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VISION

Lords Institute of Engineering and Technology strives continuously for excellence in professional education through quality, innovation and team work and to emerge as a premier institute in the state and across the nation.

MISSION

- To impart quality professional education that meets the needs of present and emerging technological world.
- To strive for student achievement and success, preparing them for life, career and leadership.
- To provide scholarly & vibrant learning that enables faculty, staff and studentsto achieve personal and professional growth.
- To contribute to the advancement of knowledge in both fundamental and applied areas of Engineering & Technology.
- To forge mutually beneficial relationships with Government Organizations, Industries, Society and the Alumni.

QUALITY POLICY

LORDS INSTITUTE OF ENGINEERING AND TECHNOLOGY imparts quality education by practicing a system of quality assurance that enables continued improvement in the teaching-learning practices and enhances student skills and talents.

About the College:

Lords Institute of Engineering and Technology (Autonomous), Hyderabad was established in 2003 by Lords Educational Society (LES) and affiliated to Osmania University, Hyderabad. The institution is considered to be among the Top Muslim Minority Engineering Colleges in the Country with the below credentials:

- It is the only Muslim Minority Engineering Institution in the Telugu states (Telangana and Andhra Pradesh) which is conferred with autonomous status by the *University Grants Commission (UGC)*, New Delhi and granted autonomy by *Osmania University*, Hyderabad, for all the programs for a period of 10 years with effect from Academic Year 2021-22.
- It is the only Muslim Minority Institution in the state accredited by the *National Board of Accreditation (NBA)* in March 2020, February 2018 and 2012 for all the eligible B.E. Programmes.
- It is also the only Muslim Minority Engineering Institution accredited by the *National Assessment and Accreditation Council (NAAC)* with a CGPA of 3.02 on a four scale at 'A' grade valid for five years till 2026.
- Civil Engineering Laboratories are accredited by *National Accreditation Board for Testing and Calibration Laboratories (NABL)* valid for three years till 2024 for offering Industrial Consultancy services.
- *GHMC* has extended its contract with the Institution for the fourth consecutive year as third party quality control agency as well as consultancy services.
- Recognized as 'Host Institution' for Technology Business Incubator (TBI) by
- *Ministry of Micro, Small and Medium Enterprises (MSME)*, Government of India.
- Recognized by the Ministry of Education Innovation Council in *Atal Ranking ofInstitutions on Innovation Achievement* (ARIIA 2022) as band "PERFORMER"
- Selected by Ministry of Education, Government of India to adopt five villagesunder the scheme *Unnat Bharat Abhiyan (UBA)* in association with IIT Delhi.
- All India Council for Technical Education (AICTE) has granted the funds under the schemes for Promoting Interests, Creativity & Ethics among Students (SPICES)and AICTE Training and Learning (ATAL).
- Lords International Centre got recognized as Nodal Centre for International English Language Testing System (IELTS) by IDP Australia.
- Signed Memorandum of Understanding (MOU) with Lincoln University College,Malaysia for research collaboration, Ph. D and Post-Doc opportunities.
- Alumni got featured in Forbes 30 under 30 Asia and India categories.
- Student won Medals and Prizes in Sports at State and National level.
- Highest intake in B.E. courses among all the Muslim Minority Institutions.

From humble beginning in 2003 with an intake of 180 students in CSE, EEE and ECE, now the intake has increased to 1080 in 2021. In Under Graduate B.E. Programmes viz., Artificial Intelligence and Machine Learning (AI & ML), Civil Engineering (CE), Electronics and Communication Engineering (ECE), Electrical and Electronics Engineering (EEE), Mechanical Engineering (ME), Information Technology (IT), Computer Science and Engineering (CSE), CSE (Artificial Intelligence and Machine Learning) & CSE (Data Science); In Post Graduate M.E. / M.Tech Programmes we have total intake of 210 in Computer Science and Engineering, Structural Engineering, Construction Management and MBA. At present, about 3000+ students are pursuing various programs including B.E., M.E., M.Tech and MBA. The student body is having representation from different states of India and about 15+ Nationalities. In the past 19 years, over 9000+ students have graduated from the college and are well settled in their respective careers.

Our efforts have been acknowledged by the Industry and various Ranking Agencies. The Institution is ranked 109th across India, 66th in South India and 18th in Hyderabad among all the Private Engineering Colleges by 'The Week Magazine' in August 2022 edition. 'Times of India', has also awarded us 21st rank among top 25 Private Engineering Colleges in Telangana and 176th rank in all India in July 2021 edition. In addition to this media houses such as 'Outlook' ranked 8th in Hyderabad & 112th in India in 2019 edition, 'Dataquest', 'Lokmat', 'Competition Success Review', have also ranked us among Best Engineering Colleges of Hyderabad in past.

The institution hosts one of the biggest libraries in twin cities of Telangana with seating capacity of more than 400 students, Total volumes of 48305 and Total Titles 16745, E-Journals 25900 and Print Journals 135. Computer Centre is used by Government Agencies and Top Corporate Companies to conduct various competitive exams and entrance tests such as IIT-JEE, NEET, GATE, TS-EAMCET, TS-ECET, TS-ICET, TS-PGECET, APPSC, Bank POs, RRB, CAT, etc.

Multimedia Studio was established during the pandemic situation to help students with video lectures by faculty members for those facing problems in accessing the online live classes. Repository is maintained across all digital platforms including official YouTube channel and social media. Students have developed gadgets to tackle COVID-19 such as Drone Sanitizer, Mist sterilizer, Currency Disinfectant, Low-Cost Oxygen Concentrator which got national recognition and companies like Eureka Forbes signed Non-Disclosure Agreement for Technology Transfer. Faculty awarded with Patent Grant after successful hearing by the Patent Authority, Government of India.

GOVERNING BODY:

S.No.	Name	Designation	Category
1.	Mr. CA Basha Mohiuddin	Chairman, Lords Educational Society	Chairman
2.	Mrs. Rizwana Begum	Secretary, Lords Educational Society	Member
3.	Mr. Syed Touseef Ahmed	Vice Chairman, Lords Educational Society	Member
4.	Mr. CA Syed Tanvir Ahmed	Treasurer, Lords Educational Society	Member
5.	Mrs. Sana Syeeda	Joint Secretary, Lords Educational Society	Member
6.	Prof. Narsimhulu Sanke	Professor of Mechanical Engineering, Osmania University, Hyderabad	Member –University Nominee
7.	Mr. G. Giri Babu	Deputy Director (Tech-1), Commissionerate of Technical Education (CTE), Government of Telangana	Member – State Government Nominee
8.	Dr. R. N. Yadav	Professor of ECE, Moulana Azad National Institute of Technology, Bhopal	Member – UGC Nominee
9.	Dr. Shakeel Ahmed	Joint Secretary, UGC	Member – Eminent Educationist
10.	Dr. T. K. Shaik Shavali	Professor of CSE, LIET	Member –Teacher
11.	Dr. Syed Nawazish Mehdi	Professor of Mechanical Engineering, LIET	Member –Teacher
12.	Dr. C. Venkata Narasimhulu	Principal (Ex-Officio)	Member Secretary

LORDS INSTITUTE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous Institution)

ACADEMIC REGULATIONS

For the Four-Year Degree Programme in Engineering

(With effect from the Academic Year 2022-23)

I. Preliminary Definitions and Nomenclature

S. No	Keywords	Definition
1.	Academic Year	Two consecutive (one odd & one even) semesters constitute one Academic year.
2.	Choice Based Credit System (CBCS)	The CBCS provides choice for students to select from the prescribed Courses (Core, Professional, Open Electives and Skill Development Courses).
3	Programme	An Educational Programme leading to the Award of a Degree.
4.	Semester	Each Semester consists of 16 weeks of Academic work equivalent to 90 actual teaching days. In general, the odd semester is scheduled from July to December and even semester from January to June.
5.	Discipline	It is the branch or specialization of B.E. Degree program, such as AI&ML, CE, CSE, CSE (AI&ML), CSE (DS),ECE, EEE, IT & ME
6	Admission Procedure	As Prescribed AICTE and Government of by Telangana, India.
7	Course	Usually referred to, as "papers/ subjects" is a component of program. All courses need not carry the same weight. The courses should define learning objectives and learning outcomes. A course may be designed comprising of Lectures/Tutorial/Practical/ Laboratory work/ Mini Project/ Project Work /Seminars /Exams/ Viva/ Assignments /Presentations/ Internship/ Skill Development Activity etc. or a combination of some of these. The medium of instruction, examinations and project report will be in English.
8.	Credit Based Semester System (CBSS)	Under the CBSS, the requirement for awarding a degree certificate is prescribed in terms of number of credits to be obtained by the student- A unit by which the course work is measured. It determines the number of hours of instructions required per week as per AICTE Model Curriculum i.e., one credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of Practical work/ Field work per week.
9.	Grading	To be normally done using Letter Grades as qualitative measure of achievement in each Course like: S (Outstanding), A (Excellent), B (Very Good), C (Good), D(Average), E (Pass) and F (Fail) based on the marks (%) scored in (CIE+SEE) of the course and converted to grade by relative / absolute grading.

10.	Grade Point (GP)	It is a numerical weight allotted to each letter grade on a 10-point scale.
11.	Credit Point	It is the product of grade point and number of credits for a course.
12.	Semester Grade Point Average (SGPA)	It is a measure of performance of work done in a semester. It is the ratio of total credit points secured by a student in various theory and lab courses / field works / projects / skill development courses offered in that particular semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.
13.	Cumulative Grade Point Average (CGPA)	It is a measure of overall cumulative performance, of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses that are evaluated till that semester and the sum of the total credits of all courses in all the semesters that have been evaluated till that semester of the program. It is expressed up to two decimal places.
14.	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, credits & grade secured) along with SGPA of that semester and CGPA earned till that semester.
15.	Course Load	Every student should register for a set of courses in each semester, with the total number of credits specified by considering the permissible weekly contact hours.
16.	Course Registration	Every student to formally register in each Semester for courses (credits) on the advice of the faculty.
17.	Course Evaluation	Continuous Internal Evaluation (CIE) & Semester End Examination (SEE) constitutes the main assessment prescribed for each course in the Semester.
18.	Continuous Internal Evaluation (CIE)	To be normally conducted by the course instructor which includes descriptive test, surprise test / quizzes / MCQ's / fill in the blanks / assignments / field work / exclusive talk /real time project / mini- projects & seminars, group discussions, any other activity specified by respective teacher either weekly or during mid-term and anytime throughout the semester, with weightage for the different components being fixed at the institutional level.
19.	Semester End Examination (SEE)	To be normally conducted at the institutional level, this will cover the entire course syllabi. The syllabi are to be modularized and SEE questions to be set from each unit/module, with choice if any, to be confined to unit/module concerned only. The questions are to be based on knowledge, comprehension, analysis, synthesis and evaluation as per Blooms taxonomy.

20.	Revision of Regulations, Curriculum and Syllabi	The institution from time to time may revise, amend or change the regulations, scheme of examinations, curriculum and syllabi with the approval of the Academic Council and Board of Studies.
21.	Student	Student is a candidate who has taken admission into undergraduate program of this college, as per the guidelines stipulated from time to time by AICTE, Government of Telangana and the Affiliating university, i.e. Osmania University, Hyderabad, India.

II. Admission Procedure:

A candidate is admitted into the four-year undergraduate degree programme of Bachelor of Engineering (B.E.) for all the branches of study as per the norms prescribed by AICTE, Telangana State Council of Higher Education (TSCHE), Government of Telangana, from time to time.

Each candidate will be allotted one programme at the time of admission, strictly depending on the merit secured at the Entrance Examination and subject to the prevalent rules regarding reservations of seats.

