

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad

ARISTOTLE EDUCATIONAL SOCIETY

Aristotle Educational Society was established in 2000, with an aim of bringing quality Engineering and management education closer to the student's who are aspiring for it. The society is founded by experienced and visionary team of academicians, industrialists and NRI Entrepreneurs, whose valuable knowledge and experience are the guiding factors for establishing Professional Institutions.

KG REDDY COLLEGE OF ENGINEERING AND TECHNOLOGY (KGR CET)

KG Reddy College of Engineering and Technology is established by the Aristotle Educational Society in the year 2008 at Chilkur Village, Moinabad, Telangana State with four Undergraduate courses. The College is approved by All India Council of Technical Education, New Delhi and is affiliated to Jawaharlal Nehru Technological University Hyderabad, Hyderabad. At present the college offers six Undergraduate programs and one Postgraduate program.

The college has grown up leaps and bounds during the last 12 years and our alumni are working in reputed MNCs all over the globe as our brand ambassadors. We have added many feathers to our cap in the last decade.

The college is accredited with A⁺ grade by the National Assessment and Accreditation Council (NAAC), University Grant Commission, Government of India. The College has been granted Autonomous Institution status by the UGC with effect from Academic year 2021-22 for a period of 10 years. Also, the departments of Computer Science and Engineering and Electronics and Communication Engineering are accredited by the National Board of Accreditation (NBA), AICTE, Government of India.

At KGR CET we are always thriving for improvement and innovation in education, including infrastructure expansion and faculty talent acquisition. Our endeavor is to provide best of the class facilities and services to our students. Twenty first Century society is a knowledge society. But many of our educationists and captains of industry are of the opinion that there is a significant mismatch between the kind of education students are equipped

KG Reddy College of Engineering & Technology (AUTONOMOUS)

Affiliated to JNTUH, Hyderabad

with from our institutions and the industry's expectations. It is precisely to bring down this gap that our focus is on continuous enhancement of both the technical skills as well as the soft skill of our students to compete and succeed in the global workplaces of tomorrow.

INSTITUTION VISION:

To become self-sustainable institution which is recognized for its new age engineering through innovative teaching and learning culture, inculcating research and entrepreneurial ecosystem, and sustainable social impact in the community.

MISSION:

- To offer undergraduate and post-graduate programs that is supported through industry relevant curriculum and innovative teaching and learning processes that would help students succeed in their professional careers.
- To provide necessary support structures for students, which will contribute to their personal and professional growth and enable them to become leaders in their respective fields?
- To provide faculty and students with an ecosystem that fosters research and development through strategic partnerships with government organisations and collaboration with industries.
- To contribute to the development of the region by using our technological expertise to work with nearby communities and support them in their social and economic growth.

DEPARTMENT OF HUMANITIES & SCIENCES

The department of Humanities & Sciences (H&S) is being established in the year 2008 in KG Reddy College of Engineering & Technology (KGR CET). It inculcates the basic knowledge of English, Engineering Physics / Applied Physics, Engineering Chemistry, and Mathematics. These subjects are considered as the foundation of engineering education. The H&S department has well qualified and experienced professors possessing Doctorate degrees in their respective subjects. The department provides

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad

strong foundation for the Engineering courses by teaching the students how to apply the knowledge of Mathematics and sciences in solving complex Engineering problems. The interdisciplinary approach is offered in the first year, which allows students to shape their course of study to their needs and interests while assuring breadth in their learning.

English is global language and a key for success and a basic requirement along with academics. To face this challenge we have well equipped language laboratory and well trained faculty members who guide the students to learn and use English language as their medium of communication.

Mathematics is the king of sciences and technology, and it is a base for all branches; Mathematics itself is a language to solve the problems by using formulas and equations. The department provides guidance and explains the logical idea with the help of excellent faculty members. Department has Math Lab to make it more interesting and easier to learn.

To solve the mystery of nature Physics plays a prominent role, department is well equipped with laboratory and expert faculty to make the subject easy and enjoyable for learning.

The study of chemistry is crucial in all manufacturing process where the transformation of one form of material into another, equally important. Study of Environmental Chemistry gives knowledge about saving the globe from pollution. Departments has well organized laboratory where students will learn and do experiments under the supervision of excellent faculty members.

Vision:

To establish a strong foundation in basic sciences such as Mathematics, Physics, Chemistry, which in turn help the students to excel in their core engineering discipline and also train them to acquire proficiency in English language communication.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad

Mission:

- To provide academic excellence in basic sciences in the perspective of engineering.
- Students and faculties are provided learning environment where they can master in engineering discipline by applying knowledge from basic sciences.
- Inculcate research culture through project-based assignments.

CODE OF CONDUCT FOR STUDENTS

It shall be the responsibility of the students of KGR CET to be familiar with and adhere to this Code and any amendment brought to this Code.

1. Behave in a dignified and courteous manner and show due respect to the authorities, employees, elders and fellow students.
2. Access all educational opportunities and facilities available in the college and make good use of them to benefit academically and to develop scientific temper.
3. Respect the laws of the country and human rights and always conduct in a responsible and dignified manner.

BEHAVIOUR & CONDUCT OF THE STUDENT IN THE CAMPUS

1. The students are expected to be in your seat in the classroom by 9:00 am. However, 10 minutes of grace time is given to enter the class only for the first hour. If you arrive at the institute after 9:10 am and before 09:50 am you can attend the rest of the classes. From 10:00 am, no student will be allowed to gain entry into the campus. You are not permitted to enter the class after the commencement of the class (except 1st period) and should not leave a class before that class ends.
2. You should not leave the campus during the working hours (between 9:00 am and 3:45 pm) without prior permission from the principal. Students' who wishes to leave the campus for any reason may apply for permission to the concerned Head who in turn forward the case to the Principal. The Gate pass will be issued only after the permission from the Principal with the consent of the parent.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad

3. Respect the laws of the country and human rights and always conduct in a responsible and dignified manner.
4. You must wear neat and clean formal dress. Your attire should be befitting to the status of a student doing a professional course. Identity Card is to be always worn around the neck.
5. Use of mobile phones is strictly prohibited in the classrooms / labs / workshops / Library / computer labs / Seminar Hall / Offices and other prominent places.
6. All the interpersonal communication within the campus must be only in English. If mistakes, fear / tension, mother tongue influence etc. are your reasons for not speaking in English, you must realize that they are all part and parcel of the learning process. Unless you make mistakes and learn from your mistakes you will never be able to acquire good command over English. As you are all aware, good command over English paves the way for a good professional career.
7. In case there is any delay on the part of any teacher in entering your class, and as a result the students are idle, one of the students from your class (preferably CR) may contact the Class in charge / HOD / Academic Dean for corrective measures / necessary arrangements. You should not be seen in corridors, canteen, and buses or anywhere outside your classroom / lab without carrying a permission letter. If you do not have any teaching hours you are advised to utilize your free time in Library, Digital Library, Language Lab, Sports Lounge, etc.
8. You must actively participate in all academic, co curricular and extracurricular activities like; Seminars / Workshops, Tech Fests, College Day and all the National Festivals and use them to develop their technical and soft skills.
9. Students are expected to develop good manners, self-discipline and integrity and groom themselves to be responsible engineers of the country. As a student, also you are expected to respect your teachers, elders and fellow students.
10. If any one of you have any complaints or grievances, you are always welcome and bring it to the notice of your respective departments and the institution grievance cell to address your grievances/problems.
11. Never forget that you are always welcome to make your suggestions for the improvement of the institution. Your suggestions will be

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad

appreciated and implemented if they found to be good, innovative, and helpful to us in offering better services to all of you.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad

RULES FOR STUDENTS

- Students are advised and expected to
- Be punctual for all the activities.
- Be regular for the classes, labs, workshops, and examinations.
- Greet their faculty and seniors.
- Express themselves appropriately without the use of profane language or offensive gestures.
- Respect the safety of others by not bringing real or imitation weapons to college or the hostel.
- Avoid indulging in loose talk or spreading rumors on campus.
- Refrain from sitting in places such as parapets, stairs, footpaths, etc.
- Wear their identity cards while on the campus.
- Keep away from possession or consumption of chewing gum, narcotic drugs, tobacco, alcohol and other intoxicating substances which are strictly prohibited by law.
- Do not indulge in anti-institutional, anti-social, anti-national, communal, indecent, immoral or political activities within the campus and hostels
- Do not organize, attend or participate in any activity or agitation sponsored by political or religious organizations.
- Do not respond to any form of strike, procession or agitation including slogan shouting or boycott of activities.
- Take prior approval and permission of the Principal before undertaking any educational / recreational tours or industrial visits.
- Avoid coming to the college in their personal vehicles. Vehicles should be parked in the designated parking space only. Rash or negligent driving of vehicles, blowing of horns and riding with more than one pillion rider is prohibited.
- Report promptly any unauthorized entry of outsiders into the campus as well as hostels.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

Key Words

Academic Year: An academic year is referred as the period consisting of two consecutive semesters with 16 weeks each of instructional period followed by both the semester exams.

Course: A plan of study of a particular subject leading to an examination. All the courses need not carry the same weight. A course may be designed to comprise of lectures/ tutorials/ laboratory work/ field work/ outreach activities/ project work/ vocational training/ viva/ seminars/ assignments/ presentations etc. or a combination of some of these.

Choice Based Credit System (CBCS): Choice Based Credit System (CBCS) is the programme in which the students have a choice to choose from the prescribed courses and can learn at their own pace and the entire assessment is graded-based on a credit system.

Credit Point: It is the product of Grade Point and Number of Credits for a course.

Credit: A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/ field work perweek.

Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student of all the semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to 2nd decimal place.

Grade Point: It is a numerical weight allotted to each letter Grade on a 10-point scale.

Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C and F.

Programme: An Educational Programme leading to the award of a Degree.

Semester: Each semester will consist of 16-18 weeks of academic work equivalent to 90 actual instructions days.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

Semester Grade Point Average (SGPA): It is a measure of performance of the work done by the student in a semester. It is the ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to 2nd decimal place.

Transcript or Grade Card or Certificate: Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

Types of Courses: The Courses in under B. Tech, program may be of four kinds' viz., Core, Elective, Mandatory and extra subject.

a) Core Course:-

There may be a Core Course in every semester and are to be compulsorily studied by a student and is essential requirement for a given Programme. This include courses like Basic Science, Engineering Science, Humanities and Social Science including Management courses and Professional Core courses

b) Elective Course:-

Elective Course is a course which can be chosen by the students from a pool of subjects. In general, the elective course is,

- Supportive to the discipline of study
- Providing an expanded scope of the course subjects
- Nurturing student's proficiency/skill.
- In case an elective is "Discipline centric" and is offered by the student's department itself, the elective is called **Professional elective**.
- On the other hand, if the elective is offered by the other departments or if the choice is given to the students to choose from other disciplines, the elective is called an "**Open Elective**."

