this lab, students will able to

CO1	**Verify**[4] working of logic gates, flip-flops etc.
CO2	**Use**[4] digital IC's for code conversion.
CO3	**Design**[6] combinational and sequential logic circuits.

List of Experiments:

1. Study of basic logic gates.
2. Study of De- Morgan's theorem.
3. Gates as building blocks.
4. Design of half and full adder.
5. Design of half and full subtractor.
6. Design of 2bit magnitude comparator.
7. Design of Code converter (Binary to Gray, Gray to Binary).
8. Design of multiplexer and de-multiplexer.
9. Study of 3:8 decoder.
10. Study of Flip Flops.
11. Design of counter.

ELE216: Power Electronics Lab

(Ver. 1.0, PC, School of Technology)

Lect.	Tut.	Practical	Credits	Evaluation Scheme			
				Component	Exam	WT %	Pass (%)
-	-	2	1	Practical	FEP	50	40
					POE	50	40

Course Outcomes: At the end of this lab, students will able to

CO1	**Study**[1]working of various types of semiconductor devices.
CO2	**Analyse**[4] the operation of power electronics converters.
CO3	**Design**[6] the power electronics circuits using software.

List of Experiments:

1. Study of V.I. characteristic of SCR, TRIAC & DIAC.
2. Study of BJT, IGBT, GTO & MOSFET.
3. Study of UJT firing circuit for the control of SCR.
4. Generate and study the PWM control signal for Single Phase DC to AC inverter.
5. Operation of the single phase half controlled & fully controlled AC to DC Converter.
6. Study the operation of back to back connected SCR/TRIAC Controlled AC Voltage controller.
7. Operation of the chopper circuit for the control of DC Voltage using (1) Pulse width control (2) Frequency Control & (3) Current limit Control.
8. Operation of Single Phase inverter.
9. Study of Three phase firing circuit for three phase AC to DC bridge converter.
10. Testing of digital firing modules.
11. Study and Testing of a Three Phase bridge inverter with different types of loads.
12. Study the harmonics & reactive power measurement in AC mains with rectifier and AC Voltage Controller loads.
13. Simulation of rectifier circuits using MATLAB/SIMULINK.
14. Simulation of inverter circuits using MATLAB/SIMULINK.

ELE218: Professional Skill Development – II

(Ver. 1.0, PC, School of Technology)

Lect.	Tut.	Practical	Credits	Evaluation Scheme			
				Component	Exam	WT%	Pass%
-	-	2	NC	Practical	FEP	100	40

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

CO1	**Demonstrate**[3] leadership skills
CO2	**Evaluate**[6] process and practical ways of decision making
CO3	**Judge**[6]causes of stress and find remedies to reduce stress
CO4	**Apply**[3] business etiquettes and ethics
CO5	**Exhibit**[3] group discussion and Interview skills

Unit I

Leadership: Skills for a good Leader, Assessment of Leadership Skills
Creativity: Lateral thinking, vertical thinking, Out of box thinking.

(04 Hrs)

Unit II

Decision Making: Importance and necessity of Decision Making, Process and practical way of Decision Making, Weighing Positives & Negatives.

(04 Hrs)

Unit III

Stress Management: Causes of Stress and its impact, how to manage & distress, Circle of control, Stress Busters.
Emotional Intelligence: What is Emotional Intelligence, dealing with feelings, emotional quotient, why Emotional Intelligence matters, Emotion Scales, Managing emotions.

(04 Hrs)

Unit IV

Adapting to corporate life: Corporate Grooming and dressing, Business Etiquette Business Ethics, Dinning Etiquette, Ethics policy.

(04 Hrs)

Unit 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.

Interview: Process, techniques, Pre-In-After the interview preparation.

(04 Hrs)

Reference Books:

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.

ELE220: Mini Project

(Ver. 1.0, PC, School of Technology)

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

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

CO1	**Understand**[2] practical importance of small scale electrical projects
CO2	**Develop**[1] the model of identifying problem
CO3	**Analysis**[1] of obtained result.

Prerequisite: Basic Knowledge of Electrical Engineering.

Guidelines:

1. A Team of maximum 03 students should work to design, build and test a small Electrical /Electronic hardware project and submit it at the end of semester.
2. Evaluation of Mini project will be conducted by the faculty incharge based on the hardware project performance of presentation & the report submission.
3. Students should select a problem which addresses some basic problems related to electrical based real life applications.
4. Students should understand/develop basic model/ circuit
5. Students should understand testing of various components.
6. Students should develop a necessary PCB for the circuit.
7. Students should see that final circuit submitted by them is in working condition.
8. 10-15 pages report to be submitted by students.
9. The mini project must have hardware part.
10. Department may arrange demonstration with poster presentation of all mini projects developed by the students at the end of semester.

Report should comprise of following:

1. Introduction: background of relevant topic, with detailed literature survey

2. Definition of the Problem: Explain the related problem / difficulties / issues / challenges in the current work, Highlight the different possibilities and alternatives to solve the problem, justify the selection of right alternatives/solution, how these ideas/methods are most applicable.

3. Objectives of mini project: List few objectives of the project

4. Methodology: Explain the procedure of project work, Draw the sketch/draft/outline of the project/device/research, and Show the plan of project work

5. Relevant areas: Write the relevant areas, where your project work will be applicable e.g: Healthcare, Agriculture, Industry, Technology, Society etc.

6. Conclusion.