Eligibility: Candidate must have passed the Intermediate or equivalent examination with Physics, Mathematics, Chemistry, Computer Science, Electronics, Information Technology, Biology, Informatics Practices, Biotechnology, Technical Vocational subject, Agriculture, Engineering Graphics, Business Studies, Entrepreneurship (any of the three). Obtain at least 45% marks (40% marks in case of candidates belonging to reserved category) in the above subjects taken together as per guidelines of AICTE and relaxations given by Telangana Government from time to time if any.

i. 70% of seats under Category-A (based on the rank obtained at state level entrance examination i.e. TS-EAMCET) will be filled by the Convener, TS- EAMCET.

ii. 30% of seats under Category-B will be filled by the management as per the guidelines issued through government orders from time to time by the TSCHE, Government of Telangana. Out of 30%, 5% seats are allotted for NRI quota.

iii. In addition to i & ii, there is a supernumerary quota of maximum 10 seats under the Prime Minister's Special Scholarship Scheme (PMSSS) for students of Union Territories including Jammu & Kashmir and Ladakh as well as 15% for Overseas Citizen of India (OCI), Foreign Nationals (FN), Children of Indian Workers in Gulf Countries as approved by AICTE from time to time.

iv. All the leftover seats in convener quota are filled based on the guidelines given by the Convener, TS-EAMCET through spot admission procedure.

v. **Admission to the second year of B.E. (Lateral Entry) Program:**
Students seeking admission into this category shall qualify TS-ECET conducted by the TSCHE, Government of Telangana. Admissions are on the basis of merit ranks obtained by the students.
Eligibility: Candidate must have passed minimum 3 years Diploma examination with at least 45% marks (40% marks in case of candidates belonging to reserved category) and relaxations given by Telangana Government from time to time if any.

vi. **Spot Admission Procedure for B.E. Lateral Entry:**

Any seats left vacant after counselling by TS-ECET convener will be filled based on the guidelines given by the Convener, TS-ECET. In addition to this the vacancies in the First Year shall also be filled through spot admission procedure as per guidelines of TSCHE, Government of Telangana.

III. Programme Structure, Programme of Study and Duration:

(i)   Structure of Undergraduate Engineering program:

S.No	Classification		Course Work – Subject Area
	AICTE	**UGC**	
1.	HSMC	Foundation Courses	Humanities and Social Sciences including English, Communication Skills, Technical Report Writing, Economics & Finance, Accountancy and other Management Courses.
2.	BSC		Basic Sciences Courses (BSC) including Mathematics, Physics and Chemistry as well as Aptitude & Reasoning
3.	ESC		Engineering Science Courses (ESC) including Engineering Workshop, Engineering Graphics, Basics of Electrical / Electronics / Mechanical / Civil / Computer Engineering and Skill Development such as programming languages, simulation tools, etc.
4.	PCC	Core Courses	Professional Core Courses are relevant to the chosen specialization / branch.
5.	PEC	Professional Electives	Professional Elective Courses are relevant to the chosen specialization / branch.
6.	OEC	Open Electives	Open Electives Courses are from other technical or emerging subject areas.
7.	PROJ	Project	Mini Project, Project work, internship, comprehensive viva-Voce, and Technical Seminar.
8.	MC	Mandatory Courses	These courses are non-credit courses with Internal and External evaluation.
9.	BC	Bridge Course	These courses are non-credit courses with internal evaluation and for lateral entry students only.
10.	SDC	Skill Development Courses	Skill Development Courses are from emerging subject areas.

(ii)   Programs Offered:

The following programs of study are offered by Lords Institute of Engineering and Technology (Autonomous) for academic year 2022-23:

S.No.	Branch Code	Bachelor of Engineering	Number of Seats
1.	732	Civil Engineering	90
2.	733	Computer Science and Engineering	180
3.	734	Electrical & Electronics Engineering	30
4.	735	Electronics & Communication Engineering	120
5.	736	Mechanical Engineering	60
6.	737	Information Technology	180
7.	748	Computer Science and Engineering (Artificial Intelligence & Machine Learning)	180
8.	750	Computer Science and Engineering (Data Science)	180
9.	729	Artificial Intelligence and Machine Learning	60
		Total Intake:	**1080**

(iii)   Duration of study:

1. The duration of the programme is eight semesters in four years denoted as I, II,III, IV, V, VI, VII and VIII semesters, where each academic year comprises of two semesters:
   - Instruction per semester - 16 weeks.
   - Preparation holidays (includes practical exams) - 2 weeks
   - Each semester shall normally consist of 90 teaching days (including examination days). The BoS Chair / Head of the Department shall ensure that every faculty imparts instruction as per the number of hours specified in the syllabus covering the full content of the syllabus for the Course being taught
   - The number of weeks for each semester may be changed based on approval by Academic Council and Governing Body.
   - No admission / re-admission / promotion / transfer are entertained after four weeks of the commencement of instruction.
   - In case there are any court cases consequent to which the authorities are compelled to admit any candidate after the announced last date of admissions, the admission (seat) of such student would be reserved for the subsequent year on a supernumerary basis.
   - No refund of Tuition fee will be made after the commencement of instruction for students who wish to cancel their admission.

2. Candidate, who fails to fulfill all the requirements for the award of the degree as specified here in after within (N+4) academic years from the time of admission, will forfeit his / her seat in the programme and his / her admission will stand cancelled; where 'N' is normal or minimum duration prescribed for completion of the programme (4 years).

3. Diploma candidates admitted to the second year under lateral entry scheme shall fulfill all the requirements for the award of the degree as specified herein after within (N+3) academic years from the time of admission failing which they will forfeit their seat and their admission will stand cancelled, where 'N' is normal or minimum duration prescribed for completion of the programme (3years).

4. Lateral entry students shall also complete the bridge courses as required. The scheme and other guidelines will be intimated to the students from time to time.

IV. Registration of Courses

1. Every admitted student shall be assigned to a faculty advisor who shall guide and counsel the student about the details of the academic program, rules and regulations and the choice of courses wherever applicable considering student's academic background and career objectives.

2. Each student admitted should register for all courses prescribed in particular semester of study.

3. Every student shall confirm their enrollment for the courses of the succeeding semester at the end of the current semester. Those who fail to register can enroll at least one week before the commencement of concerned semester with valid reason. Registration of courses, such as professional and open electives by the students in each semester as prescribed by the department concerned shall be completed within the stipulated period on or before the due date. Change of professional electives and open electives will not be entertained after the due date.

4. No elective course shall be offered by department unless a minimum of **30%** students register for the course **in a division / class**. After registering for a course, student shall attend the classes, to satisfy the academic requirements for attending the semester end examinations.

V. Rules and Regulations of Attendance:

1. Candidates admitted to a particular programme of study are required to pursue a "Regular programme of study" by putting in attendance of not less than 75% in each semester before they are permitted to appear for the Semester End Examination.

2. a) In special cases and for sufficient cause shown, the Principal / Academic Council on recommendation of concerned Head of the Department may condone deficiency in attendance to the extent of 10% on medical grounds subject to submission of medical certificate and payment of Rs. 2000/- as condonation fee. Such condonation shall be availed for a maximum of 4 (four) times in the entire period of B. E. programme.

   b) However, in respect of women candidates who seek condonation of attendance due to pregnancy, the Principal / Academic Council on recommendation of concerned Head of the Department may condone the deficiency in attendance to the extent of 15% (as against 10% condonation for others) on medical grounds subject to submission of medical certificate to this effect. Such condonation is permitted only once during the programme of study.

3. Attendance of N.C.C. / N.S.S. Camps or Inter-Collegiate or Inter-University or Inter-State or International matches or debates or Educational Excursions or such other Inter-University activities as approved by the authorities involving journeys outside the city in which the college is situated will not be counted as absence.
   (i) However, absence shall not exceed four (4) weeks per semester of thetotal period of instructions.
   (ii) Such leave should be availed with prior permission from the Principaland not be availed more than twice during the programme of study.
   (iii) Without any prior permission, such leave shall be treated as absence.
   (iv) While calculating the attendance, the number of classes not attended in each subject will be deleted in the denominator.

4. The attendance shall be calculated on aggregate of the courses from date of commencement of classes or date of re-admission in case of detained candidates as per the almanac.

5. In case of the candidates who fail to put in the required attendance in a programme of study, candidate shall be detained in the same class and will not be permitted to appear for the Semester End Examination. Such candidates shall have to seek re-admission into the same class during the subsequent year in order to appear for examination after fulfilling the attendance requirements and on payment of the requisite tuition fee.

6. a) Candidates admitted to the first year through TS-EAMCET and who do not have the required attendance, but have more than 40% of attendance can seek re-admission without appearing for the entrance test again.

   b) In respect of candidates of such programs where the admissions are governed through TS-EAMCET, candidates of B.E. I semester, who got less than 40% attendance would lose their seat and they will have to seek admission afresh by appearing at the entrance test again.

VI. Scheme of Instructions and Examinations:

1. The Scheme of Instruction & Evaluation for various courses in each semester shall be provided by the College at the beginning of the Semester. Also, syllabi prescribed for the branch of study shall be as approved by the Board of Studies, Academic Council and ratified by the Governing Body.

2. The distribution of marks based on **Continuous Internal Evaluation (CIE)** and the **Semester End Examination (SEE)** for B.E. programme shall be as follows:

Subject	Continuous Internal Evaluation (CIE) Marks	Semester End Examination (SEE) Marks
Each Theory subject	40	60
Each Practical or Drawing Subject for which less than 5 hours a week is provided in the scheme of instruction.	25	50
Each Practical or Drawing Subject for which 5 or more hours a week is provided in the scheme of instruction.	50	50
Skill Development Course	25	50
Internship / Technical Report Writing / Technical Seminar	50	---
Comprehensive Viva-Voce	100	---
Mini Project	50	50
Major Project	50	150
Mandatory Course (Non-Credit)	40	60

3. THEORY COURSES

3.1 Continuous Internal Evaluation (CIE):

Out of 40 marks in total, 10 marks for Surprise Test / Quizzes / MCQ's / Fill in the Blanks/Any other activity specified by respective teacher and 10 marks for Real Time Project / Field Work / Exclusive Talk / Assignment / Any other activity specified by teacher. Descriptive test will be of 20 marks, out of which 6 marks are for short answer questions (a-c) each carrying 2 marks and 14 marks are for choice based long answer questions. Average of two descriptive tests and average of minimum two Surprise Test / Quizzes / MCQ's / Fill in the Blanks (10 marks) and average of minimum two Assignments / Real Time Project / Field Work / Exclusive Talk / (10 marks) will be calculated for the total CIE (40 marks). Bloom's Taxonomy will be followed in the question paper setting.

Distribution of Continuous Internal Examination Marks					
Type	Questions	Duration in minutes	No. of Questions	Marks per Question	Total (Marks)
Descriptive	Short Answer Questions (First Question is compulsory)	60	1	6	6
	Long Answer Questions (2 out of 3)		2	7	14
Surprise Test / Quizzes / MCQ's / Fill in the Blanks / Any other activity specified by Respective Teacher					10
Real Time Project / Field Work / Exclusive Talk / Assignment /Any other activity specified by Respective Teacher					10
Grand Total					40

Semester End Exam (SEE):

1. The Semester End Examination will be conducted for 60 marks, duration of three hours. The question paper for SEE will have seven (7) questions out of which the candidate has to answer five (5) questions where each question carries12 marks.
2. The first question is compulsory which consists of six (6) short questions covering the entire syllabus and each question (a-f) carries 2 marks.
3. The remaining six questions (2-7) cover the entire syllabus and the candidate can answer any four questions.

Distribution of Continuous Internal Examination Marks					
Type	Questions	Duration in minutes	No. of Questions	Marks per Question	Total (Marks)
Descriptive	Short Answer Questions (First Question is compulsory)	180	1	12	12
	Long Answer Questions (4 out of 6)		4	12	48
Grand Total					60

4. PRACTICAL COURSES:
4.1. Continuous Internal Evaluation (CIE):

CIE shall be conducted for 25/50 marks out of which 15/30 marks for day- to-day performance including attendance, timely submission of lab observations & records, viva-voce, 10/20 marks for internal lab exam and viva-voce.