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

c) Mandatory Courses (Non-Credit Courses)

AICTE considers that the Course work of certain subjects is essential and as such for the award of a B.Tech degree a pass in these subjects is made mandatory. Therefore, such types of courses are referred as mandatory courses. As the AICTE also feels that only a familiarity with the subject content of these courses is essential, only a pass in each of these courses is required. Therefore, these subjects are included in the curriculum as non-Credit courses

- d)** There may be an extra course which can be chosen by the student having the credit but not to be considered for awarding the CGPA/SGPA in every semester

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

**ACADEMIC REGULATIONS FOR B. TECH. REGULAR STUDENTS WITH
EFFECT FROM ACADEMIC YEAR 2021-22 (R-21)**

**Under-Graduate Degree Programme in Engineering & Technology
(UGP in E&T)**

K G Reddy College of Engineering and Technology (KGR CET) offers a 4-year (8 semesters) **Bachelor of Technology** (B.Tech.) degree programme, under Choice Based Credit System (CBCS) in the following branches of Engineering.

S. No	Branch*
I	Civil Engineering
II	Mechanical Engineering
III	Electronics and Communication Engineering
IV	Computer Science and Engineering
V	Computer Science and Engineering (Artificial Intelligence and Machine Learning)
VI	Computer Science and Engineering (Data Science)

2.0 Eligibility for admission

2.1 Admission to the under graduate (UG) programme shall be made either on the basis of the merit rank obtained by the qualified student in entrance test conducted by the Telangana State Government (EAMCET) or the University or on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the government from time to time.

The medium of instructions for the entire under graduate programme in Engineering & Technology will be **English** only.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

3.0 B.Tech. Program structure

3.1 A student after securing admission shall complete the B. Tech. programme in a minimum period of **four** academic years (8 semesters), and a maximum period of **eight** academic years (16 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B. Tech course. Each student shall secure 160 credits (with CGPA \geq 5) required for the completion of the under graduate programme and award of the B. Tech. degree.

3.2 UGC/ AICTE specified definitions/ descriptions are adopted appropriately for various terms and abbreviations used in these academic regulations/ norms, which are listed below.

3.2.1 Semester scheme

Each under graduate programme is of 4 academic years (8 semesters) with the academic year divided into two semesters of 22 weeks (\geq 90 instructional days) each, each

Semester having – ‘Continuous Internal Evaluation (CIE)’ and ‘Semester End Examination (SEE)’ under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) indicated by UGC, and curriculum/course structure as suggested by AICTE are followed.

3.2.2 Credit courses

All subjects/ courses are to be registered by the student in a semester to earn credits which shall be assigned to each subject/ course in an L: T: P: C (lecture periods: tutorial periods: practical periods: credits) structure based on the following general pattern.

- One credit for one hour/ week/ semester for theory/ lecture (L) courses or Tutorials.
- One credit for two hours/ week/ semester for laboratory/ practical (P) courses.

Courses like Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization lab are mandatory courses. These courses will not carry any credits.

Courses under the extra subject will have credits, but will not be considered for awarding of CGPA/SGPA

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad

Academic Regulations - R21

3.2.3 Subject Course Classification

All subjects/ courses offered for the under graduate programme in Engineering & Technology (B. Tech. degree programmes) are broadly classified as follows. The KGR CET has followed almost all the guidelines issued by AICTE/UGC.

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses (FnC)	BS – Basic Sciences	Includes mathematics, physics and chemistry subjects
2		ES – Engineering Sciences	Includes fundamental engineering subjects
3		HS – Humanities and Social sciences	Includes subjects related to humanities, social sciences and management
4	Core Courses (CoC)	PC – Professional Core	Includes core subjects related to the parent discipline/ department/ branch of Engineering.
5	Elective Courses (ElC)	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
6		OE – Open Electives	Elective subjects which include inter- disciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering.
7	Core Courses	Project Work	B.Tech. project or UG project or UG major project or Project Stage I & II
8		Industrial training/ Mini- project	Industrial training/ Summer Internship/ Industrial Oriented Mini-project/Mini-project

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

9		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering.
10	Mandatory Courses(MC)	Mandatory Subject	Mandatory courses (non-credit)
11	Extra Course (SD)	Extra Subject	Includes Engineering for Sustainable Development and Social innovations courses

4.0 Course registration

- 4.1** A 'faculty advisor or counselor' shall be assigned to a group of 20 students, who will advise the students about the under graduate programme, its course structure and curriculum, choice/option for subjects/ courses, based on their competence, progress, pre-requisites and interest.
- 4.2** The academic section of the college invites 'registration forms' from students before the beginning of the semester through 'on-line registration', ensuring 'date and time stamping'. The on-line registration requests for any 'current semester' shall be **completed before the commencement of SEEs (Semester End Examinations) of the preceding semester**.
- 4.3** A student can apply for on-line registration, only after obtaining the 'written approval' from faculty advisor/counselor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with Head of the Department, faculty advisor/ counselor and the student.
- 4.4** A student may be permitted to register for all the subjects/ courses in a semester as specified in the course structure with maximum additional subject(s)/course(s) limited to 4 credits, based on progress and SGPA/ CGPA, and completion of the 'pre- requisites' as indicated for various subjects/ courses, in the department course structure and syllabus contents.
- 4.5** Choice for 'additional subjects/ courses' must be clearly indicated, which needs the specific approval and signature of the faculty advisor/ counselor.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

- 4.6** If the student submits ambiguous choices or multiple options or erroneous entries during on-line registration for the subject(s) / course(s) under a given/ specified course group/ category as listed in the course structure, only the first mentioned subject/ course in that category will be taken into consideration.
- 4.7** Subject/ course options exercised through on-line registration are final and cannot be changed or inter-changed; further, alternate choices also will not be considered. However, if the subject/ course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats). Such alternate arrangements will be made by the head of the department, with due notification and time-framed schedule, within the first week after the commencement of class-work for that semester.
- 4.8** Dropping of subjects/ courses may be permitted, only after obtaining prior approval from the faculty advisor/ counselor 'within a period of 30 days' from the beginning of the current semester.
- 4.9** Open electives: The students have to choose three open electives (OE-I, II & III) from the list of open electives given. However, the student cannot opt for an open elective subject offered by his own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.
- 4.10** Professional electives: The students have to choose six professional electives (PE-I to VI) from the list of professional electives given.

5.0 Subjects/ courses to be offered

- 5.1** A typical section (or class) strength for each semester shall be 60.
- 5.2** A subject/ course may be offered to the students, only if a minimum of 20 students (1/3 of the section strength) opt for it. The maximum strength of a section is limited to 80 (60 + 1/3 of the section strength).
- 5.3** More than one faculty member may offer the same subject (lab/ practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection of choice for students will be based on - 'first come first serve basis and CGPA

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

criterion' (i.e. the first focus shall be on early on-line entry from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

- 5.4** If more entries for registration of a subject come into picture, then the Head of the Department concerned shall decide, whether or not to offer such a subject/ course for two (or multiple) sections.
- 5.5** In case of options coming from students of other departments/ branches/ disciplines (not considering open electives), first priority shall be given to the student of the 'parent department'.

6.0 Attendance requirements:

- 6.1** A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum of 75% of attendance in aggregate of all the subjects/ courses (excluding attendance in mandatory courses like Environmental Science, Constitution of India, Intellectual Property Rights, Gender Sensitization lab and extra courses) for that semester. Two periods of attendance for each theory subject shall be considered, if the student appears for the mid-term examination of that subject. **This attendance should also be included in the fortnightly review of attendance to the Institutions.**

The attendance of Mandatory Non-Credit courses should be submitted separately to the University.

- 6.2** Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.
- 6.3** A stipulated fee shall be payable for condoning of shortage of attendance.
- 6.4** Shortage of attendance below 65% in aggregate shall in **no** case be condoned.
- 6.5** **Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester.** They may seek re-registration for all those subjects

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

registered in that semester in which the student is detained, by seeking re-admission into that semester as and when offered; if there are any professional electives and/ or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category.

- 6.6** A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.
- 6.7** For all extra courses offered in a semester, a "Satisfactory completion Certificate" shall be issued to the student, only after securing 75% attendance and secure greater than or equal to 40 % marks in such course. Letter Grade shall be allotted for these courses.

7.0 Academic requirements

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in item no. **6**.

- 7.1** A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course, if student secures not less than 35% (25 marks out of 70 marks) in the semester end examination, and a minimum of 40% (40 marks out of 100 marks) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing '**C**' grade or above in that subject/course.
- 7.2** A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Industrial Oriented Mini Project/Summer Internship and seminar, if the student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them. The student is deemed to have failed, if he (i) does not submit a report on Industrial Oriented Mini Project/Summer Internship, or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) does not present the seminar as required in the IV year I Semester, or (iii) secures less than 40% marks in Industrial Oriented Mini Project/Summer Internship and seminar evaluations.

A student may reappear once for each of the above evaluations, when they are scheduled again; if the student fails in such 'one re appearance' evaluation also, the student has to reappear for the same

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

in the next subsequent semester, as and when it is scheduled.

7.3 Promotion Rules

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to second year first semester	(i) Regular course of study of first year second semester. (ii) Must have secured at least 19 credits out of 38 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3.	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 48 credits out of 80 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to third year second semester	Regular course of study of third year first semester.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

6	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 73 credits out of 123 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

7.4 A student (i) shall register for all courses/subjects covering 160 credits as specified and listed in the course structure, (ii) fulfills all the attendance and academic requirements for 160 credits, (iii) earn all 160 credits by securing SGPA ≥ 5.0 (in each semester), and CGPA (at the end of each successive semester) ≥ 5.0 , (iv) **passes all the mandatory courses**, to successfully complete the under graduate programme. The performance of the student in these 160 credits shall be taken into account for the calculation of 'the final CGPA (**at the end of under graduate programme**)', and shall be indicated in the grade card of IV year II semester.

7.5 If a student registers for '**extra subjects**' (in the parent department or other departments/branches of Engg.) other than those listed subjects totaling to 160 credits as specified in the course structure of his department, the performances in those '**extra subjects**' (although evaluated and graded using the same procedure as that of the required 160 credits) will not be taken into account while calculating the SGPA and CGPA. For such '**extra subjects**' registered, percentage of marks and letter grade alone will be indicated in the grade card as a performance measure, subject to completion of the attendance and academic requirements as stated in regulations 6 and 7.1 – 7.4 above.

7.6 A student eligible to appear in the semester end examination for any subject/ course, but absent from it or failed (thereby failing to secure '**C**' grade or above) may reappear for that subject/ course in the

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

supplementary examination as and when conducted. In such cases, internal marks (CIE) assessed earlier for that subject/ course will be carried over, and added to the marks to be obtained in the SEE supplementary examination for evaluating performance in that subject.

7.7 A student **detained in a semester due to shortage of attendance may be re- admitted in the same semester in the next academic year for fulfillment of academic requirements.** The academic regulations under which a student has been readmitted shall be applicable. However, no grade allotments or SGPA/ CGPA calculations will be done for the entire semester in which the student has been detained.

7.8 A student detained **due to lack of credits, shall be promoted to the next academic year only after acquiring the required academic credits.** The academic regulations under which the student has been readmitted shall be applicable to him.

8.0 Evaluation - Distribution and Weightage of marks

8.1 The performance of a student in every subject/course (including practicals and Project Stage- I &II) will be evaluated for 100 marks each, with 30 marks allotted for CIE (Continuous Internal Evaluation) and 70 marks for SEE (Semester End - Examination).

8.2 For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of one objective paper, one descriptive paper and continuous assessment. The objective paper and the descriptive paper shall be for 10 marks each with a total duration of 1 hour 20 minutes (20 minutes for objective and 60 minutes for descriptive paper). The objective paper is set with 20 multiple choice, fill-in the blanks and matching type of questions for a total of 10 marks. The descriptive paper shall contain 4 full questions out of which, the student has to answer 2 questions, each carrying 5 marks. While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus. 10 marks are allocated for continuous assessment (as specified by the subject teacher concerned). The first assessment should be submitted before the conduct of the first mid-term examination, and the second assessment should be submitted before the conduct of the second mid-term examination. The total marks secured by the student in each mid-term examination are

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

evaluated for 30 marks, and the average of the two mid-term examinations shall be taken as the final marks secured by each student in Continuous Internal Evaluation. If any student is absent from any subject of a mid-term examination, a makeup test will be conducted on payment of fee fixed by the examination branch. The details of the end semester question paper pattern are as follows:

8.2.1 The semester end examinations (SEE) will be conducted for 70 marks consisting of two parts viz. i) Part- A for 20 marks, ii) Part - B for 50 marks.

- Part-A is a compulsory question consisting of ten sub-questions. Two questions from each unit and carry 2 marks each.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

8.2.2 For subjects like Engineering Graphics/Engineering Drawing, the SEE shall consist of five questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions. There shall be no Part – A, and Part – B system.

8.2.3 For subjects like Machine Drawing Practice/Machine Drawing, the SEE shall be conducted for 70 marks consisting of two parts viz. (i) Part – A for 30 marks. 3 out of 4 questions must be answered, (ii) Part – B for 40 marks. Part – B is compulsory.

8.2.4 For the Subject Estimation, Costing and Project Management, the SEE paper should consist of Part- A, Part-B and Part C.

- (i) Part – A – 1 out of 2 questions from Unit – I for 25 Marks,
- (ii) Part – B – 1 out of 2 questions from Unit – II for 15 Marks,
- (iii) Part – C – 3 out of 5 questions from Units – III, IV, V for 30 Marks.

8.2.5 For subjects Structural Engineering – I & II (RCC & STEEL), the SEE will be conducted for 70 marks consisting of 2 parts viz. (i) Part – A for 15 marks and, (i) Part – B for 55 marks. Part – A is a compulsory

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

question consisting of ten sub- questions. The first five sub-questions are from each unit relating to design theory and codal provisions and carry 2 marks each. The next five sub-questions are from each unit and carry 1 mark each. Part – B consists of 5 questions (numbered 2 to 6) carrying 11 marks each. Each of these questions is from one unit and may contain sub- questions. For each question there is either or choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

- 8.3** For practical subjects there shall be a continuous internal evaluation during the semester for 30 marks and 70 marks for semester end examination. Out of the 30 marks for internal evaluation of day-to-day experiment wise evaluation in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 15 marks conducted by the laboratory teacher concerned. The semester end examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed by the, Controller of Exams/Principal from the panel of examiners recommended by Chairman, Board of Studies in respective Branches.
- 8.4** For the subject having design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing, machine drawing practice and estimation), the distribution shall be 30 marks for continuous internal evaluation (15 marks for day-to-day work and 10 marks for internal tests and 05 marks for attendance) and 70 marks for semester end examination. There shall be two internal tests in a semester and the average of the two shall be considered for the award of marks for internal tests.
- 8.5** There shall be an Industrial Oriented Mini Project/Summer Internship, in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester examinations and pursue it during summer vacation. Industrial Oriented Mini Project/Summer Internship shall be submitted in a report form and presented before the committee in IV year I semester. It shall be evaluated for 100 external marks. The committee consists of an external examiner; Head of the Department, supervisor of the Industrial Oriented mini project/Summer Internship and a senior faculty member of the department. There shall be 30 internal marks and 70 external marks for Industrial Oriented Mini Project/Summer Internship.
- 8.6** There shall be a seminar presentation in IV year I semester. For the

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

seminar, the student shall collect the information on a specialized topic, prepare a technical report, and submit it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 100 internal marks. There shall be no semester end examination for the seminar.

8.7 UG project work shall be carried out in two stages: Project Stage – I during IV Year I Semester, Project Stage – II during IV Year II Semester. Each stage will be evaluated for 100 marks. Student has to submit project work report at the end of each semester. First report includes project work carried out in IV Year I semester and second report includes project work carried out in IV Year I & II Semesters. SEE for both project stages shall be completed before the commencement of SEE Theory examinations.

8.8 For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall evaluate the project work for 70 marks and project supervisor shall evaluate for 30 marks. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one re appearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

8.9 For Project Stage – II, the external examiner shall evaluate the project work for 70 marks and the project supervisor shall evaluate it for 30 marks. The topics for industrial oriented mini project, seminar and Project Stage – I shall be different from one another. The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule, or (ii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

For conducting viva-voce of project stage – II, institute selects an external examiner from the list of experts in the relevant branch submitted by the , Controller of Exams/Principal from the panel of

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

examiners recommended by Chairman, Board of Studies in respective Branches.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if student fails in such 'one reappearance' evaluation also, he has to reappear for the same in the next subsequent semester, as and when it is scheduled.

8.10 The Laboratory marks and the sessional marks awarded by the faculty are subject to scrutiny by the Institution whenever/wherever necessary. In such cases, the sessional and laboratory marks awarded by the teacher will be referred to a College Academic Committee. The Committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved as per the University rules and produced before the Committees of the University as and when asked for.

8.11 For all mandatory courses and extra subjects, a student has to secure 40 marks out of 100 marks (i.e. 40% of the marks allotted) in the continuous internal evaluation for passing the subject/course. These marks should also be submitted along with the internal marks of other subjects.

8.12 Candidates shall be permitted to apply for recounting/revaluation of SEE scripts within 2 weeks with a payment of prescribed fee.

No marks or letter grades shall be allotted for Mandatory / Non-Credit / Extra Subject courses. Only Pass/Fail shall be indicated in Grade Card.

9.0 Grading procedure

9.1 Grades will be awarded to indicate the performance of students in each theory subject, laboratory / practicals, seminar, Industry Oriented Mini Project, and project Stage - I & II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade shall be given.

9.2 As a measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	O (Outstanding)	10
80 and less than 90%	A⁺ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B⁺ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (FAIL)	0
Absent	Ab	0

9.3 A student who has obtained an 'F' grade in any subject shall be deemed to have 'failed' and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

9.4 To a student who has not appeared for an examination in any subject, 'Ab' grade will be allocated in that subject, and he is deemed to have 'failed'. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same as those obtained earlier.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

9.5 A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

9.6 A student earns grade point (GP) in each subject/ course, on the basis of the letter grade secured in that subject/ course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

Credit points (CP) = grade point (GP) x credits For a course

9.7 A student passes the subject/ course only when $GP \geq 5$ ('C' grade or above)

9.8 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (CP) secured from all subjects/ courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to two decimal places. SGPA is thus computed as

$SGPA = \frac{\sum_{i=1}^N C_i G_i}{\sum_{i=1}^N C_i} \dots$ For each semester,

where 'i' is the subject indicator index (takes into account all subjects in a semester), 'N' is the no. of subjects '**registered**' for the semester (as specifically required and listed under the course structure of the parent department), C_i is the no. of credits allotted to the i^{th} subject, and G_i represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} subject.

9.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in all registered courses in all semesters, and the total number of credits registered in all the semesters. CGPA is rounded off to two decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula

$CGPA = \frac{\sum_{j=1}^M C_j G_j}{\sum_{j=1}^M C_j} \dots$ for all S semesters registered

(i.e., up to and inclusive of S semesters, $S \geq 2$),

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

where 'M' is the total no. of subjects (as specifically required and listed under the course structure of the parent department) the student has 'registered' i.e., from the 1st semester onwards up to and inclusive of the 8th semester, 'j' is the subject indicator index (takes into account all subjects from 1 to 8 semesters), C_j is the no. of credits allotted to the j^{th} subject, and G_j represents the grade points (GP) corresponding to the letter grade awarded for that j^{th} subject. After registration and completion of I year I semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA:

Course / Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	$4 \times 8 = 32$
Course 2	4	O	10	$4 \times 10 = 40$
Course 3	4	C	5	$4 \times 5 = 20$
Course 4	3	B	6	$3 \times 6 = 18$
Course 5	3	A+	9	$3 \times 9 = 27$
Course 6	3	C	5	$3 \times 5 = 15$
	21			152

$$\text{SGPA} = 152/21 = 7.24$$

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

Illustration of calculation of CGPA up to 3rd semester:

Semester	Course / Subject Title	Credits Allotted	Letter Grade Secured	Corresponding Grade Point (GP)	Credit Points (CP)
I	Course 1	3	A	8	24
I	Course 2	3	O	10	30
I	Course 3	3	B	6	18
I	Course 4	4	A	8	32
I	Course 5	3	A+	9	27
I	Course 6	4	C	5	20
II	Course 7	4	B	6	24
II	Course 8	4	A	8	32
II	Course 9	3	C	5	15
II	Course 10	3	O	10	30
II	Course 11	3	B+	7	21
II	Course 12	4	B	6	24
II	Course 13	4	A	8	32
II	Course 14	3	O	10	30
III	Course 15	2	A	8	16
III	Course 16	1	C	5	5
III	Course 17	4	O	10	40
III	Course 18	3	B+	7	21
III	Course 19	4	B	6	24
III	Course 20	4	A	8	32
III	Course 21	3	B+	7	21
	Total Credits	69		Total Credit Points	518

CGPA = 518/69 = 7.51

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

The above illustrated calculation process of CGPA will be followed for each subsequent semester until 8th semester. The CGPA obtained at the end of 8th semester will become the final CGPA secured for entire B.Tech. Programme.

9.10 For merit ranking or comparison purposes or any other listing, only the 'rounded off' values of the CGPAs will be used.