4.2 Semester End Examination (SEE):

SEE shall be conducted for 50 marks out of which 10 marks are allocated for write up (design / procedure / schematic diagram) of the given experiment, 20 marks for conduction of experiment, 10 marks for results and 10 marks for viva-voce with a duration of 3 hours.

The external examiner will be appointed by the Principal / Chief Controller of Exams of the college, from any outside college among the autonomous / reputed institutions from a panel of three examiners submitted by the concerned Head of the Department / BOS Chairperson.

5. INTERNSHIP

The student shall undergo four weeks internship during summer vacation after IV semester to gain practical experience in industrial environment, exposure to current technological developments and improve his / her Interpersonal Skills. It also provides opportunities to learn understand and sharpen real time technical / managerial skills required at the job; where the evaluation will be done in the V Semester.

Internship has to be done at Industry / Corporate Sector / Government / Non-Government / Research Institutions / MSMEs / Startups / Entrepreneurship Incubator Units, etc.

Internship will be evaluated for 50 marks as CIE based on Punctuality in Attendance (10), Maintenance of Diary on daily work done (20), seminar presentation / viva voce followed by a report submission (20) to a committee consisting of Head of the Department, Senior Faculty and Faculty Advisor/ Supervisor for evaluation.

6. MINI-PROJECT

There shall be a Mini Project, which the student shall carryout after the V semester examinations the evaluation of which shall be done in sixth semester for a maximum of 100 marks out of which 50 marks each for CIE and SEE respectively. Evaluation will be done as per the below criteria:

CIE Evaluation:

50 marks are evaluated based on below criteria:

i. Literature Review (10)

ii. Innovation / Originality (10)

iii. Methodology / Relevance / Practical Application (10)

iv. Seminar Presentation followed by report (20)

A committee consisting of Supervisor, Senior Faculty and Head of the Department shall review and evaluate the CIE based on the above criteria.

6.2 SEE Evaluation:

50 Marks are evaluated based on the below criteria:
a. Overall Subject Knowledge (15)
b. Viva-voce Examination (15)
c. Demonstration and Verification of Results (20)
However, the criteria may change as per the "committee" whenever required.

Student should appear for SEE with Mini-Project Report.
A 'committee' consisting of External Examiner, Supervisor and Head of the Department shall review and evaluate the SEE based on the above criteria.

7. MAJOR PROJECT

There shall be a Major Project, which the student shall carryout during the eighth semester. The evaluation shall be done for a maximum of 200 marks out of which 50 marks for CIE and 150 marks for SEE. Evaluation will be done as per the following criteria:

7.1. CIE Evaluation:

50 marks are evaluated based on below criteria:
i. Literature Review (10)
ii. Innovation / Originality (10)
iii. Methodology / Relevance / Practical Application (10)
iv. Seminar Presentation followed by report (20)

A committee consisting of Supervisor, Senior Faculty and Head of the Department shall review and evaluate the CIE based on the above criteria.

7.2. SEE Evaluation:

150 Marks are evaluated based on below criteria:
a. Overall Subject Knowledge (40)
b. Viva-voce Examination (40)
c. Demonstration and Verification of Results (70)

However, the criteria may change as per the 'committee' whenever required. Student should appear for SEE with Major-Project Report.

A "committee" consisting of External Examiner, Supervisor and Head of the Department shall review and evaluate the SEE based on the above criteria.

Note:
(i) A course that has CIE, but no SEE as per scheme will be treated as Pass if the candidate obtains at least 40% marks in CIE.
(ii) Candidates can choose an online course from MOOC's to improve their obtained score / credits / grade, provided the syllabus is at least 70% similar to the particular subject by taking approval of respective BOS chairperson. If the MOOC's score / credits / grade is higher than the already obtained score, then it will be considered.
(iii) The candidates should preferably complete any online courses through SWAYAM / NPTEL before VII-Semester in view of backlog problem.
(iv) The details of instruction period, examination schedule, vacation etc., shall be notified by the College Academic Council.
(v) The medium of instruction and examination shall be English.

(vi) At the end of each semester, SEE shall be held as prescribed in the respective Schemes of Examination. Examinations pertaining to SEE are called main examinations and examinations pertaining to the other semesters will be called supplementary / backlogs examinations.

(vii) To enable the B.E. Final Year students to complete the programme requirements in time, there shall be a Backlog / Supplementary Exam for VIII and all the previous semesters, which will be scheduled within one month of publication of VIII semester results.

(viii) The examinations prescribed may be conducted by means of written papers, practical and oral tests, inspection of certified sessional work in Drawing, Laboratories and Workshop or by means of any combination of these methods as may be deemed necessary.

(ix) Candidates will be required to produce complete Lab Records of the Practical work done by them in each practical examination, along with other materials prepared or collected as part of Laboratory work/ Project.

(x) A candidate shall be deemed to have fully passed a Theory course, if the candidate secures a minimum of 40% in SEE and total of 40% in CIE & SEE together, and in Practical / Laboratory / Projects etc., candidate has to secure 50% in SEE and total of 50% in CIE & SEE together.

Minimum pass marks / grade in the Semester End Examinations and CIE shall be as below:

Each Theory Course	40%	E-Grade
Each Practical Course/Drawing Course/Project Work	50%	D-Grade

(xi) In case of hearing impaired, orthopedically handicapped and visually challenged candidates, 10% reduction in pass marks in each subject is admissible as per G.O. Ms. No.150, dated 31-08-2006.

(xii) If a candidate in any semester examination of the programme fails to secure the minimum marks / grade in any course, then the candidate should appear only in the failed subject of the semester.

(xiii) If a candidate desires to have recounting, revaluation and challenge evaluation, then candidate can apply for it as per the notification of the Examination Branch, LIET.

(xiv) WITH-HOLDING OF RESULTS:
    a. If a candidate has found with any indiscipline / malpractice in examinations, the candidate results shall be withheld.
    b. The issue of the award of the provisional certificate and the B.E. degree is liable to be withheld in such cases.

VII.   Rules of Promotion:

The following rules are applicable to the students who are taking admission into first year of B.E. programme with effective from Academic Year 2022-23:

S. No.	Semester/ Class	Conditions to be fulfilled
1.	From I-Semester to II-Semester	• Regular course of study of I- Semester
2.	From II-Semester to III-Semester	• Regular course of study of II- Semester. • Must have secured at least 40% of total credits prescribed for I and II Semesters together
3.	From III-Semester to IV-Semester	• Regular course of study of III- Semester.
4.	From IV-Semester to V-Semester	• Regular course of study of IV- Semester. • Must have secured at least 40% of Total credits prescribed for I, II, III and IV Semesters put together.
5.	From V-Semester to VI-Semester	• Regular course of study V- Semester.
6.	From VI- Semester to VII- Semester	• Regular course of study of VI- Semester. • Must have secured at least 50% of • total credits prescribed for I, II, III, IV, V and VI Semesters put together
7.	From VII-Semester to VIII-Semester	• Regular course of study of VII Semester.
8.	Eligibility to appear VIII- Semester Examinations.	• Regular Semester

Note:
1. In case the candidate does not fulfill the requirement as per the above-mentioned table then the candidate will be detained.
2. The candidate who wishes to take re-admission into the year in which he/ she are detained have to pay the total tuition fee of that year and all the credits earned during that year shall become null and void.

VIII.   Grading system:

1. Candidates who have passed all the examinations of the B.E. Degree Programme shall be awarded CGPA in accordance with the grade secured by them in all eight semesters taken together, including the CIE marks secured in those semesters.
2. The grade secured shall be shown in the memorandum of marks as per the cumulative performance in SEE and CIE as per the course structure.
   Grades are allotted based on the marks secured in SEE and CIE as per the following criteria:

Academic Performance	Letter Grade	Grade points
90% ≤ Marks ≤ 100%	S	10
80% ≤ Marks < 90%	A	9
70% ≤ Marks < 80%	B	8
60% ≤ Marks < 70%	C	7
50% ≤ Marks < 60%	D	6
40% ≤ Marks < 50%	E	5
Marks < 40% (Theory Courses)	F	0
Marks < 50% (Practical Courses)	F	0

3. SEMESTER GRADE POINT AVERAGE (SGPA) & CUMULATIVE GRADE POINT AVERAGE (CGPA) Calculation:

a) SGPA = ☐ Letter Grade Point **x** Credits **/** ☐ Credits

SGPA is calculated upto second decimal point and it is calculated only when all subjects in that semester are Cleared / Passed.

b) CGPA = ☐ (SGPA) $_j$ **x** (Total Credits) / ☐ Total Credits

Where "j" is the semester indicator index (all subjects from first to eight semester).
CGPA at a given point of Semester is calculated upto second decimal point. It is calculated only when total credits earned are equal to total credits prescribed as per scheme upto a semester in which the candidate has last appeared for SEE.

c) Courses in which the candidate has failed are not included in computing SGPA / CGPA.

IX.   Award of Degree:

A student shall be declared to be eligible for the award of B.E., provided the student has successfully gained the required number of total credits and other requirements as specified in the curriculum corresponding to the student's programme within the stipulated time.

Award of Division:

CGPA	DIVISION
7.5 and above	First Class with distinction
6.5 and less than 7.5	First Class
5.5 and less than 6. 5	Second Class
4.0 and less than 5.5	Pass
Less than 4.0	Fail

X. Award of Gold & Silver Medal:

(i) Students securing highest CGPA at institution level in a **single attempt** are eligible for award of Gold Medal.

(ii) Students securing first highest and second highest CGPA at each program/ department/ branch level in a **single attempt** are eligible for award of Gold and Silver Medals respectively.

(iii) Students appearing in Supplementary Exams are not eligible.

(iv) A re-admitted student is not eligible for any Medal.

XI. Improvement of Overall Score:

a. A candidate who wishes to improve Candidate overall score may do so within one academic year immediately after having passed all the examinations of the B.E. degree program, by reappearing in not more than two semesters (all subjects pertaining to the semester taken together) examinations.

b. For the award of the overall score, candidate will have the benefit of the higher of the two aggregates of marks/ grade secured in the corresponding semester(s).

XII. General Rules of Examinations:

1. Application for permission to appear in any examination shall be made available in the Examination Branch of LIET.

2. When a candidate's application is found in order and eligible to appear in SEE, the Controller of Examination shall furnish with a hall-ticket affixing the photograph, enabling the candidate to appear in the SEE. The hall-ticket should be produced by the candidate before admitted to the premises where the examination is likely to be held.

3. A candidate who does not present for examination for any reason whatsoever, except shortage of attendance, shall not be entitled to claim refund of the whole or part of the examination fee, for subsequent examination(s).

4. A candidate after being declared successful in all examinations, shall be given a provisional certificate stating the year of examination, the branch in which candidate was examined and the overall grade secured. However, the candidate has to obtain degree certificate (convocation) from Osmania University.

5. No candidate shall be allowed to write two exams simultaneously at any circumstance.

6. Candidates, who have appeared once in any examination of the programme, need not put in fresh attendance, if they wish to re-appear at the corresponding examination, notwithstanding the fact that the college may have introduced new courses. They will, however, have to appear in the examination according to the scheme of instructions of any syllabi in force.

7. Procedures and the conduct of Exams will be as per Osmania University.

XIII. Transitory Regulations:

Whenever, course or scheme of instruction is revised or modified in a particular year, four examinations immediately following thereafter, shall be conducted according to the old syllabi / regulations. Candidates not appearing for examinations or failed shall take the examination subsequently according to the revised syllabus/ equivalent subjects/ regulations.

XIV. Range of Credits:

a. Candidate has to secure 160 credits for the award of B.E. Degree. Candidate will be eligible to get the Undergraduate Degree with 'Honors' or 'Additional Minor Engineering', if candidate secures 20 credits in addition to 160 credits (subject to approval of Osmania University). These could be acquired through MOOCs approved by BOS.

Honors: In addition to their primary Program B.E., an Engineering Student has the opportunity to award with 'Honors' Degree.