9.11 SGPA and CGPA of a semester will be mentioned in the semester Memorandum of Grades if all subjects of that semester are passed in first attempt. Otherwise the SGPA and CGPA shall be mentioned only on the Memorandum of Grades in which sitting he passed his last exam in that semester. However, mandatory courses will not be taken into consideration.

10.0 Passing standards

10.1 A student shall be declared successful or 'passed' in a semester, if he secures a GP ≥ 5 ('C' grade or above) in every subject/course in that semester (i.e. when the student gets an SGPA ≥ 5.00 at the end of that particular semester); and he shall be declared successful or 'passed' in the entire under graduate programme, only when gets a CGPA ≥ 5.00 for the award of the degree as required.

10.2 After the completion of each semester, a grade card or grade sheet shall be issued to all the registered students of that semester, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, title, no. of credits, grade earned, etc.), credits earned.

11.0 Declaration of results Computation of SGPA and CGPA are done using the procedure listed in 9.6 to 9.9.

For final percentage of marks equivalent to the computed final CGPA, the following formula may be used.

$$\% \text{ of Marks} = (\text{final CGPA} - 0.5) \times 10$$

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

12.0 Award of degree

12.1 A student who registers for all the specified subjects/ courses as listed in the course structure and secures the required number of 160 credits (with CGPA ≥ 5.0), within 8 academic years from the date of commencement of the first academic year, shall be declared to have 'qualified' for the award of B. Tech. degree in the chosen branch of Engineering selected at the time of admission.

12.2 A student who qualifies for the award of the degree as listed in item 12.1 shall be placed in the following classes.

12.3 A student with final CGPA (at the end of the under graduate programme) ≥ 8.00 , and fulfilling the following conditions - shall be placed in 'first class with distinction'. However, he

- (i) Should have passed all the subjects/courses within the first 4 academic years from the date of commencement of first year first semester. Or within 3 academic years in case of lateral entry candidates by clearing all the courses.
- (ii) Should not have been detained or prevented from writing the semester end examinations in any semester due to shortage of attendance or any other reason.

A student not fulfilling any of the above conditions with final CGPA > 8 shall be placed in '**first class**'.

12.4 Students with final CGPA (at the end of the under graduate programme) ≤ 6.50 but < 8.00 shall be placed in 'first class'.

12.5 Students with final CGPA (at the end of the under graduate programme) ≤ 5.50 but < 6.50 , shall be placed in 'second class'.

12.6 All other students who qualify for the award of the degree (as per item 12.1), with final CGPA (at the end of the under graduate programme) ≤ 5.00 but < 5.50 , shall be placed in 'pass class'.

12.7 A student with final CGPA (at the end of the under graduate programme) < 5.00 will not be eligible for the award of the degree.

12.8 Students fulfilling the conditions listed under item 12.3 alone will be eligible for award of 'Gold Medal'.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

13.0 Withholding of results

13.1 If the student has not paid the fees to the College at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and the student will not be allowed to go into the next higher semester. The award or issue of the degree may also be withheld in such cases and the matter will be referred to the academic council for final decision.

14.0 Student transfers

14.1 There shall be no branch transfers after the completion of admission process.

14.2 There shall be no transfers from one college/stream to another within the constituent colleges and units of Jawaharlal Nehru Technological University Hyderabad.

14.3 **The students seeking transfer to colleges affiliated to JNTUH from various other Universities/institutions have to pass the failed subjects which are equivalent to the subjects of Institution, and also pass the subjects of Institution which the students have not studied at the earlier institution. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of Institution, the students have to study those subjects in Institution in spite of the fact that those subjects are repeated.**

14.4 The Institution shall provide one chance to write the internal examinations in the equivalent subject(s) to the students transferred from other universities/institutions colleges who are on rolls, as per the clearance (equivalence) letter issued by the Institution.

15.0 Scope

15.1 The academic regulations should be read as a whole, for the purpose of any interpretation.

15.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

15.3 The Institution may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the dates notified by the Principal.

15.4 Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

15 TRANSCRIPTS

After successful completion of the total programme of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee.

16 SUPPLEMENTARY EXAMINATIONS

In addition to the Regular end semester examinations, Supplementary Examinations for the previous semesters will be conducted within the 30 days from the deceleration of results of previous semester. A student can appear for any number of supplementary examinations till he/she clears all courses which he/she could not clear in the first attempt. However, the maximum stipulated period cannot be relaxed under any circumstances.

17 GRADUATION CEREMONY

18.1 The College shall have its own annual Graduation Ceremony for the award of degrees to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute.

18.2 The College shall institute Prizes and Awards to meritorious students, for being given away annually at the Graduation Ceremony.

19. TERMINATION OF THE PROGRAM

The admission of a student to the program may be terminated and the student may be asked to leave the Institute in the following circumstances:

19.1 The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

19.2 The student fails to satisfy the norms of discipline specified by the institute from time to time.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

**ACADEMIC REGULATIONS FOR B. TECH. (LATERAL ENTRY SCHEME)
FROM THE AY 2022 - 23**

1. Eligibility for award of B. Tech. Degree(LES)

The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.

2. The student shall register for 122 credits and secure 122 credits with CGPA ≥ 5 from II year to IV year B.Tech. programme (LES) for the award of B.Tech.degree.
3. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.
4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

5. Promotion rule

S. No	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester.
2	Second year second semester to third year first semester	(i) Regular course of study of second year second semester. (ii) Must have secured at least 25 credits out of 42 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester	Regular course of study of third year first semester.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

4	Third year second semester to fourth year first semester	(i) Regular course of study of third year second semester. (ii) Must have secured at least 51 credits out of 85 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

6. **All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).**

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

MALPRACTICES RULES

**DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN
EXAMINATIONS**

	Nature of Malpractices/Improper conduct	Punishment
	If the student:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which student is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The hall ticket of the student is to be cancelled.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad

Academic Regulations - R21

4.	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

6.	<p>Refuses to obey the orders of the chief superintendent/assistant superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.</p>	<p>In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the student(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.</p>
----	--	--

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

7.	Leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
8.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits theseat.
9.	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to the

**KG Reddy College of Engineering & Technology
(AUTONOMOUS)**

Affiliated to JNTUH, Hyderabad
Academic Regulations - R21

		police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared for including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the student has appeared for including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported for further action to award a suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the students as per the above guidelines.

* * *

KG Reddy College of Engineering & Technology (AUTONOMOUS)

Affiliated to JNTUH, Hyderabad
B. Tech – CSE & ECE
Course Structure & Syllabus - R21

B. Tech. I-Year I-Semester

Sl. No.	Category	Course Code	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
				L	T	P	T		Int. Marks	Ext. Marks	Total Marks
1	BS	KG21MA101	Mathematics-I	3	1	-	4	4	30	70	100
2	BS	KG21AP102	Applied Physics	3	-	-	3	3	30	70	100
3	ES	KG21CS103	Programming in C	3	1	-	4	4	30	70	100
4	ES	KG21EC104	Basic Electrical Engineering	3	-	-	3	3	30	70	100
5	ES	KG21ME105	Engineering Workshop	1	-	2	3	2	30	70	100
6	BS	KG21AP106	Applied Physics lab	-	-	2	2	1	30	70	100
7	ES	KG21CS107	C Programming Lab	-	-	2	2	1	30	70	100
8	ES	KG21EC108	Basic Electrical Engineering Lab	-	-	2	2	1	30	70	100
Total				13	02	08	23	19	240	560	800
9	*SD	KG21SD109	Design Thinking and Sustainable Development	1	-	2	3	2	-	100	-

***SD (Engineering for Sustainable Development) – Extra Subject**

B. Tech. I-Year II-Semester

Sl. No.	Category	Course Code	Course Title	Contact Periods per week				Credits	Scheme of Examination Max. Marks		
				L	T	P	T		Int. Marks	Ext. Marks	Total Marks
1	BS	KG21MA201	Mathematics-II	3	1	-	4	4	30	70	100
2	BS	KG21CH202	Engineering Chemistry	3	-	-	3	3	30	70	100
3	ES	KG21CS203	Python Programming	3	1	-	4	4	30	70	100
4	ES	KG21ME204	Engineering Graphics	1	-	4	5	3	30	70	100
5	HS	KG21EN205	English	2	-	-	2	2	30	70	100
6	BS	KG21CH206	Engineering Chemistry Lab	-	-	2	2	1	30	70	100
7	HS	KG21EN207	English Language & Communication Skills Lab	-	-	2	2	1	30	70	100
8	ES	KG21CS208	Python Programming Lab	-	-	2	2	1	30	70	100
Total:				12	02	10	24	19	240	560	800
9	*SD	KG21SD209	Innovation for Rural Development	1	-	2	3	2	-	100	-

***SD (Engineering for Sustainable Development) – Extra Subject**

Mathematics - I
(Common to all branches)

Course Code: KG21MA101

L T P C

3 1 0 4

B.Tech. I Year I-Semester

Prerequisites: No Prerequisites**Course Objectives:** The course will help students to learn

1. Types of matrices and concept of a rank of the matrix and apply this concept to know the consistency and solving the system of linear equations.
2. Reduce the quadratic form to canonical form by orthogonal transformation.
3. Geometrical approach to the mean value theorems and their application to the mathematical problems
4. Methods of solving the ordinary differential equations of first order and first degree.
5. Methods of solving the ordinary differential equations of higher order.

Course Outcomes: After completion of this course, the students will be able to**CO1:** Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations**CO2:** Reduce the quadratic form to canonical form using orthogonal transformations.**CO3:** Solve the applications on the mean value theorems.**CO4:** Identify whether the given differential equation of first order is exact or not.**CO5:** Solve higher differential equation and apply the concept of differential equation to real world problems**UNIT-I: Matrices**

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by using Gauss Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations, L-U Decomposition method.

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties of Symmetric, Hermitian, Skew-symmetric, Skew-Hermitian, orthogonal matrices, Unitary Matrices.

UNIT-II: Quadratic forms

Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation .

UNIT-III: Calculus

Mean value theorems: Rolle's Theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's theorem with remainders, Taylor's and Maclaurin's expansions.

UNIT-IV: First Order ODE

Exact, linear and Bernoulli's equations; Applications: Newton's law of cooling, Law of natural growth and decay, orthogonal trajectories; Equations not of first degree: equations solvable for p , equations solvable for y , equations solvable for x , Clairaut's type.

UNIT-V: Ordinary Differential Equations of Higher Order

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

Text Books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

References:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
3. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. R. K Jain, S. R. K. Iyengar, Advanced Engineering Mathematics, 5th Edition, Narosa publications, Reprint, 2019.

Applied Physics
(Common to ECE, CSE)

Course Code: KG21AP102

L	T	P	C
3	0	0	3

B. Tech. I-Year I-Semester

Prerequisites: Fundamental knowledge of applied physics at pre – university level.

Course Objectives: The course will help students to

1. Understand the basic concepts of related Quantum physics in micro level.
2. Demonstrate the concepts of semiconductors: BJT, Photo detectors and Hall Effect.
3. Examine polarization mechanisms in dielectric materials and explore the Maxwell's equations.
4. Study the working mechanisms of various lasers and their applications.
5. Understand the principle of optical fiber and interpret its applications in various fields.

Course Outcomes: Upon completion of this course, the students will be able to

- CO1:** The student would be able to learn the fundamental concepts on Quantum behaviour of matter in its microstate.
- CO2:** The knowledge of fundamentals of semiconductor technology which enable the students to apply in various fields.
- CO3:** The course also helps the students to be exposed to the phenomena of electromagnetism and Illustrate applications of Maxwell's equation.
- CO4:** Design, characterization and study of properties of LASER's which helps the students to prepare new materials for various engineering applications.
- CO5:** Understand the construction and working principle of optical fibers and its applications in various fields.

UNIT - I: Quantum Mechanics

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

UNIT - II: Semiconductor Physics

Introduction to Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature in intrinsic semiconductors, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall Effect, p-n junction diode, Zener diode and their V-I Characteristics. Bipolar Junction Transistor (BJT): Construction, Principle of operation. Semiconductor photo detectors: PIN and Avalanche and their structure, materials, working principle and Characteristics.

UNIT - III: Electromagnetism and Magnetic Properties of Materials

Laws of electrostatics, electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, polarization, permittivity and dielectric constant, internal fields in a solid, Clausius -Mossotti equation, ferroelectrics and piezoelectrics. Magnetization, permeability and susceptibility, classification of magnetic materials, ferromagnetic domains, Hysteresis, Applications of magnetic materials.

UNIT - IV: Lasers

Introduction and characteristics of Lasers: directionality, monochromaticity, intensity and coherence. Interaction of radiation with matter: Stimulated absorption, spontaneous emission and stimulated emission. Principle and working of lasers: Population inversion, Pumping and lasing action. Types of Lasers: Ruby laser, Nd: YAG laser, Carbon dioxide (CO₂) laser, He-Ne laser, Semiconductor laser, Applications of laser.

UNIT - V: Fiber Optics

Introduction, Optical fiber as a dielectric wave guide, Principle of total internal reflection, construction and working of optical fiber, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibers, Losses (attenuation) associated with optical fibers, Applications of optical fibers.

Text Books:

1. Applied Physics, P. K. Palaniswamy, Scitech Publications (India) Pvt. Ltd, 2018.
2. Engineering Physics, Manoj K. Harabola, T. Vijaya Krishna, T. Madhu Mohan, Cengage Learning India Pvt. Ltd, 2018.
3. Engineering Physics, B. K. Pandey, S. Chaturvedi –Cengage Learning.
4. Physics, Resnick Halliday and Krane 5th Edition, Wiley, 2014.
5. A text book of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P. G. Kshirsagar –S. Chand.

References:

1. Richard Robinett , Quantum Mechanics.
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc. (1995).
3. Online Course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Gupta on NPTEL.
4. K. Thyagarajan & Ajay Ghatak (2010), "lasers theories and application", springer, 2nd Edition, ISBN 1441964410, 650 pages
5. Arthur Beiser (2009), "concepts of modern physics", Tata McGraw Hill, 6th Edition, ISBN 0070151555

PROGRAMMING IN C
(Common to all branches)

Course Code: KG21CS103

L	T	P	C
3	1	0	4

C.Tech. I Year I-Semester

Prerequisites: Fundamentals of Basic Mathematics**Course Objectives:** The course will help students to learn

1. To interpret the various steps in program development.
2. To recall and recite the fundamentals, syntax and semantics of C programming language.
3. To illustrate problem solving using arrays, strings, structures and pointers.
4. To demonstrate using of structured and modular programming approach in solving problems.
5. To code, Interpret and debug the given program using files.

Course Outcomes: After completion of this course, the students will be able to**CO1:** Design Algorithms using problem-solving techniques for given problems and demonstrate C programming Constructs to develop programs.**CO2:** Apply functions and Arrays to enhance reusability and data manipulation**CO3:** Use Pointers to manage the memory effectively**CO4:** Differentiate Structures and Unions and implement for efficient memory management**CO5:** Apply File handling concepts for Real-World Applications

UNIT - I: Introduction to Programming Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code , Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do-while loops I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr. Command line argument

UNIT - II: Arrays, Strings, Structures and Pointers: Arrays: one- and two-dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings Structures: Defining structures, initializing structures, unions, Array of structures Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self-referential structures in linked list (no implementation)

Enumerated, Structure, and Union Types– The Type Definition (type def), Enumerated types, Structures –Declaration, initialization, accessing structures, operations on structures, Complex structures, structures and functions, Passing structures through pointers, self-referential structures, unions, bit fields, C programming examples, command –line arguments.

UNIT - III: Preprocessor and File handling in C: Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

UNIT - IV: Function and Dynamic Memory Allocation: Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

UNIT - V: Introduction to Algorithms: Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc. Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

Text Books:

1. B.A.Forouzan and R.F. Gilberg, "Computer Science: A Structured Programming Approach Using C", Cengage Learning, 3rd Edition, 2007.
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
3. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
2. Hall of India
3. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
4. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
5. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

BASIC ELECTRICAL ENGINEERING
(Common to CSE, ECE)

Course Code: KG21EC104

L T P C

3 0 0 3

B.Tech. I Year I-Semester

Prerequisites: No Prerequisites**Course Objectives:** The course will help students

1. To introduce the concepts of electrical circuits and its components.
2. To understand magnetic circuits, DC circuits and AC single phase & three phase circuits.
3. To study and understand the different types of DC/AC machines and Transformers.
4. To impart the knowledge of various electrical installations.
5. To introduce the concept of power, power factor and its improvement.

Course Outcomes: Upon completion of this course, the students will be able to**CO1:** Solve and Analyze electrical circuits using network laws and theorems.**CO2:** Analyze single phase and three phase AC circuits.**CO3:** Draw the phasor diagram and equivalent circuit of Transformer with and without load.**CO4:** Categorize the AC and DC machines and their applications.**CO5:** Analyze the various electrical installations.**UNIT-I: D.C. Circuits**

Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT-II: A.C. Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor,

Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III: Transformers

Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV: Electrical Machines (Elementary operation only)

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Losses in components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT-V: Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup, uninterrupted power supply (UPS) & types.

Text Books:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L.S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011
4. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010
5. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989

Reference Books:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University

2. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
3. Network Theory by N. C. Jagan & C. Lakshminarayana, B.S. Publications.
4. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
5. "I.J. Nagrath & D.P. Kothari", "Electric Machines", Tata Mc Graw Hill Publishers, 3rd edition, 2004.
6. "P.S. Bimbra", "Electrical Machines", Khanna Publishers, 7th Edition, 2014.
7. "Abhijith Chakrabarthi & SubithaDebnath", "Electrical Machines", Mc Graw Hill, 2015.

**Engineering Workshop
(Common to CSE, ECE)**

Course Code: KG21ME105

L	T	P	C
1	0	2	2

B. Tech. I Year I-Semester

Prerequisites: Practical Skills**Course Objectives:** The course will help students to

1. Explain production of various engineering products and carpentry tools.
2. Provide hands on experience about use of different engineering materials, tools, equipments.
3. Explain the construction, function, use and application of different working tools, equipment and machines.
4. Compare various welding and joining processes.
5. Identify marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

Course Outcomes: Upon completion of this course, the students will be able to**CO1:** Explain about the production of various engineering products and carpentry tools.**CO2:** Make use of hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.**CO3:** Summarize the construction, function, use and application of different working tools, equipment and machines.**CO4:** Examine various welding and joining processes.**CO5:** Demonstrate the various marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.**Trades for Exercises:****At least two exercises from each trade:****Demonstration and use of Hand tools:** V-block, Marking Gauge, Files, Hack Saw, Drills, Taps.

Fitting – To prepare job using V-Fit, Dovetail Fit & Semi-circular fit.

Welding: To Study of electric arc welding tools & equipments. To prepare the job by demonstrating the Butt Joint, Lap Joint, T-joint & L-joint.

Tin-Smithy – To prepare the Job; Square Tin, Rectangular Tray & Conical Funnel.

Foundry – To prepare the Job; Preparation of Green Sand Mould using Single Piece and Split Pattern

Carpentry: To prepare the Job; T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint

Sheet Metal & Soldering Work: To prepare the job by using Development & Soldering: Frustum of cone, Prism (Hexagon & Pentagon), Truncated Square Pyramid.

House-wiring – To prepare the wiring for Parallel & Series, Two-way Switch and Tube Light.

Black Smithy – To prepare the Job: Round to Square, Fan Hook and S-Hook.

Trades for demonstration & understanding:

Plumbing, Machine Shop (Lathe, Milling, Planar, Grinding, Drilling), Power tools in construction and Wood Working.

Text Books:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha/
3. A Textbook of Workshop Technology by R S Kurmi & J K Gupta/S Chand Publishers.

Reference Books:

1. S. K. Hajra Choudhury, A. K. Hajra Choudhury, "Elements of Workshop Technology", Vol I: Manufacturing Processes, 15th Edition Reprinted 2013, Media Promoters & Publishers Pvt Ltd., Mumbai.
2. Work shop manual - P. Kannaiah / K. L. Narayana / SciTech
3. Workshop Manual / Venkat Reddy/ BSP
4. Mechanical Workshop Practice by K C John
5. Workshop technology by W. A. J. Chapman

**Applied Physics Lab
(Common to ECE, CSE)**

Course Code: KG21AP106

L	T	P	C
0	0	2	1

B. Tech. I Year I-Semester

Prerequisites:

Theory related laboratory experiments to apply theoretical knowledge to practical situations.

Course Objectives: The course will help students to

1. The Objective of this course is to make the students gain practical knowledge to co-relate with the theoretical studies.
2. Achieve perfectness in experimental skills and the study of practical applications will bring more confidence and ability to develop and fabricate engineering and technical equipments.
3. Design of circuits using new technology and latest components and to develop practical applications of engineering materials and use of principle in the right way to implement the modern technology.
4. Students will able to develop basic communication skills through working in groups in performing the laboratory experiments.
5. Students will able to understand the concept of mathematical equations to obtain quantitative results.

Course Outcomes: After completion of this course, the students will be able to**CO1:** Apply the various procedures and techniques for the experiments.**CO2:** Use the different measuring devices and meters to record the data with precision.**CO3:** Apply the mathematical concepts/equations to obtain quantitative results.**CO4:** Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results

CO5: Apply the various theoretical concepts for the experiments.