Award of an 'Honors' Degree is subject to the following conditions:

(i) The student must have earned at least twenty (20) relevant and approved additional Credits.

(ii) Earning of these additional credits shall be through MOOCs/ NPTEL/ any other on-line Courses, which are approved by the respective BOS.

(iii) The list of courses is subject to the approval of respective BOS.

(iv) These additional twenty (20) Credit Courses shall not be part of the regular Curriculum.

(v) A candidate must ensure to earn the required Credits for the award of respective 'Honors' Degree, before the completion of the regular Course.

(vi) It is the candidate's responsibility for registering the Courses through ONLINE and the required Registration Fee shall be borne by the respective student

Additional Minor Engineering: In addition to their primary program B.E., an engineering student has the opportunity to study one 'Additional Minor Engineering' in any areas listed as per AICTE handbook and Model Curriculum. 'Additional Minor Engineering' allows a candidate to gain inter-disciplinary experience and exposure to concepts and perspectives which may not be a part of their regular Degree Program, thus widening their understanding of the Engineering Profession. Upon completion of an 'Additional Minor Engineering', a candidate shall be better equipped to perform inter-disciplinary research.

Award of an 'Additional Minor Engineering' Degree is subject to the following conditions:

(i) The candidate must earn at least twenty (20) additional Credits.

(ii) Earning of these additional credits shall be through MOOCs / NPTEL / any other on-line Courses, which are approved by the respective BOS.

(iii) The list of Courses is subject to the approval of respective BOS.

(iv) These additional twenty (20) Credit Courses shall not be part of the regular Curriculum.

(v) A candidate must ensure that candidate shall earn the required Credits for the award of respective 'Additional Minor Engineering' Degree, before completion of regular course.

(vi) It is the candidate's responsibility for registering the courses through ONLINE and the required Registration fee shall be borne by the respective candidate.

b.   MOOC is a free web-based distance learning programme that is designed for participation of large number of geographically dispersed candidates. MOOC may be patterned at department level of each college. The MOOC list will be provided by the Chairperson, Board of Studies of the concerned department for each semester, beyond semester-II.

Other Information:

i. Candidates shall obtain prior approval(s) from their BOS Chairperson/ Principal before opting for 'Additional Minor Engineering' or 'Honors'.

ii. A candidate is eligible to opt either for 'Honors' or 'Additional Minor Engineering'.

iii. A candidate is not eligible to opt for both the above-mentioned Degrees.

iv. The award of Honors or Additional Minor Engineering is subject to the rules and regulations of Osmania University that are updated from time to time.

XV.   Malpractice and Award of Punishment:

S.No	Malpractice	Maximum Punishments
1.	Possession of the prohibited (written or printed) papers, books, notes during the examination period but which were not used.	Expulsion from the Examination Hall and Cancellation of the performance in that course only
2.	Possession of the prohibited (written or printed) papers, books, notes during the examination period, which were used.	Shall be debarred from appearing at the subsequent papers of the examination apart from cancelling the result of the examination in which He/she had indulged in malpractice.
3.	Matter relevant to the examination being written on any part of the body or on the clothes worn, or in the instruments, wrappings, etc.	-do-
4.	Attempting to take help from any prohibited papers, notes, written or printed matter, writings on the walls, furniture and attempting to take help from or giving help to other regarding answer to any question or questions of the examination paper.	-do-

5.	Taking help from or consulting of prohibited written or printed material; consulting and/or taking help from or helping other examinee during the examination period inside the examination hall or outside it; with or without his or her consent, or helping other candidate to receive help from anyone else.	-do-
6.	An examinee who attempts todisclose his/her identity to the paper valuer by writing his/her roll number at a place other than the place prescribed for it, or by writing his/her name or any coded message or an examiner, who makes an appeal to the paper valuer in the answer book.	Cancelling the result of that paper
7.	Writing such as invocation of God's name in any form.	To be ignored
8.	Writing on the question paper or other papers; the answer to questions, rough work, etc., without any intention of passing it on to another examinee.	To be warned not to do so
9.	Using abusive and obscene language in the answer book.	Cancellation of the result of that paper
10.	Examinee allowing or destroying prohibited material found in his possession or acting in any other manner with a view to destroy evidence.	Cancellation of the result of all examinations taken or proposed to be taken during that session and prohibiting his/her admission to or continuation in any course of the University for a period of one year.
11.	Refusing to obey instructions of the Chief Superintendent/ Invigilator	Cancelling the result of that paper
12.	Smuggling an answer book / additional answer book/matter into or out of the examination hall.	Cancellation of the result of all examinations taken or proposed to be taken during that session and prohibiting his/ her admission to or continuation in any course of the University for a period of the year.
13.	Inserting in or removing from the answer book/additional answer book of any sheet.	-do-
14.	Substituting wholly or partly an answer book/additional answer book.	-do-
15.	Impersonation even at a single examination.	To be dealt with as per law

16.	Cases of examinees when conspiring to interchange in Roll Nos.	Cancellation of the result of all examinations taken or proposed to be taken during that session and prohibiting their admission or constitution in any course of the University for a period of one year.
17.	Creation of disturbance or otherwise misbehaving in and around the examination hall during or before the examination.	Cancelling the results of all examinations taken or proposed to be taken during that session and prohibiting admission into or continuation in any course of study for a period of two years.
18.	Guilty of assaulting/abusing intimidating any person connected with the examination work any time before, during or after the examination	Cancelling the result of all examinations taken or proposed to be taken during that session and the next session and prohibiting admission into or continuation in any course for a period of two years.
19.	Punishments for malpractices not defined here would be recommended on the merits of the individual cases by the malpractices committee.	

XVI.   Rules of Conduct for students:

- The college premises and buildings shall be kept clean; writing and sticking posters and notices on the building walls is strictly prohibited.
- Students are not permitted to resort to strikes and demonstrations within the college. Participation in any such activity shall automatically result in their dismissal from the college.
- No student unions, except professional associations, are permitted in the college.
- Any student responsible for bringing outsiders into the college campus for settling student disputes will be expelled from the college.
- The students may go on Industrial Tours on their own expense. The college will not defray any expenses of the tour.
- The students are expected to be regular in their class work and should conduct themselves in a disciplined manner. They should abide by such rules of discipline and conduct as stipulated by the college from time to time.

- Fees must be paid in full within two weeks of 1st semester in the college.
- The Principal of the college is the final authority regarding the discipline in the institution and has full power to suspend, fine, rusticate and take any other action, which is deemed necessary.
- The conduct of the students should be exemplary, not only within the premises of the college but also outside.
- The students are informed that they should furnish the latest addresses of their parents/ guardians in the Principal's Office. Any change of address of the parents/ guardian should also be informed immediately, in the college office.
- Ragging is prohibited. Any student participating in ragging is liable to be summarily expelled from the college, without any enquiry. Ragging on campus and off campus is strictly prohibited and it is a cognizable offence. The college has constituted Anti-Ragging Committee, vigilance teams, anti-ragging squads involving the police officers, senior faculty, etc., as per the Act.

XVII.   Academic Regulations for B.E. (Lateral Entry Scheme) with effect from A. Y. 2022-23:

Eligibility for award of B.E. Degree (LES)

1. The Lateral Entry 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 from II year to IV- year B.E. programme (LES) for the award of B.E. degree.
3. The students, who fail to fulfill the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.E.
4. The attendance requirements of B.E. (Regular) shall be applicable to B.E. (LES).

Promotion Rules:

S. No.	Semester/ Class	Conditions to be fulfilled
1.	From III-Semester to IV-Semester	• Regular course of study of III- Semester.
2.	From IV-Semester to V-Semester	• Regular course of study of IV- Semester. • Must have secured at least 40% of Total credits prescribed for I, II, III and IV Semesters put together.
3.	From V-Semester to VI-Semester	• Regular course of study V- Semester.
4.	From VI- Semester to VII- Semester	• Regular course of study of VI- Semester. • Must have secured at least 50% of • total credits prescribed for I, II, III, IV, V and VI Semesters put together
5.	From VII-Semester to VIII-Semester	• Regular course of study of VII Semester.
6.	Eligibility to appear VIII- Semester Examinations.	• Regular Semester

Note:

- All the other regulations as applicable to B.E. 4-year degree course (Regular) will hold good for B.E. (Lateral Entry Scheme).
- These regulations can be modified from time to time retrospectively and prospectively based on approval of Academic Council or Governing Body.
- All the rules and regulations, specified herein after shall be read as whole for the purpose of interpretation.
- As per the requirements of the Statutory Bodies, Principal, Lords Institute of Engineering and Technology (Autonomous), shall be the Chairman of the College Academic Council.
- Whenever a doubt arises in the interpretation of these rules and regulations, the interpretation of the Chairman, Academic Council, Lords Institute of Engineering and Technology (Autonomous) is final.

LORDS INSTITUTE OF ENGINEERING AND TECHNOLOGY
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)
SCHEME OF INSTRUCTIONS & EXAMINATIONS [LR-21]
(w.e.f Academic Year 2022-23)
B.E. I-Semester

S. No.	Course Code	Category	Course Title	L	T	P/D	Contact Hours/Week	CIE	SEE	Duration in Hours	Credits
								Maximum Marks			
MC: Three Week Induction Programme											
Theory Course											
1	U21CH102	MC	Environmental Sciences	2	-	-	2	40	60	3	-
2	U21EN103	MC	Essence of Indian Traditional Knowledge	2	-	-	2	40	60	3	-
3	U21MA101	BSC	Mathematics-I	3	1	-	4	40	60	3	4
4	U21PH101	BSC	Engineering Physics	3	1	-	4	40	60	3	4
5	U21CS101	ESC	Programming for Problem Solving	3	-	-	3	40	60	3	3
Practical/ Laboratory Course											
6	U21PH1L1	BSC	Engineering Physics Lab	-	-	3	3	25	50	3	1.5
7	U21CS1L1	ESC	Programming for Problem Solving Lab	-	-	4	4	25	50	3	2
8	U21ME1L1	ESC	Engineering Graphics & Design Practice Lab	1	-	4	5	50	50	3	3
		Total		14	2	11	27	300	450	-	17.5

L: Lecture (Hrs/Wk/Sem) **T**: Tutorial (Hrs/Wk/Sem) **P:** Practical **D**: Drawing (Hrs/Wk/Sem)

CIE: Continuous Internal Evaluation   **SEE**: Semester End Examination
MC: Mandatory Course   **BSC**: Basic Science Course
ESC: Engineering Science Courses   **CS**: Computer Science
MA: Mathematics   **EN:** English
PH: Physics   **ME:** Mechanical Engineering
CH: Chemistry

Note:
1. Each contact hour is a Clock Hour.
2. The duration of the practical class is three hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

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SCHEME OF INSTRUCTIONS & EXAMINATIONS [LR-21]
(w.e.f Academic Year 2022-23)
B.E. II-Semester

S. No.	Course Code	Category	Course Title	L	T	P/D	Contact Hours/Week	CIE	SEE	Duration in Hours	Credits
				Scheme of Instructions				**Scheme of Examination**			
								Maximum Marks			
			Theory Course								
1	U21EN202	MC	Indian Constitution	2	-	-	2	40	60	3	-
2	U21MA201	BSC	Mathematics-II	3	1	-	4	40	60	3	4
3	U21CH201	BSC	Engineering Chemistry	3	1	-	4	40	60	3	4
4	U21EE201	ESC	Basic Electrical Engineering	3	-	-	3	40	60	3	3
5	U21EN201	HSMC	English for Professional Communication	2	-	-	2	40	60	3	2
			Practical/ Laboratory Course								
6	U21CH2L1	BSC	Engineering Chemistry Lab	-	-	3	3	25	50	3	1.5
7	U21EE2L1	ESC	Basic Electrical Engineering Lab	-	-	3	3	25	50	3	1.5
8	U21EN2L1	HSMC	Effective Communication Skills Lab	-	-	3	3	25	50	3	1.5
9	U21ME2L2	ESC	Engineering & IT Workshop Lab	1	-	4	5	50	50	3	3
	Total			14	2	13	29	325	500	-	19.5

L: Lecture (Hrs/Wk/Sem)   **T**: Tutorial (Hrs/Wk/Sem)   **P**: Practical   **D**: Drawing (Hrs/Wk/Sem)

CIE: Continuous Internal Evaluation   **SEE**: Semester End Examination   **MC**: Mandatory Course
BSC: Basic Science Course   **ESC**: Engineering Science Course   **CH**: Chemistry
EN: English   **ME**: Mechanical Engineering.   **EE:** Electrical Engineering
HSMC: Humanities and Social Science Including Management course   **MA**: Mathematics

Note:
1. Each contact hour is a Clock Hour.
2. The duration of the practical class is three hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)
SCHEME OF INSTRUCTIONS & EXAMINATIONS [LR-21]
(w.e.f Academic Year 2023-24)
B.E. III-Semester

S. No.	Course Code	Category	Course Title	L	T	P/D	Contact Hours/Week	CIE	SEE	Duration in Hours	Credits
				Scheme of Instructions				Scheme of Examination (Maximum Marks)			
Theory Course											
1	U21EC304	ESC	Digital Electronics and Computer Organization	3	-	-	3	40	60	3	3
2	U21CD301	PCC	Operating Systems	3	-	-	3	40	60	3	3
3	U21CS302	PCC	Data Structures	3	-	-	3	40	60	3	3
4	U21CD301	PCC	Database Management Systems	3	-	-	3	40	60	3	3
5	U21CM301	PCC	Python Programming	3	-	-	3	40	60	3	3
Practical/ Laboratory Course											
6	U21CS3L1	PCC	Data Structures Lab	-	-	3	3	25	50	3	1.5
7	U21 CD3L1	PCC	Database Management Systems Lab	-	-	3	3	25	50	3	1.5
8	U21CM3L1	ESC	Python Programming Lab	-	-	3	3	25	50	3	1.5
Bridge Course*											
9.	U21CS3L2	ESC	C Programming Lab	-	-	2	2	50	-	3	-
10	U21EN3L2	HSMC	Effective Communication Skills Lab	-	-	2	2	50	-	3	-
Total				15	1	9 (*13)	24 (*28)	275 (*375)	50	-	19.5

*Bridge course for lateral entry students only.

L: Lecture (Hrs/Wk/Sem) **T:** Tutorial (Hrs/Wk/Sem) **P:** Practical **D:** Drawing (Hrs/Wk/Sem)

CIE: Continuous Internal Evaluation **SEE:** Semester End Examination **BSC:** Basic Science Course
ESC: Engineering Science Course **PCC:** Program Core Course **EN:** English
CS: Computer Science **CM:** CSE-AIML **CD:** CSE-Data Science
AM: AI&ML **EC:** Electronics & Communications
HSMC: Humanities & Social Sciences Including Management Course

Note:
1. Each contact hour is a Clock Hour.
2. The duration of the practical class is three hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

LORDS INSTITUTE OF ENGINEERING AND TECHNOLOGY
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)
SCHEME OF INSTRUCTIONS & EXAMINATIONS [LR-21]
(w.e.f Academic Year 2023-24)
B.E. IV-Semester

S. No.	Course Code	Category	Course Title	Scheme of Instructions				Scheme of Examination			Credits
				L	T	P/D	Contact Hours/Week	Maximum Marks		Duration in Hours	
								CIE	SEE		
Theory Course											
1	U21MA402	BSC	Mathematics – III (Mathematics for Data Science)	3	1	-	3	40	60	3	4
2	U21EN401	HSMC	English For Technical Communication	2	-	-	2	40	60	3	2
3	U21ME409	ESC	Operations Research	3	-	-	3	40	60	3	3
4	U21CS402	PCC	JAVA Programming	3	-	-	3	40	60	3	3
5	U21CD401	PCC	Basics of Data Science	3	1	-	3	40	60	3	4
Practical/ Laboratory Course											
6	U21EN4L1	HSMC	Advanced Communication Skills	-	-	3	3	25	50	3	1.5
7	U21CS4L1	PCC	JAVA Programming Lab	-	-	3	3	25	50	3	1.5
8	U21CD4L1	PCC	Data Science Using R lab	-	-	3	3	25	50	3	1.5
Total				14	1	9	23	275	450	-	20.5

L: Lecture (Hrs/Wk/Sem)   **T**: Tutorial (Hrs/Wk/Sem)   **P:** Practical   **D**: Drawing (Hrs/Wk/Sem)

CIE: Continuous Internal Evaluation   **SEE**: Semester End Examination   **EN:** English
BSC: Basic Science Course   **ESC**: Engineering Science Course   **PCC:** Program Core Course
ME: Mechanical Engineering   **MA**: Mathematics   **CD:** CSE-Data Science
HSMC: Humanities & Social Sciences Including Management Course   **CS:** Computer Science

Note:
1. Each contact hour is a Clock Hour.
2. The duration of the practical class is three hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)
SCHEME OF INSTRUCTIONS & EXAMINATIONS [LR-21]
(w.e.f Academic Year 2024-25)
B.E. V-Semester (Tentative)

| S. No. | Course Code | Category | Course Title | Scheme of Instructions | | | | Scheme of Examination | | | Credits |
| | | | | L | T | P/D | Contact Hours/Week | Maximum Marks | | Duration in Hours | |
								CIE	SEE		
Theory Course											
1	U21CD501	PCC	Design and Analysis of Algorithms	3	-	-	3	40	60	3	3
2	U21CD502	PCC	Discrete Mathematics	3	1	-	3	40	60	3	4
3	U21CD503	PCC	Artificial Intelligence	3	-	-	3	40	60	3	3
4	-	PEC	Professional Elective-I	3	-	-	3	40	60	3	3
5	-	OEC	Open Elective-I	3	-	-	3	40	60	3	3
Practical/ Laboratory Course											
6	U21CD5L1	PCC	Artificial Intelligence Lab	-	-	3	3	25	50	3	1.5
7	U21CD5L2	PCC	Design and Analysis of Algorithms Lab	-	-	3	3	25	50	3	1.5
Internship											
8	U21CD5P1	PROJ	Internship (During Summer Vacation after IV Semester)	-	-	2	2	50	-	3	1
Total				15	1	8	23	300	400	--	20

L: Lecture (Hrs/Wk/Sem)   **T**: Tutorial (Hrs/Wk/Sem)   **P**: Practical   **D**: Drawing (Hrs/Wk/Sem)

CIE: Continuous Internal Evaluation   **SEE:** Semester End Examination
BSC: Basic Science Course   **CD**: CSE-Data Science   **PCC:** Program Core Course
PEC: Professional Elective Course   **OEC:** Open Elective Course   **PROJ:** Project

Note:
1. Each contact hour is a Clock Hour.
2. The duration of the practical class is three hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)
SCHEME OF INSTRUCTIONS & EXAMINATIONS [LR-21]
(w.e.f Academic Year 2024-25)
B.E. VI-Semester (Tentative)

S. No.	Course Code	Category	Course Title	Scheme of Instructions				Scheme of Examination			Credits
				L	T	P/D	Contact Hours/Week	Maximum Marks		Duration in Hours	
								CIE	SEE		
Theory Course											
1	U21MB601	HSMC	Business Economics and Financial Analysis	3	-	-	3	40	60	3	3
2	U21CD601	PCC	Machine Learning	3	-	-	3	40	60	3	3
3	U21CD602	PCC	Distributed Database	3	1	-	3	40	60	3	4
4	-	PEC	Professional Elective-II	3	-	-	3	40	60	3	3
5	-	OEC	Open Elective-II	3	-	-	3	40	60	3	3
Practical/ Laboratory Course											
6	U21CD6L1	PCC	Machine Learning Lab	-	-	3	3	25	50	3	1.5
7	U21CD6L2	PCC	Distributed Database Lab	-	-	3	3	25	50	3	1.5
8	U21EN6L1	HSMC	Technical Report Writing	-	-	2	2	50	-	3	1
Seminar											
9	U21CD6P1	PROJ	Technical Seminar	-	-	2	2	50	-	3	1
Skill Development Course											
11	U21MA6L1	BSC	Aptitude and Reasoning	-	-	2	-	50	-	3	1
Total				12	1	18	29	410	390	--	22

L: Lecture (Hrs/Wk/Sem)   **T**: Tutorial (Hrs/Wk/Sem)   **P:** Practical   **D**: Drawing (Hrs/Wk/Sem)

CIE: Continuous Internal Evaluation   **SEE:** Semester End Examination   **OEC:** Open Elective Course
ESC: Engineering Science Course   **PCC:** Program Core Course   **MA**: Mathematics
CD: CSE-Data Science   **PEC:** Professional Elective Course   **EN:** English
HSMC: Humanities & Social Sciences Including Management Course   **PROJ:** Project

Note:
1. Each contact hour is a Clock Hour.
2. The duration of the practical class is three hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

LORDS INSTITUTE OF ENGINEERING AND TECHNOLOGY
(An Autonomous Institution)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING - (DATA SCIENCE)
SCHEME OF INSTRUCTIONS & EXAMINATIONS [LR-21]
(w.e.f Academic Year 2025-26)
B.E. VII-Semester (Tentative)

S. No.	Course Code	Category	Course Title	Scheme of Instructions				Scheme of Examination			
				L	T	P/D	Contact Hours/Week	CIE	SEE	Duration in Hours	Credits
Theory Course											
1	U21CD701	PCC	Data Mining	3	-	-	3	40	60	3	3
2	U21CD702	PCC	Data Handling and Visualization	3	-	-	3	40	60	3	3
3	-	PEC	Professional Elective III	3	-	-	3	40	60	3	3
4	-	PEC	Professional Elective IV	3	-	-	3	40	60	3	3
5	-	OEC	Open Elective-III	3	-	-	3	40	60	3	3
Practical/ Laboratory Course											
7	U21CD7L1	PCC	Data Mining Lab	-	-	3	3	25	50	3	1.5
8	U21CD7L2	PCC	Data Handling and Visualization Lab	-	-	3	3	25	50	3	1.5
Project											
9	U21CD6P2	PROJ	Mini Project	-	-	6	6	50	50	3	3
			Total	18	-	6	24	290	460	-	21

L: Lecture (Hrs/Wk/Sem)   **T**: Tutorial (Hrs/Wk/Sem)   **P**: Practical   **D**: Drawing (Hrs/Wk/Sem)

CIE: Continuous Internal Evaluation   **SEE:** Semester End Examination   **CD**: CSE-Data Science
PCC: Program core courses   **PEC:** Professional Elective Courses   **OEC**: Open Elective Courses

Note:
1. Each contact hour is a Clock Hour.
2. The duration of the practical class is three hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

LORDS INSTITUTE OF ENGINEERING AND TECHNOLOGY
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING - (DATA SCIENCE)
SCHEME OF INSTRUCTIONS & EXAMINATIONS [LR-21]
(w.e.f Academic Year 2025-26)
B.E. VIII-Semester (Tentative)

S. No.	Course Code	Category	Course Title	Scheme of Instructions				Scheme of Examination			Credits
				L	T	P/D	Contact Hours/Week	Maximum Marks		Duration in Hours	
								CIE	SEE		
Theory Course											
1	U21CD801	PCC	Natural Language Processing	3	-	-	3	40	60	3	3
2	-	PEC	Professional Elective V	3	-	-	3	40	60	3	3
3	-	OEC	Open Elective IV	3	-	-	3	40	60	3	3
Project											
4	U21CD8P1	PROJ	Comprehensive Viva-Voce	-	-	4	4	100	-	3	2
5	U21CD8P2	PROJ	Major Project	-	-	16	16	50	150	3	8
Total				9	-	20	29	270	330	-	19

L: Lecture (Hrs/Wk/Sem)   **T**: Tutorial (Hrs/Wk/Sem)   **P**: Practical   **D**: Drawing (Hrs/Wk/Sem)

CIE: Continuous Internal Evaluation   **SEE**: Semester End Examination
PCC: Program core course   **PEC:** Professional Elective Course   **OEC**: Open Elective Course
CD: CSE-Data Science   **PROJ:** Project

Note:
1. Each contact hour is a Clock Hour.
2. The duration of the practical class is three hours, however it can be extended wherever necessary, to enable the student to complete the experiment.