List of Experiments:

1. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.
2. Solar Cell: To study the V-I Characteristics of solar cell.
3. Light Emitting Diode: Plot V-I and P-I characteristics of light emitting diode.
4. Stewart – Gee’s experiment: Determination of magnetic field along the axis of a current carrying coil.
5. Hall effect: To determine Hall co-efficient of a given semiconductor.
6. Photoelectric effect: To determine work function of a given material.
7. LASER: To study the characteristics of LASER sources.
8. Optical fibre: To determine the bending losses of Optical fibers.
9. LCR Circuit: To determine the Quality factor of LCR Circuit.
10. Thermoelectric effect: To determine the seebeck coefficient.

Note: Any 8 experiments are to be performed

C PROGRAMMING LAB
(Common to all branches)

Course Code: KG21CS107

L	T	P	C
0	0	2	1

B. Tech. I Year I-Semester

Prerequisites: [Note: The programs may be executed using any available Open Source/ Freely available IDE Some of the Tools available are:

Code Lite: <https://codelite.org/>Code::Blocks: <http://www.codeblocks.org/>DevCpp : <http://www.bloodshed.net/devcpp.html>Eclipse: <http://www.eclipse.org>

This list is not exhaustive and is NOT in any order of preference]

Course Objectives: The course will help students to learn

1. To work with an IDE to create, edit, compile, run and debug programs
2. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
3. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
4. To write programs using the Dynamic Memory Allocation concept.
5. To create, read from and write to text and binary files

Course Outcomes: After completion of this course, the students will be able to**CO1:** Formulate the algorithms for simple problems and identify correct logical errors encountered during execution.**CO2:** Modularize the code with functions so that they can be reused.**CO3:** Represent and manipulate data with arrays and strings.**CO4:** Use structures and pointers of different types.

CO5: Create, read and write to and from simple text and binary files.

Practice Sessions:

1. Write a simple program that prints the results of all the operators available in C (including pre/ post increment, bitwise and/or/not , etc.). Read required operand values from standard input.
2. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values from standard input.

Simple Numeric Problems:

1. Write a program for find the max and min from the three numbers.
2. Write the program for the simple, compound interest.
3. Write program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.
4. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

$$5 \times 1 = 5$$

$$5 \times 2 = 10$$

$$5 \times 3 = 15$$

Expression Evaluation:

1. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula $s = ut + \frac{1}{2}at^2$ where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
2. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)
3. Write a program that finds if a given number is a prime number
4. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
5. A Fibonacci sequence is defined as follows:

The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

6. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
7. Write a C program to find the roots of a Quadratic equation.
8. Write a C program to calculate the following, where x is a fractional value.
 $1 - x/2 + x^2/4 - x^3/6$
9. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1 + x + x^2 + x^3 + \dots + x^n$. For example: if n is 3 and x is 5, then the program computes $1 + 5 + 25 + 125$.

Arrays and Pointers and Functions:

1. Write a C program that uses functions to perform the following:
 - i. Addition of Two Matrices
 - ii. Multiplication of Two Matrices
 - iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
2. Write a C program to find the minimum, maximum and average in an array of integers.
3. Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
4. Write a C programs that use both recursive and non-recursive functions
 - i. To find the factorial of a given integer.
 - ii. To find the GCD (greatest common divisor) of two given integers.
 - iii. To find x^n
5. Write a program for reading elements using pointer into array and display the values using array.
6. Write a program for display values reverse order from array using pointer.
7. Write a program through pointer variable to sum of n elements from array.

Strings:

1. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
2. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
3. Write a C program that uses functions to perform the following operations:
 - i. To insert a sub-string in to a given main string from a given position.
 - ii. To delete n Characters from a given position in a given string.
4. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
5. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
6. Write a C program to count the lines, words and characters in a given text.

Files:

1. Write a C program to display the contents of a file to standard output device.
2. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
3. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
4. Write a C program that does the following:

It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function). Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function). The program should then read all 10 values and print them back.
5. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

Structures:

Write a C program that uses functions to perform the following operations:

- i. Reading a complex number
- ii. Writing a complex number
- iii. Addition of two complex numbers
- iv. Multiplication of two complex numbers

(Note: represent complex number using a structure.)

Miscellaneous:

1. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.
2. Write a C program to construct a pyramid of numbers as follows:

```

1           *           1           1           *
1  2       *   *       2  3       2  2       *   *
1  2  3   *   *   *   4  5  6   3  3  3   *   *   *
                                     4  4  4   *   *
                                           *
```

Suggested Reference Books for solving the problems:

1. Byron Gottfried, Schaum's, "Outline of Programming with C", McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg, "C Programming and Data Structures", Cengage Learning, (3rd Edition, 2018)
3. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Prentice Hall of India.
4. R.G. Dromey, "How to solve it by Computer", Pearson, (16th Impression)
5. Programming in C, Stephen G. Kochan, Pearson Education, (4th Edition)
6. Herbert Schildt, "C: The Complete Reference", Mc Graw Hill, 4th Edition

BASIC ELECTRICAL ENGINEERING LAB
(Common to CSE, ECE)

Course Code: KG21EC108

L	T	P	C
0	0	2	1

B.Tech. I Year I-Semester

Prerequisites: No Prerequisites**Course Objectives:** The course will help students

- 1.To analyze a given network by applying various electrical laws and network theorems.
- 2.To know the response of electrical circuits for different excitations.
- 3.To calculate, measure and know the relation between basic electrical parameters.
- 4.To analyze the performance characteristics of DC electrical machines.
- 5.To analyze the performance characteristics of AC electrical machines.

Course Outcomes: Upon completion of this course, the students will be able to**CO1:** Apply the basic electrical laws.**CO2:** Analyze the response of different types of electrical circuits to different excitations.**CO3:** Calculation and Measurement of relation between the basic electrical parameters.**CO4:** Analyze and draw the characteristics of transformers and electrical machines.**CO5:** Analyze and draw the characteristics of electrical machines.**List of experiments / demonstrations:**

1. Verification of Ohms Law.
2. Verification of KVL and KCL.
3. Transient Response of Series RL and RC circuits using DC excitation.

4. Transient Response of RLC Series circuit using DC excitation.
5. Resonance in series RLC circuit.
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single – Phase Transformer.
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation).
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star).
10. Measurement of Active and Reactive Power in a balanced Three – phase circuit.
11. Performance Characteristics of a Separately / Self Excited DC Shunt / Compound Motor.
12. Torque – Speed Characteristics of a Separately / Self Excited DC Shunt / Compound Motor.
13. Performance Characteristics of a Three – phase Induction Motor.
14. Torque – Speed Characteristics of a Three – phase Induction Motor.
15. No – Load Characteristics of a Three – phase Alternator.

Design Thinking and Sustainable Development (Common to all branches)

Course Code: KG21SD109

L	T	P	C
1	0	2	2

B.Tech. I Year I-Semester

Prerequisites: No Prerequisites**Course Outcomes:** After completion of this course, the students will be able to**CO1:** Comprehend the role of engineering in the society**CO2:** Develop a sense of meaning for the role engineers need to play in sustainable development (Engineering for Sustainable Development)**CO3:** Demonstrate informed design knowledge and practices a (Human-Centered Design)**Course Content:**

1. Case studies on major advancements in history contributed by engineering
2. Introductions to United Nations Sustainable Development Goals (SDG's) (selected) and NAE Grand Challenges
3. Introduction to Human-Centered Design
4. Problem Analysis and Proof of Concept for close or semi-structured problems aligned to SDG

Assessment**Course grading breakdown**

Deliverable	Percentage
Case Study Discussion	20%
UN SDG/NAE Grand Challenges Lead Discussion	25%
Design Report	30%
Reflection write-ups	15%
Engagement and Participation	10%

Course Structure

Week 1 - 4	Case studies on major advancements in history contributed by engineering
Week 5 - 8	Introductions to United Nations Sustainable Development Goals (SDG's) (selected) and NAE Grand Grant Challenges
Week 9 - 12	Introduction to Human-Centered Design
Week 13 - 16	Problem Analysis and Proof of Concept for close or semi-structured problems aligned to SDG

Mathematics - II
(Common to all branches)

Course Code: KG21MA201

L	T	P	C
3	1	0	4

B. Tech. I Year II-Semester

Prerequisites: No Prerequisite**Course Objectives:** The course will help students to learn

1. Concepts of Laplace transforms and solution of ordinary differential equations using Laplace transform techniques.
2. Concepts of maxima and minima of function of two or more variables using partial differentiation.
3. Evaluation of multiple integrals and their applications.
4. The physical quantities involved in engineering field related to vector valued functions.
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals.

Course Outcomes: After completion of this course, the students will be able to**CO1:** Apply the Laplace transforms techniques for solving ODE's**CO2:** Find the extreme values of functions of two variables with/ without constraints.**CO3:** Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped.**CO4:** Apply the concepts of gradient, divergence and curl to formulate engineering problems.**CO5:** Evaluate the line, surface and volume integrals and converting them from one to another

UNIT-I: Laplace Transforms

Laplace Transforms; Laplace Transform of standard functions; first shifting theorem; Laplace transforms of functions when they are multiplied and divided by 't'. Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Special functions; Laplace transform of periodic functions.

Inverse Laplace transform by different methods, convolution theorem (without Proof), solving ODEs by Laplace Transform method.

UNIT-II: Multivariable calculus (Partial Differentiation and applications)

Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-III: Integral Calculus

Definition of Improper Integral: Beta and Gamma functions and their applications. Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelepiped).

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration

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

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
4. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

REFERENCES:

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Edition, Wiley India, 1984.
3. M. K. Jain, SRK Iyengar, R.K.Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.
4. N. P Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
5. Raman B. V, Higher Engineering Mathematics, Tata McGraw Hill, New Delhi, 11th Reprint, 2010

**Engineering Chemistry
(Common to CSE, ECE)**

Course Code: KG21CH202

L	T	P	C
3	0	0	3

B.Tech. I Year II-Semester

Prerequisites:

1. Knowledge of basic chemistry
2. Basic concepts of electro chemistry and polymers

Course Objectives: The course will help students

1. To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
2. To impart the knowledge of water, and its purifications methods are essential for the engineers and in industry.
3. To acquire the knowledge of electrochemistry, corrosion, and its industrial applications.
4. To acquire the skills on polymers and energy sources to apply them for various engineering fields.
5. To impart then knowledge of engineering materials and their aspects useful for understanding material chemistry.

Course Outcomes: Upon completion of this course, the students will be able to**CO1:** Apply the concept of water and understand the problem of water and its treatment.**CO2:** Summarize the concepts of electrochemistry, corrosion, and its applications.**CO3:** Implement the clear concepts on polymers and their applications in various engineering fields.**CO4:** Analyze to get clear concepts on energy sources and it's applications in various engineering fields.

CO5: Understand the concept of engineering materials and to design new materials for sustainable construction.

UNIT - I: Water and its treatment:

Introduction – hardness of water – Causes of hardness. Types of hardness: temporary and permanent. Expression and units of hardness. Numerical problems on the hardness of water. Estimation of hardness of water by the complex metric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler troubles - Scale, Sludge, Priming, Foaming, and Caustic embrittlement. Treatment of boiler feed water by Calgon conditioning, Phosphate conditioning, and Colloidal conditioning. External treatment of water- Ion exchange process. Desalination of water – Reverse osmosis.

Unit - II: Electrochemistry and corrosion:

Electrochemistry: Electrochemical cells – Cell, Electrode, electrode potential, standard electrode potential, Nernst equation-derivation and significance-numerical problems on Nernst equation, Electrochemical series and its applications. Standard hydrogen electrode, Construction and functioning of Calomel, Quinhydrone and glass electrode. Batteries – Primary (Lithium cell) and secondary batteries (Lead-acid storage battery and Lithium-ion battery).

Corrosion: Causes and effects of corrosion – Theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion. Galvanic corrosion, Concentration cell corrosion- water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anodic protection and impressed current cathodic methods. Surface coatings – metallic coatings –Methods of coating- Hot dipping (Galvanizing and Thinning) cementation, electroplating on Nickel/Copper electroless plating.

Unit – III: Polymeric materials:

Polymers: Definition, Monomer, functionality, and degree of polymerisation. Classification – Types of Polymerisation-Addition & Condensation – Mechanisms of free radical addition Polymerisation.

Plastics: Definition, characteristics- Compounding and fabrication- Methods of Moulding- Thermoplastics and Thermosets– Preparation, properties and applications– PVC, Teflon and Bakelite.

Fibers: Definition, Characteristics, Preparation, Properties and applications of Terylene, Nylon 6,6.

Elastomers: Definition and characteristics. Natural rubber- structure, processing of latex, Vulcanisation. Preparation, properties and applications of BuNa-S and Butyl rubber. Conducting Polymers- Definition, Classification. Mechanism of conduction in Polyacetylene. Biodegradable polymers- Concept, Applications and advantages of biodegradable polymers.

Unit – IV: Energy sources:

Fuels: Definition, classification with examples. Calorific value. Characteristics of good fuel.

Coal: Types- Analysis of coal- proximate analysis.

Petroleum- Refining- Fractional distillation- composition, properties and uses of petrol, diesel and kerosene. Cracking-types, moving bed catalytic cracking. Knocking- Octane and Cetane rating, Composition, characteristics and uses of LPG, CNG.

Biodiesel- Transesterification, Advantages of Hydrogen fuel- production, storage, advantages and limitations. Introduction to Solar energy.

Unit - V: Engineering Materials:

Portland cement: Composition and constituents. Setting and hardening of cement, special cement- properties and uses of High alumina cement, White cement and waterproof cement. RCC, Decay of Concrete.

Refractories: Classification, Properties-Refractoriness, RUL, Chemical inertness and porosity. Characteristics of a good refractory. Engineering applications. Failure of a refractory.

Lubricants: Classification- Mechanism of Lubrication, Properties- Viscosity, Acid value, Flash & Fire point, Cloud & Pourpoint. Introduction to nanomaterials and their applications.

Text Book:

1. Engineering Chemistry – PC Jain and M Jain – Dhanpath Rai and Sons, New Delhi.
2. A Text book of Engineering Chemistry-S.S. Dara and S.S. Umare.
3. A Text book of Engineering Chemistry-Dr. Sunita Rattan.

Reference Books:

1. Text book of Engineering Chemistry by Ramadevi, VenktaRamana Reddy & Prshanth Rath, Cengage learning publications.
2. A text book of Engineering Chemistry by Thirumala Chary, Laxminarayana, Shashikala. Pearson Publications.
3. Engineering Chemistry by Shashi Chawla, Dhanpatrai & Company (P) Ltd. Delhi (2011).
4. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015).
5. Text book of Engineering Chemistry by Bharathi Kumari Yalamanchili, VGS Techno Series.

PYTHON PROGRAMMING
(Common to CSE, ECE, CSE(AI&ML), CSE(DS))

Course Code: KG21CS203

L	T	P	C
3	1	0	4

D.Tech. I Year II-Semester

Prerequisites: Fundamentals of Basic Mathematics.**Course Objectives:** The course will help students to learn

1. Implement the basic concepts of Python constructs to solve basic computational problems and regular expressions for searching patterns in strings.
2. Handle Functions and Files in Python.
3. Implement Object Oriented Programming concepts in Python.
4. Build Database Programming in Python.
5. Implement the applications related to Databases in Python.

Course Outcomes: After completion of this course, the students will be able to**CO1:** Demonstrate the basic concepts of Python and write the standard programs using Python**CO2:** Apply the concepts of Python constructs, sequences, sets dictionaries and strings to solve basic computational problems and regular expressions for searching patterns in strings.**CO3:** Demonstrate the Proficiency in handling Functions and File Systems in Python.**CO4:** Design applications using object-oriented programming features and perform the Exception Handling.**CO5:** Implement the applications related to Database in Python.

UNIT – I: Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules

Sequences - Strings, Lists, and Tuples, Mapping and Set Types, Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding,

UNIT - II FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

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

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

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

Text Books:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
2. R. Nageswara Rao, "Core Python Programming", Dreamtech Press, 2nd Edition, 2018.
3. [Martin C. Brown](#), "Python: The Complete Reference", McGraw Hill Education, 2018

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
4. Learning Python, Mark Lutz, O'Really.
5. Liang Y.Daniel, "Introduction to Programming using Python", Pearson Education, 1st Edition, 2017

**Engineering Graphics
(Common to CSE, ECE)**

Course Code: KG21ME204

L	T	P	C
1	0	4	3

B.Tech. I Year II-Semester

Prerequisites: No Prerequisites**Course Objectives:** The course will help students to

1. Understand basic concepts in engineering drawing.
2. Adequate knowledge about standard principles of orthographic projection of objects.
3. Construct the sectional views and pictorial views of solids.
4. Make use of the principles of orthographic and isometric projections
5. Discover sectional views and pictorial views of solids

Course Outcomes: Upon completion of this course, the students will be able to**CO1:** Summarize the basic concepts in engineering drawing**CO2:** Apply standard principles of orthographic projection of objects**CO3:** Imagine the sectional views and pictorial views of solids.**CO4:** Invent the principles of orthographic and isometric projections**CO5:** Draw the sectional views and pictorial views of solids.**UNIT-I: Introduction to Engineering Drawing**

Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloids and Hypocycloid, Scales– Plain & Diagonal.

UNIT –II: Orthographic Projections

Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes.

UNIT –III: Projections of Regular Solids

Auxiliary Views - Sections or Sectional views of Right Regular Solids –Prism,

Cylinder, Pyramid, Cone – Auxiliary views– Sections of Sphere.

UNIT-IV: Development of Surfaces of Right Regular Solids

Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of- Prism vs Prism-Cylinder Vs Cylinder.

UNIT- V:

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non-Isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa–Conventions.

Introduction to Computer Aided Drafting (Elementary)

Introduction, Computer screen, layout of the software, standard toolbar/menus and description of most commonly used toolbars, navigational tools .Co-ordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment Selection of drawing size and scale, Commands and creation of Lines, Co- ordinate points, axes, poly- lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off- set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, material conventions and lettering.

Text Books:

1. Engineering Drawing N.D.Bhatt and /Charotar
2. Engineering Drawing /N.S.Parthasarathy and VelaMurali/Oxford
3. Engineering Graphics” by K R GopalKrishna

Reference Books:

1. Engineering Drawing/Basant Agrawal and McAgrawal/McGrawHill
2. Engineering Drawing / M. B.Shah, B.C. Rane/ Pearson.
3. Computer Aided Engineering Drawing–K Balaveera Reddy etal–CBS Publishers
4. Technical Drawing with Engineering Graphics by Frederick E Giesecke and Ivan Hill
5. A Textbook of Engineering Drawing by R K Dhawan

ENGLISH
(Common to ECE & CSE)

Course Code: KG21EN205

L T P C

2 0 0 2

B.Tech. I Year II-Semester

Prerequisites:

1. Basic knowledge of English Language.
2. Sentence formation.
3. Vocabulary (knowledge of words).
4. Understanding the given Text.
5. Answering comprehension questions.
6. Correct use of Grammar.

Course Objectives: The course will help students to

1. Develop their study skills and communication skills in formal and informal Situations.
2. Improve their technical writing proficiency by understanding the nuances of writing.
3. Improve their language proficiency, with emphasis on Vocabulary, Grammar, Reading and Writing skills.
4. Instill in them the values of good manners.
5. Equip them to study their academic and non academic subjects more effectively, using theoretical and practical components of the English syllabus.

Course Outcomes: Upon completion of this course, the students will be able to**CO1:** Utilize the basic structure of English Language to speak & write correctly.**CO2:** Comprehend the given text and respond appropriately.**CO3:** Articulate in English focusing on LSRW Skills.

CO4: Reflect in English Language effectively in formal & informal situations.

CO5: Communicate confidently in various contexts and different cultures.

UNIT – I: The Raman Effect’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes.

Grammar: Parts of speech- Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading- Cultivate the habit of reading news paper.

Basic Writing Skills: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely.

Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT –II: ‘Ancient Architecture in India’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement - Tenses.

Reading: Improving Comprehension Skills – Techniques for Good Comprehension-News Paper reading

Writing: Difference between Formal & Informal Writing-Format of a Formal Letter-Writing Formal Letters E.g., Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT –III: ‘Blue Jeans’ from the prescribed textbook ‘English for Engineers’ published by Cambridge University Press.

Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses-Active & Passive Voice.

Reading: Sub-skills of Reading- Skimming and Scanning.

Writing: Nature and Style of Sensible Writing- Defining- Describing Objects, Places and Events – Classifying- Providing Examples or Evidence

UNIT –IV: 'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Standard Abbreviations in English

Grammar: Redundancies and Clichés in Oral and Written Communication.

Reading: Comprehension- Intensive Reading and Extensive Reading.

Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

UNIT –V: 'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Technical Vocabulary and their usage branch-wise.

Grammar: Common Errors in English.

Reading: Reading Comprehension (Code-mixing & Code-switching) -Exercises for Practice.

Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats-Structure of Reports (Manuscript Format) - Types of Reports - Writing a Report.

Prescribed Text Books:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.
2. Wren & Martin, Basic English Grammar, First Edition 1935, British India, Pages376, S. Chand Publications.

References:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007).Remedial English Grammar. Macmillan.

4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I -III. CIEFL, Hyderabad. Oxford University Press.