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING - (DATA SCIENCE)
SCHEME OF INSTRUCTIONS & EXAMINATIONS [LR-21]
PROFESSIONAL ELECTIVE COURSES

S. No.	Course Code	Category	Course Title	L	T	P/D	Contact Hours/Week	CIE	SEE	Duration in Hours	Credits
								Maximum Marks			
Theory Course											
1	U21CD504	PEC 1	Graph Theory	3	-	-	3	40	60	3	3
	U21CD505		Computer Networks	3	-	-	3	40	60	3	3
	U21CD506		Automata Languages and Computation theory	3	-	-	3	40	60	3	3
	U21CD507		Web Technologies	3	-	-	3	40	60	3	3
2	U21CD603	PEC 2	Block Chain Technology	3	-	-	3	40	60	3	3
	U21CD604		Network Security and Cryptography	3	-	-	3	40	60	3	3
	U21CD605		Statistical Simulation and data Analysis	3	-	-	3	40	60	3	3
	U21CD606		Software Engineering	3	-	-	3	40	60	3	3
3	U21CD703	PEC 3	Information Storage and Management	3	-	-	3	40	60	3	3
	U21CD704		Cloud Computing	3	-	-	3	40	60	3	3
	U21CD705		Business Intelligence and Analytics	3	-	-	3	40	60	3	3
	U21CD706		Software Testing Methodologies	3	-	-	3	40	60	3	3
4	U21CD707	PEC 4	Basics of Soft Computing Techniques	3	-	-	3	40	60	3	3
	U21CD708		Semantic Web Social Networks	3	-	-	3	40	60	3	3
	U21CD709		Deep Learning	3	-	-	3	40	60	3	3
	U21CD710		Software Project Management	3	-	-	3	40	60	3	3
5	U21CD802	PEC 5	Optimization Techniques	3	-	-	3	40	60	3	3
	U21CD803		Internet Of Things	3	-	-	3	40	60	3	3
	U21CD804		Cognitive Science and Analytics	3	-	-	3	40	60	3	3
	U21CD805		Secure Software Design and Enterprise Computing	3	-	-	3	40	60	3	3

PROFESSIONAL ELECTIVES WITH FOUR THREADS

S. No.	PE-I	PE-II	PE-III	PE-IV	PE-V
1	Graph Theory	Block Chain Technology	Information Storage and Management	Basics of Soft Computing Techniques	Optimization Techniques
2	Computer Networks	Network Security and Cryptography	Cloud Computing	Semantic Web Social Networks	Internet Of Things
3	Automata Languages and Computation theory	Statistical Simulation and data analysis	Business Intelligence and Analytics	Web and Social Media Analytics	Cognitive Science and Analytics
4	Web Technologies	Software Engineering	Software Testing Methodologies	Software Project Management	Secure Software Design and Enterprise Computing

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SCHEME OF INSTRUCTIONS & EXAMINATIONS [LR-21]
(w.e.f Academic Year 2021-22)
OPEN ELECTIVE COURSES

S. No	Course Code	Category	Course Title
1	U21EE508	OEC 1	Non-Conventional Energy Systems
	U21EE509		Energy Conservation and Management
	U21CS508		Data Base Management Systems**
	U21IT506		Data Structures**
	U21ME509		Basics of Mechanical Engineering
	U21ME510		Modern Manufacturing Processes
	U21CE510		Disaster Preparedness and Management
	U21CE511		Civil Engineering Principles and Practices
	U21EC507		Principles of Electronic Communication
	U21EC508		Semi-Conductor Devices
	U21MB502		Managerial Communication
	U21MB503		Managerial Science and Theory
	U21SH501		History of Science & Technology
	U21SH502		Economic Policies in India

S. No	Course Code	Category	Course Title
2	U21EE608	OEC 2	Fundamental of Power Electronics
	U21EE609		Electrical Installation and Safety
	U21CS607		Java Programming**
	U21IT606		Operating Systems**
	U21ME608		Basics Of 3-D Printing
	U21ME609		Optimization Methods for Engineers
	U21CE607		Construction Materials
	U21CE608		Engineering Geology
	U21EC607		Principles of Data Communication and Network
	U21EC608		Embedded Systems
	U21MB602		Total Quality Management
	U21MB603		Innovation Management
	U21SH601		Indian Music System
	U21SH602		Introduction to Art and Aesthetics

S. No	Course Code	Category	Course Title
3	U21EE711	OEC 3	Introduction to Electrical Vehicles
	U21EE712		Design estimation and Costing of Electrical Systems
	U21CS711		Data Sciences**
	U21IT705		Basics of Artificial Intelligence**
	U21ME711		Renewable Energy Resources
	U21ME712		Cooling of Electronic Components
	U21CE711		Environmental Systems
	U21CE712		Urban Transportation System
	U21EC703		IOT and its protocols
	U21EC704		Television and Video Engineering
	U21MB702		Logistics Management
	U21MB703		Management of Start Up's
	U21SH701		Display Devices
	U21SH702		Comparative Study of Literature

S. No	Course Code	Category	Course Title
4	U21EE804	OEC 4	Smart Building Systems
	U21EE805		Industrial Automation
	U21CS806		Basics of Machine Learning**
	U21IT802		Cloud computing**
	U21ME806		Hybrid Vehicle Technology
	U21ME807		Power Plant Engineering
	U21CE806		Green Building Technology
	U21CE807		Environmental Impact Assessment
	U21EC805		Fundamentals of Wireless Communication
	U21EC806		Fundamental Digital Design using Verilog HDL
	U21MB802		Entrepreneurship
	U21MB803		E - Marketing
	U21SH801		Corrosion Science and Technology
	U21SH802		Introduction To Philosophical Thoughts

Note: **Subject is not offered to the students of CSE and Allied branches.

B.E I YEAR I SEM SYLLABUS

Course Code	Course Title						Core / Elective
U21CH102	**ENVIRONMENTAL SCIENCES**						Core
Prerequisite	**Contact Hours Per Week**				CIE	SEE	**Credits**
	L	**T**	**D**	**P**			
-	2	-	-	-	40	60	-

Course Objectives:
1. To create awareness and impart basic knowledge about the environmental and its allied problems.
2. To know the functions of ecosystems.
3. To understand importance of biological diversity.
4. To study different pollutions and the impact on environment.
5. To know social and environment related issues and their preventive measures.

Course Outcomes:
After completing this course, the student will be able to:
1. Adopt environmental ethics to attain sustainable development.
2. Develop an attitude of concern for the environment.
3. Conservation of natural resources and biological diversity.
4. Creating awareness of Green technologies formation's security.
5. Imparts awareness for environmental laws and regulations.
6. Apply the Principles of ecology and bio-diversity for sustainable development.

UNIT-I
The Multidisciplinary Nature of Environmental Studies: Definition, scope and importance, need for public awareness.
Natural Resources: Water Resources – Use and over utilization of surface and ground water, flood, drought, conflicts over water, **Dams:** Benefits and Problems. Food Resources –World Food Problems, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, Forest Resources –Use and overexploitation, deforestation & its effect on tribal people. Land Resources – Land Degradation, environmental effect of mining, man induced landslides, soil erosion and desertification**.** Energy Resources– Growing energy needs. Renewable and Non-renewable energy resources.

UNIT-II
Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in ecosystem, food chains, ecological pyramids, ecological succession, types of ecosystems (marine, pond, river, forest, grassland & desert).

UNIT-III
Biodiversity: Levels of Biodiversity, Bio-geographical classification of India, Value of biodiversity, Threats to biodiversity, endangered and endemic species of India, Conservation of biodiversity, global and national efforts.

UNIT-IV
Environmental Pollution: Definition, Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution, solid waste management.
Environment Protection Act: Air, water, forest and wildlife Acts, issues in the enforcement of environmental legislation.

UNIT-V
Social Issues and the Environment: Watershed management and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.
Environmental Disaster Management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology. Disaster management cycle and disaster management in India.

Field Work:
- Visit to a local area to document environmental issues – agricultural area / pond / lake / terrestrial ecosystem.
- Visit to a local polluted area-market / slum area / Industrial area / traffic area.

Textbooks:
1. Erach Bharucha, Environmental Studies for undergraduate courses, second edition, Universities Press.
2. R. Rajagopalan, Environmental Studies from crisis to cure, oxford Publication.

Reference Books:
1. A.K. De, Environmental Chemistry, Wiley Eastern Ltd.
2. E.P. Odum, Fundamentals of Ecology, W.B. Sunders Co.,USA.
3. M.N. Rao and A.K. Datta,Waste Water Treatment, Oxford and IBK Publications.
4. Benny Joseph, Environmental Studies, Tata Mc GrawHill, 2005.
5. V.K. Sharma, Disaster Management, National Centre for Disaster Management, IIPE, 1999.

Course Code	Course Title						Core /Elective
U21EN103	**ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE**						Core

Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
	L	**T**	**D**	**P**			
	2	-	-	2	40	60	-

Course Objectives:
1. Sensitize Students about Tradition, Philosophy of Indian Culture.
2. Distinguish the Indian languages and literature among different traditions.
3. Learn the philosophy of Ancient, Medieval and Modern India.
4. Acquire the information about the Fine Arts of India.
5. Know the contribution of Scientists of different Eras.

Course Outcomes:
After completion of the course the students are able to:
1. Gain knowledge of Indian Philosophical Foundation.
2. Understand all religions and their philosophy.
3. Comprehend Indian Languages, Culture and Literature. .
4. Appreciate Indian Fine Artistic skills.
5. Familiarize with Indian Education System, Ethics, and Moral Values.
6. Explore the Science and Scientists of Ancient, Medieval and Modern India.

Unit-I
Introduction to Indian Knowledge System and Culture:
Basics of Indian Philosophy, Civilization, Culture and Heritage, General Characteristics of Culture, Importance of Culture in Human Literature, Indian Culture, Ancient, Medieval & Modern India.

Unit-II
Indian Philosophy & Literature:
Origin of Indian Religious Ideologies, Vedas, Upanishads, Schools of Vedanta, and Other Philosophical Literature. **Languages and Literature-I:** The Role of Sanskrit, Significance of scriptures to current society, Indian Philosophies, other Sanskrit Literature, Literature of South India.
Languages and Literature-II: Literature of North Indian Languages & Literature.
Group Discussion / Case Study -1 PPT Presentation.

Unit-III
Religion and Philosophy:
Religion and Philosophy in Ancient & Medieval India, Religious Reform Movements in Modern India (Selected Movements Only).

Unit-IV
Indian Fine Arts & Its Philosophy (Art, Technology & Engineering):
Indian Painting, Handicrafts, Music, Divisions of Indian Classical Music, Modern Indian Music, Dance and Drama, Indian Architecture (Ancient, Medieval and Modern) Science and Technology in India, Development of Science in Ancient, Medieval and Modern India.

Unit-V
Education System in India:
Education in Ancient, Medieval and Modern India, Aims of Education, Subjects, Languages, Science and Scientists of Ancient, Medieval & Modern India.
Role of Gurukulas in Education System, Value based Education.
Group Discussion / Case Study –II PPT Presentation.

Suggested Books:
1. Kapil Kapoor, "Text and Interpretation: The India Tradition'', ISBN: 81246033375, 2005.
2. "Science in Samskrit", Samskrita Bharti Publisher, ISBN-13:978-8187276333,2007.Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publish.