**Engineering Chemistry Lab
(Common to CSE, ECE)**

Course Code: KG21CH206

L	T	P	C
0	0	2	1

B.Tech. I Year II-Semester

Prerequisites:

1. Basic knowledge of volumetric titrations.

Course Objectives: The course will help students

1. To estimate the hardness of water and ferrous ion by volumetric titration method.
2. To determine the strength of acid and base by conductometric titration method.
3. To determine the strength of acids, bases and ferrous ion by potentiometric titration method.
4. To synthesize the polymer and Nano materials.
5. The measurement of physical properties like acid value, viscosity and saponification.

Course Outcomes: Upon completion of this course, the students will be able to**CO1:** Estimate the hardness of water and ferrous ion by volumetric titration method.**CO2:** Calculate the strength of acid and base by conductometric method.**CO3:** Evaluate the concentration of acids, bases and ferrous ion by potentiometric method.**CO4:** Execute the percentage yield of synthesized polymer and Nano materials.**CO5:** Determine the physical properties like acid value, viscosity and saponification of lubricant materials.**I: Volumetric analysis:**

1. Estimation of Hardness of water by EDTA Complexometry method

2. Estimation of Ferrous iron by Dichrometry method.
3. Estimation of Ferrous iron by Permanganometry method.

II: Conductometry:

1. Conductometric titration of strong acid Vs strong base.
2. Conductometric titration of weak acid Vs strong base.

III: Potentiometry:

1. Potentiometric titration of strong acid Vs strong base.
2. Potentiometric titration of Fe^{+2} with $\text{K}_2\text{Cr}_2\text{O}_7$ solution.

IV: Preparations:

1. Preparation of Bakelite.
2. Preparation Nylon.
3. Preparation of nano materials by co-precipitation method.

V: Lubricants:

1. Estimation of acid value of given lubricant oil.
2. Estimation Saponification value of a lubricant oil.
3. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.

Reference Books:

1. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
2. Laboratory Manual of Engineering Chemistry by Y. Bharathi Kumari & Jyotsna C, VGS Booklinks, Vijayawada, 2009.
3. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).
4. Engineering Chemistry Lab Manual by Cengage Publications.

ENGLISH LANGUAGE & COMMUNICATION SKILLS LAB
(Common to ECE & CSE)

Course Code: KG21EN207

L	T	P	C
0	0	2	1

B. Tech. I Year II-Semester

Prerequisites:

1. Basic knowledge of grammar.
2. Comprehension ability.
3. Basic conversation skills.

Course Objectives: The course will help students:

1. To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
2. To sensitize students the nuances of English speech sounds, word accent, intonation and rhythm.
3. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
4. To improve the fluency of students in spoken English and neutralize their mother tongue influence.
5. To train students to use language appropriately for public speaking and interviews.

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

- CO 1:** Acquire correct pronunciation to articulate clearly.
- CO 2:** Distinguish between formal and informal language in use.
- CO 3:** Express ideas clearly and confidently.
- CO 4:** Display confidence in Presentations with right body language.
- CO 5:** Enhance spoken and written skills for better Employability.

English Language and Communication Skills Lab (ELCS) shall have two parts:

- **Computer Assisted Language Learning (CALL) Lab**
- **Interactive Communication Skills (ICS) Lab**

Listening Skills

Objectives:

1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation.
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions.

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills

Objectives:

1. To involve students in speaking activities in various contexts.
 2. To enable students express themselves fluently and appropriately in social and professional contexts.
- Oral practice: Just A Minute (JAM) Sessions
 - Describing objects/situations/people
 - Role play – Individual/Group activities

Exercise I**CALL Lab:**

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others. Recorded Presentation on Self Introduction.

Exercise II**CALL Lab:**

Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

Practice: Situational Dialogues – Role-Play- Expressions in Various Situations – Making Requests and Seeking Permissions - Telephone Etiquette.

Accent Practice – Imitation of Native Speakers.

Exercise III**CALL Lab:**

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations.

Practice: Formal Presentations.

Fluency Test in Speech.

Exercise IV

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

Poster / Picture Presentation.

Exercise V

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Interview Skills. *Practice:* Mock Interviews.

Body Language Assessment.

PYTHON PROGRAMMING LAB
(Common to CSE, ECE, CSE(AI&ML), CSE(DS))

Course Code: KG21CS208

L	T	P	C
0	0	2	1

B. Tech. I Year II-Semester

Prerequisites: Fundamentals of Basic Mathematics.**Course Objectives:** The course will help students to

6. Handle Functions and Files in Python.
7. Implement Object Oriented Programming concepts in Python.
8. Build Database Programming in Python.
9. Implement the applications related to Databases in Python.

Course Outcomes: Upon completion of this course, the students will be able to

- CO1:** Demonstrate practical knowledge on basic concepts of Python.
- CO2:** Apply the concepts of regular expressions for searching patterns in strings.
- CO3:** Apply the knowledge of handling the Functions and file operations in Python.
- CO4:** Design applications using object-oriented programming features.
- CO5:** Design the applications related to Databases in Python.

Practice Sessions:

1. a) Write a python script to read two integer numbers and perform arithmetic operations.
 - b) Write a python script to evaluate following expressions by considering necessary inputs.

i) $ax^2 + bx + c$	ii) $ax^5 + bx^3 + c$	iii) $(ax + b) / (ax - b)$
iv) $x - a / b + c$		
2. a) Write a python script to convert a given decimal number into octal, hexadecimal and binary.

- b) Write a python script to read four integer values separated with commas and display the sum of those four numbers.
- c) Write a python script to print "KGR CET" with prefix of ten spaces by using format().
3. a) Write a python script to calculate electricity bill based on following slab rates.

Consumption units	Rate (in Rupees/Unit)
0-100	4
101-150	4.6
151-200	5.2
201-300	6.3
Above 300	8

(Hint: To get Consumption units take current meter reading and old meter reading from the user as input)

- b) Print the following pattern using python script.

```

          1
        1 2 1
      1 2 3 2 1
    1 2 3 4 3 2 1
  1 2 3 4 5 4 3 2 1

```

4. a) Write a python script to check whether the given number (N) can be expressed as Power of Two (2) or not. For example, 8 can be expressed as 2^3 .
- b) Write a python script to perform following sets operations.
- i) update () ii) discard() iii) issue perset()
- iv) isdisjoint() v) symmetric_difference ()
5. a) Given an integer tuple, for each element in the tuple check whether there exists a smaller element on the next immediate position of the tuple. If it exists print the smaller element. If there is no smaller element on the immediate next to the element then print -1.
 Example: Input: 4 2 1 5 3 Output: 2 1 -1 3 -1

- b) Write a Python program to print the number of times the string "KGR CET" can be formed for the given input string.
Example: Input: acdfksekfevskdjfs Output: 1
6. a) Write a python script to read details of N students – name, roll number, branch and age. Sort the student details based on their names and display.
- b) Write a python script to delete duplicate strings from a list of strings. (Insertion order should be maintained after deleting duplicate string).
- c) Write a python script to read details of N students into nested list and convert it into a nested dictionary.
7. a) Design a function that can perform sum of two or three or four numbers.
- b) Write a python script to implement Towers of Hanoi problem.
- c) Write a python script to print the numbers that do not appear in the Fibonacci series of n numbers where n is given by the user.
(Hint: If n is 8 then up to 8 Fibonacci numbers has to be printed)
Ex: 1 1 2 3 5 8 13 21 and in this series missing numbers should be traced and printed,
Ex: missing numbers are: 4 6 7 9 10 11 12 14 15 16 17 18 19.
8. a) Write a python script to create a regular expression to extract all words with 5 characters length from a given string.
- b) Write a python script to create a regular expression to extract the phone number from a given text.
9. a) Write a python script to copy the content of one file into another file.
- b) Write a python script to read all the strings from the text file and display them.
10. a) Write a Python program for the following problem: Create a base class Basic_Info with data members name, rollno, gender and two member functions getdata() and display(). Derive a class Physical_Fit from Basic_Info which has data members height and weight and member functions getdata() and display(). Display all the information using object of derived class.

b) Define a class REPORT with the following specification:

Private members:

Adno: 4-digit admission number

Name: 20 characters

Marks: A list of 5 floating point values

Average: average marks obtained

GETAVG() a function to compute the average obtained in five subjects.

Public members:

READINFO() function to accept values for admno, name, marks. Invoke the function GETAVG().

DISPLAYINFO() function to display all data members of report on the screen.

You should give function definitions. Write driver code to demonstrate all the functions.

11. a) Write a python script to handle following set of exceptions:

i) Arithmetic Error

ii) Import Error

iii) Index Error

iv) Key Error

b) Write a python script to throw a user defined exception called Negative, if the entered input is a negative number.

Reference Books:

1. R. Nageswara Rao, "Core Python Programming", Dreamtech Press, 2nd Edition, 2018.
2. Reema Thareja, "Python Programming using Problem Solving Approach", Oxford University Press, 1st Edition, 2017.
3. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India, 2016.

Additional Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc19_cs41/preview
2. <https://www.coursera.org/specializations/python>
3. <https://www.coursera.org/learn/python-for-applied-data-science-ai>

Innovation for Rural Development (Common to all branches)

Course Code: KG21SD209

L T P C

1 0 2 2

B.Tech. I Year II-Semester

Prerequisites: No Prerequisites**Course Outcomes:** Upon completion of this course, the students will be able to**CO1:** Engage with a community in a meaningful way and reflect on their livelihood (Community Engagement)**CO2:** Analyze the needs and assets to explore the possibilities of circular economy and sustainable development in rural villages**CO3:** Identify community-specific problems that could be addressed through technological solutions**CO4:** Reflect on the need to promote sustainable practices and rural economy for rural development**CO5:** Apply the engineering design process to ideate and develop a proof of concept to solve community-based problems**Course Content:**

1. Alignment of SDG's with Rural Development
2. Introduction to Service and Community-based problems
3. Asset and Need analysis for Circular Economy in Rural Villages (to support Grama Swayam Samridhi recommended by Palle Srujana)
4. Problem identification in partnered villages and formulation into design problems
5. Development of Proof of Concepts for community-based problems

Assessment**Course grading breakdown**

Deliverable	Percentage
GSS analysis report of assigned village	30%

Presentation and report of PoC for community-based problems	30%
Reflection 1 - Community immersion experience	15%
Reflection 2 - Engineering for Sustainable Development	15%
Engagement and Participation	10%

Course Structure

Week 1 - 2	Discussions on the alignment of SDG's with rural development
Week 3 - 6	Field visits to partner villages for rural immersion and interaction
Week 7 - 9	Analysis, evaluation, and presentations of GSS in partner villages
Week 9 - 12	Identification and formulation of community-based problems in partner villages
Week 13 - 15	Hackathons to develop Proof of Concept for community-based problems
Week 16	Project exposition on innovations for rural development