Course Code	Course Title						Core / Elective
U21MA101	**MATHEMATICS - I**						**Core**
Prerequisite	**Contact Hours Per Week**				**CIE**	**SEE**	**Credits**
--	**L**	**T**	**D**	**P**			
	3	**1**	**-**	**-**	**40**	**60**	**4**

Course Objectives
➢ To introduce the concepts of sequences, series and their properties
➢ To introduce the concepts of functions of several variables and multiple integrals
➢ To study vector differential and integral calculus

Course Outcomes
The students will able to
1. understand engineering problems through Mathematics and get logical thinking and creativity
2. learn the concepts of sequence and series
3. get the knowledge of function of single variable, curvature, evolutes and envelopes and different series
4. get familiar with function of several variables, partial differentiation, concept and calculation of Maxima and Minima
5. learn the concepts of integration, evaluation of double and triple integration and its applications
6. get the deep knowledge of Vector calculation, gradient, curl and divergence and integration concept over vectors

Unit-I
Sequences and Series: Sequences, Series, General properties of series, Series of positive terms, Comparison tests, tests of Convergence D'Alembert's ratio test, Cauchy's n^{th} root test, Raabe's test, Logarithmic test, Alternating series, Series of positive and negative terms, Absolute convergence and Conditional convergence.

Unit-II
Calculus of one Variable: Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's series, Curvature, Radius of curvature, Circle of curvature, Envelope of a family of curves, Evolutes and Involutes.

Unit-III
Multivariable Calculus (Differentiation): Functions of two variables, Limits and continuity, Partial differentiation, Total differential and Derivatives of composite and implicit functions (Chain rule), Change of variables, Jacobian, Taylor's series for functions of two variables, Maximum and minimum values of functions of two variables, Lagrange's method of undetermined multipliers.

Unit-IV

Multivariable Calculus (Integration): Double integrals, Change of order of integration, Change of Variables from Cartesian to plane polar coordinates, Triple integrals.

Unit-V
Vector Calculus: Scalar and vector fields, Gradient of a scalar field, Directional derivative, Divergence and Curl of a vector field, Line, Surface and Volume integrals, Green's theorem in a plane, Gauss's divergence theorem, Stoke's theorem (without proofs) and their verification.

Course Code	Course Title						Core / Elective
U21PH101	**ENGINEERING PHYSICS**						Core
Prerequisite	**Contact Hours Per Week**				**CIE**	**SEE**	**Credits**
	L	**T**	**D**	**P**			
--	3	1	-	-	40	60	4

Course Objectives:
1. Awareness on fundamentals of fibers in communication and lasers in Engineering.
2. Find the solutions for quantum mechanical problems and Electromagnetic waves.
3. Acquire knowledge on various properties of semiconductors and magnetic materials.
4. Analyze the dependence of dielectric polarizability on frequency and temperature.

Course outcomes:
On completion of this course, students are able to
1. Apply various types of crystalline materials in advancement of technology.
2. Analyze the energy levels in constant and periodic potentials to understand the basic properties of materials.
3. Apply duality of matter to solve quantum mechanical problems and remember the basic laws of electricity and magnetism.
4. Understand the properties of magnetic materials and superconductors.
5. Illustrates working of lasers and optical fibers in high speed communication.
6. Distinguish the materials and can justify its application in divergent fields.

UNIT-I
Crystallography: Introduction, Types of crystal systems, Bravais lattices, Lattice planes and Miller Indices (Cubic system), Inter planar spacing (Cubic system), Bragg's law, Powder diffraction method.
Crystal Defects: Classification of point defects, Concentration of Schottky defects in metals and ionic crystals, Concentration of Frankel defects, Line defects, Screw and Edge dislocations, Burger's vector.

UNIT-II
Band Theory of Solids & Semiconductors: Classical free electron theory (qualitative), Kronig Penney model (qualitative treatment), Energy band formation in solids, Intrinsic and Extrinsic semiconductors, Concept of a hole, Carrier concentration and conductivity in intrinsic semiconductors, Formation of P-N junction diode and its I – V characteristics, Thermistor and its characteristics, Hall effect and its applications.
Dielectric Materials: Dielectrics, Types of polarizations, Electronic, Ionic, Orientational and Space charge polarizations, Expression for Electronic polarizability, Frequency and temperature dependence of dielectric polarizations, Determination of dielectric constant by capacitance Bridge method, Ferro electricity, Barium titanate, Applications of Ferroelectrics.

UNIT–III
Wave Mechanics: Matter waves –de-Broglie wavelength, properties of wave function, Physical significance, Schrodinger's time dependent and time in-dependent wave equation. Particle in a 1-D box.
Electromagnetic theory: Basic laws of electricity and magnetism, Maxwell's equations in integral and differential forms, Conduction and displacement current, Relation between D, E and P – Electromagnetic waves: Equation of plane wave in free space, Poynting theorem.

UNIT-IV
Magnetic Materials: Classification of magnetic materials: dia, para, ferro, antiferro and ferrimagnetic materials, Weiss molecular field theory of ferromagnetism, Magnetic domains, Hysteresis curve, soft and hard magnetic materials, Ferrites: Applications of ferrites.
Superconductivity: Introduction, General properties of super conductors, Meissner effect, Type I and Type II superconductors, BCS theory (qualitative), Introduction to High Tc superconductors, Applications of superconductors.

Course Code	Course Title						Core / Elective
U21PH101	**ENGINEERING PHYSICS** (Common to all Branches)						**Core**
Prerequisite	**Contact Hours Per Week**				**CIE**	**SEE**	**Credits**
--	**L**	**T**	**D**	**P**			
	3	**1**	**-**	**-**	**40**	**60**	**4**

Course Objectives:
1. Awareness on fundamentals of fibers in communication and lasers in Engineering.
2. Find the solutions for quantum mechanical problems and Electromagnetic waves.
3. Acquire knowledge on various properties of semiconductors and magnetic materials.
4. Analyze the dependence of dielectric polarizability on frequency and temperature.

Course outcomes:
On completion of this course, students are able to
1. Apply various types of crystalline materials in advancement of technology.
2. Analyze the energy levels in constant and periodic potentials to understand the basic properties of materials.
3. Apply duality of matter to solve quantum mechanical problems and remember the basic laws of electricity and magnetism.
4. Understand the properties of magnetic materials and superconductors.
5. Illustrates working of lasers and optical fibers in high speed communication.
6. Distinguish the materials and can justify its application in divergent fields.

UNIT-I
Crystallography: Introduction, Types of crystal systems, Bravais lattices, Lattice planes and Miller Indices (Cubic system), Inter planar spacing (Cubic system), Bragg's law, Powder diffraction method.
Crystal Defects: Classification of point defects, Concentration of Schottky defects in metals and ionic crystals, Concentration of Frankel defects, Line defects, Screw and Edge dislocations, Burger's vector.

UNIT-II
Band Theory of Solids & Semiconductors: Classical free electron theory (qualitative), Kronig Penney model (qualitative treatment), Energy band formation in solids, Intrinsic and Extrinsic semiconductors, Concept of a hole, Carrier concentration and conductivity in intrinsic semiconductors, Formation of P-N junction diode and its I – V characteristics, Thermistor and its characteristics, Hall effect and its applications.
Dielectric Materials: Dielectrics, Types of polarizations, Electronic, Ionic, Orientational and Space charge polarizations, Expression for Electronic polarizability, Frequency and temperature dependence of dielectric polarizations, Determination of dielectric constant by capacitance Bridge method, Ferro electricity, Barium titanate, Applications of Ferroelectrics.

UNIT–III
Wave Mechanics: Matter waves –de-Broglie wavelength, properties of wave function, Physical significance, Schrodinger's time dependent and time in-dependent wave equation. Particle in a 1-D box.
Electromagnetic theory: Basic laws of electricity and magnetism, Maxwell's equations in integral and differential forms, Conduction and displacement current, Relation between D, E and P – Electromagnetic waves: Equation of plane wave in free space, Poynting theorem.

UNIT-IV
Magnetic Materials: Classification of magnetic materials: dia, para, ferro, antiferro and ferrimagnetic materials, Weiss molecular field theory of ferromagnetism, Magnetic domains, Hysteresis curve, soft and hard magnetic materials, Ferrites: Applications of ferrites.
Superconductivity: Introduction, General properties of super conductors, Meissner effect, Type I and Type II superconductors, BCS theory (qualitative), Introduction to High Tc superconductors, Applications of superconductors.

UNIT-V
Lasers: Characteristics of Lasers, spontaneous and stimulated emission of radiation, Einstein's Coefficients, population inversion, Ruby Laser, Helium Neon Laser, Semiconductor Laser and applications of lasers.
Fiber Optics: Introduction, Propagation of light through an optical fiber, Acceptance angle, Numerical aperture (NA), Types of Optical fibers and Refractive index profiles, Fiber drawing process (double Crucible Method), Losses in optical fibers, applications of optical fibers.

Text Books:

1. MN.Avadhanulu and PG. Kshirsagar, "Engineering Physics", S. Chand India PrivateLimited,11thEdition,2019.
2. P.K. Palanisamy, "Engineering Physics", Scitech India Private Limited, 4th Edition,2014.

Reference Books:

1.S. Mani Naidu, "Applied Physics", Pearson India Private Limited,1st Edition,2010.
2. R.K .Gaur and SL Gupta, "Engineering Physics", Dhanpat Rai India Private Limited, Revised Edition, 2018.
3. S. VijayaKumari,"Modern Engineering Physics", S. Chand & Company Limited, 1stEdition, 2010.
4. C. Srinivasan, "Science of Engineering Materials and Carbon Nanotubes", New age International publishers, Revised Edition, 2012.

Course Code	Course Title						Core / Elective
U21CS101	**Programming for Problem Solving**						**Core**
Prerequisite	**Contact Hours Per Week**				**CIE**	**SEE**	**Credits**
	L	**T**	**D**	**P**			
-	**3**	**-**	**-**	**-**	**40**	**60**	**3**

Course Objectives:
1. To introduce the basic concepts of Computing environment, Algorithm and Flowchart
2. To familiarize the basic concepts of C language such as data types, operators and expressions.
3. To understand modular and structured programming concepts in C
4. To learn the usage of structured data types and memory management using pointers
5. To learn the concepts of data handling using pointers

Course outcomes:
Student will be able to:
1. Formulate simple algorithms and translate the algorithms to programs using c language.
2. Implement conditional branching & iteration and arrays
3. Apply the function concepts to implement searching and sorting algorithms.
4. Analyze the usage of structures and pointer variable.
5. Apply the concept of pointers for implementing programs on dynamic memory management and string handling.
6. Design and implement programs to store data in structures and files.

Unit-I
Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numerical problems.
Representation of Algorithm: Flowchart / Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

Unit-II
Control Structures: Arithmetic expressions and precedence, Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching.
Arrays: Arrays (1-D, 2-D), Character arrays and Strings.

Unit-III
Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble and Selection), Finding roots of
Equations.
Functions: Functions (including using built in libraries), Parameter passing in functions, call by value. Passing arrays to functions: idea of call by reference

Unit-IV
Recursion: Recursion, Example programs, such as Finding Factorial, Fibonacci series
Structure: Structures, Defining structures and Array of Structures

Unit-V
Pointers: Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation), Introduction to File Handling.

Suggested Readings:
1. Byron Gottfried, –"Theory and practice of Programming with C", Schaum's Outline McGraw-Hill,1996
2. A.K. Sharma –"Computer Fundamentals and Programming in C" UniversitiesPress,2ndEdition, 2018.
3. E. Balaguruswamy, –Programming in ANSI C‖, Tata McGraw-Hill Education, 2008
4. Brian W.Kernighan and DennisM.Ritchie,‖ The C Programming Language‖, Prentice Hall of India,1988.

Course Code	Course Title		Core / Elective
U21PH1L1	**ENGINEERING PHYSICS LAB**		Core
Prerequisite	**Contact Hours Per Week**			**CIE**	**SEE**	**Credits**

Prerequisite	**L**	**T**	**D**	**P**	**CIE**	**SEE**	**Credits**
--	-	-	-	3	25	50	1.5

Course Objectives:
1. Enhance the experience of fundamental functioning, analyzing and characterization of different experiments.
2. Develop skills in the design and development of various electronic devices.
3. Create interest in working with lasers and semiconductor devices.

Course Outcomes:
1. Apply the basic principles of lasers and optical fibers to determine wavelength and numerical aperture.
2. Remember the basics of electrical properties and apply to semiconductors.
3. Evaluate the carrier concentration of semiconductor materials by applying Hall effect principle.
4. Apply the basic knowledge of semiconductors and understand the I-V characteristics of p-n junction diode, solar cell and Thermistors.
5. Analyze the various properties of ferromagnetic materials by drawing hysteresis curve.
6. Understand the concept of rigidity modulus through Torsional pendulum.

Course Description:

This is the basic science lab which is common for all branches of first year B.E. with facilities for the group of 30 students to carry out experiments independently. The lab is well-equipped and enables students to understand the fundamentals of Engineering Physics.

The basic focus in the Engineering Physics Laboratory is to develop scientific temper and encourage students to innovate in diverse technical areas for better understanding of technical and engineering problems. Students will attend labs where they will see principle of Physics in action.

List of Experiments:

1. To determine the Dielectric constant and Phase transition temperature of Lead Zirconium Titanate (PZT).
2. To draw the I - V Characteristics of P-N Junction diode and to evaluate the resistance.
3. To find the values of Electrical conductivity and energy gap of Ge crystal.
4. Determination of rigidity of modulus of Torsional pendulum.
5. Determination of carrier concentration, Mobility and Hall Coefficient of Ge crystal using Hall Effect Experiment.
6. To determine the constants of A, B and α using Thermistor characteristics.
7. To draw the curve between the magnetizing field and the intensity of magnetization of the specimen (soft iron rod)and to find out i) Coercivity ii) Retentivity and iii) Hysteresis loss.
8. To draw the I - V Characteristics of a solar cell and to calculate the
   i) Fill factor Efficiency and ii) Series resistance.
9. To Determine the Numerical Aperture (NA) of Optical fiber.
10. To determine the wave length of the given Laser source.

Note: Minimum 8 experiments should be conducted in the semester.

Text books:

1. N.K. De, "Basic Electrical Engineering" Universities press, 2015.
2. J.B. Guptha, "Fundamentals of Electrical Engineering and Electronics" S.K. Kataria & Sons Publications, 2002.
3. J.B. Guptha, "Utilization of Electric Power and Electric Traction" S.K. Kataria & Sons Publications, 2010.

Course Code	Course Title		Core / Elective
U21CS1L1	**Programming for Problem Solving Lab**		**Core**

Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	4	25	50	2

Course Objectives:
1. To understand the fundamentals of programming in C Language.
2. To write, compile and debug programs in C.
3. To formulate solution to problems and implement in C.
4. To effectively choose programming components to solve computing problems

Course Outcomes:
On completion of this course, students are able to:
1. Choose appropriate data type for implementing programs in C language.
2. Design and implement modular programs involving input output operations, decision making and looping constructs.
3. Implement search and sort operations on arrays.
4. To decompose a problem into functions and to develop modular reusable code
5. Apply the concept of pointers for implementing programs on dynamic memory management and string handling.
6. Design and implement programs to store data in structures and files.

List of experiments:
1. Finding maximum and minimum of given set of numbers, finding roots of quadratic equation.
2. Sin x and Cos x values using series expansion.
3. Conversion of binary to decimal, octal, hexadecimal and vice versa.
4. Generating Pascal triangle, pyramid of numbers.
5. Recursion: factorial, Fibonacci, GCD.
6. Matrix addition and multiplication using arrays, linear search and binary search using recursive and non-recursive procedures.
7. Bubble sort and selection sort.
8. Programs on pointers: pointer to arrays, pointer to functions.
9. Functions for string manipulations.
10. Programs on structures and unions.
11. Finding the number of characters, words and lines of given text file.
12. File handling programs.

Suggested Reading:

1. Byron Gottfried, "Programming with C", Schaum's outlines, 2nd Edition, TATA McGraw-Hill.
2. A.K.Sharma, "Computer Fundamentals and Programming in C", 2nd Edition, University Press.
3. E Balaguruswamy, "Programming in ANSI C", Tata McGraw-Hill Education, 2008.
4. Brian W. Kernighan and Dennis M. Ritchie, "the C Programming Language", Prentice Hall of India, 1988.

Course Code	Course Title						Core/Elective
U21ME1L1	**Engineering Graphics & Design Practice Lab**						Core
Prerequisite	**Contact Hours per Week**				CIE	SEE	Credits
	L	**T**	**D**	**P**			
-	1	-	4	-	50	50	3

Course Objectives

The objective of the this course is to import knowledge of

1. Design a system, component and process to meet desired needs within realistic constraints such as economic, environmental, ethical, health and safety, manufacturability and sustainability.
2. Communication effectively.
3. Techniques, skills and modern engineering tools necessary for engineering practice.
4. Different solids and their section in orthographic projections.
5. Cad package and its utility.

Course Outcomes

After completing this course, the student will be able to:

1. Learn basics of Dimensioning, Detail Drawings and Engineering Design.
2. Demonstrate the projection of point's lines, planes then create virtual drawing by using CAD software.
3. Generating the solid projection & Sectioning of the solids.
4. Develop isometric drawing of simple objects Reading the orthographic Projections of these objects.
5. Differentiate and visualize. 3D to 2D & 2D to 3D Vice- Versa.
6. Use the knowledge of Engineering Graphics to draw floor drawing, Simple Machine Element, Basic Electrical Drawing, Basic Networking Drawing.

S No	Topic / Exercises	Contact Hours	
		L	**P**
1	**Introduction to Engineering Graphics** Engineering Graphics, Significance, Drawing instrument used in engineering drawing and types of sheet layout and their folding. Types of lines used in engineering drawing, various lettering and dimensioning formats.	1	
2	**Scales** Scales, Representation, Units, Representative fraction [RF] Types: a) Reducing, Enlarging & True. b) Plain & Diagonal.	1	4
3	**Conic Sections-I** Conic section, Types, Construction of Ellipse, Parabola & Hyperbola given focus and eccentricity	1	2
4	**Conic Sections-II** Construction of ellipse [given major and minor axis], parabola [given base and height] & rectangular hyperbola		2
5	**Engineering Curves** Introduction and Construction of Cycloid, Epicycloid along with tangent and normal, Involutes (involute of triangle, square & circle)	1	4
6	**Introduction to AutoCAD** Basic commands and simple drawings. Demonstrating knowledge of the theory of CAD software [such as : The Menu System, Toolbars (standard, object properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Short menus (Button Bars), The Command Line (Where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects]	1	

7	**Orthographic Projection** Principles of Orthogonal projections-Conventions – Projections of points situated in different quadrants.	1	2
8	**Projections of straight lines - I** Line parallel to both the reference planes, line perpendicular or inclined to one reference plane.	1	2
9	**Projections of straight lines - II** Line inclined to both the reference planes.	1	2
10	**Projection of Planes - I** Perpendicular Planes.	1	2
11	**Projection of Planes - II** Oblique Planes.		2
12	**Projection of Solid - I** Axis parallel to HP or VP, Projection of regular solids in simple position.	1	2
13	**Projection of Solid - II** Projections of solids axis Inclined to one or both the reference planes.	1	4
14	**Section of Solids-I** When the sectional plane is parallel or perpendicular to one Reference Plane.	1	2
15	**Section of Solids - II** Sectional plane is inclined to one reference plane.		2
16	**Development of surfaces** Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone.	1	4
17	**Intersection of surfaces – I** Intersection of cylinder and cylinder	1	2
18	**Isometric projection-I** Planes and Principle of isometric projection, Isometric scale, Isometric Views – Conventions lines & Planes.	1	2
19	**Isometric projection-II** Compound solids, isometric Projections of simple solids & compound solids		2
20	**Conversion of Isometric to Orthographic views.**	1	2
21	**Conversion of Orthographic to Isometric views.**		2
22	**Optional [Any one must be done]** Floor plan windows, doors, and fixtures such as WC, bath, sink, shower, etc. Simple Machine Element Basic Electrical Drawing Basic Networking Drawing	1	2

Text Books:
1. Bhatt N.D., Panchal V.M. & Ingle P.R, Engineering Drawing, Charotar Publishing House,53rd Edition, (2018).
2. Shah, M.B. &Rana B.C. Engineering Drawing and Computer Graphics, Pearson Education, 2nd Edition, (2018).
3. Agrawal B. &Agrawal C. M., Engineering Graphics, TMH Publication, 2nd Edition, (2016).
4. Narayana, K.L. & P Kannaiah, Text book on Engineering Drawing, Scitech Publishers, (2009).

Reference Books:
1. S.N Lal, Engineering Drawing with Introduction to Auto CAD, Cengage Learning India Pvt Lid, New Delhi, (2018).
2. Dhananjay A Jolhe, Engineering Drawing, Tata Mcgraw Hill Education private Limited, Third print, (2009).

3. K Venkata Reddy, Text Book of Engineering drawing with AUTO CAD, BS Publications, 4th Edition, (2003).
4. (Corresponding set of) CAD Software Theory and User Manuals

NOTE:
1. At least 20 sheets must be covered.
2. Sheet number 1 to 5 (Graph sheets / drawing sheets)
3. Sheet number 6 to 22 (AutoCAD drawings)

B.E I YEAR II SEM SYLLABUS

Course Code	Course Title						Core/Elective
U21EN202	**INDIAN CONSTITUTION**						**Mandatory Course**
Prerequisite	**Contact Hours per Week**				**CIE**	**SEE**	**Credits**
	L	**T**	**D**	**P**			
-	2	-	-	-	40	60	-

Course Objectives:
1. To create awareness among students about the Indian Constitution.
2. To acquaint the working conditions of union, state, local levels, the powers and functions.
3. To create consciousness in the students on democratic values and principles articulated in the constitution.
4. To expose the students on the relations between federal and provincial units.
5. To divulge the students about the statutory institutions.

Course Outcomes:
After completing this course, the student will able to
1. Know the background of the present constitution of India.
2. Understand the working of the union, state and local levels.
3. Gain consciousness on the fundamental rights and duties.
4. Be able to understand the functioning and distribution of financial resources between the centre and states.
5. Be exposed to the reality of hierarchical Indian social structure and the ways the grievances of the deprived sections can be addressed to raise human dignity in a democratic way.
6. Evaluate and disseminate information about the statutory Institutions of India.

UNIT-I
Evolution of the Indian Constitution: 1909Act, 1919Act and 1935Act. Constituent Assembly: Composition and Functions; Fundamental features of the Indian Constitution.

UNIT-II
Union Government: Executive-President, Prime Minister, Council of Minister
State Government: Executive: Governor, Chief Minister, Council of Minister
Local Government: Panchayat Raj Institutions, Urban Government

UNIT-III
Rights and Duties: Fundamental Rights, Fundamental Duties, Directive principles of State Policy.

UNIT-IV
Relation between Federal and Provincial units: Union-State relations, Administrative, legislative and Financial, Inter-State council, NITI Aayog, Finance Commission of India.

UNIT-V
Statutory Institutions:
Elections-Election Commission of India, National Human Rights Commission, National Commission for Women.

Textbooks:

1. D.D.Basu, Introduction to the Constitution of India, Lexis Nexis, New Delhi, 9th Edition, 2016.
2. Subhash Kashyap, Our Parliament, National Book Trust, New Delhi, 2015.

Reference Books:

1. Peu Ghosh, Indian Government & Politics, Prentice Hall of India, New Delhi, 2012
2. B.Z.Fadia & Kuldeep Fadia, Indian Government & Politics, Lexis Nexis, NewDelhi, 16th Edition, 2020.

Course Code	Course Title					Core / Elective
U21MA201	**MATHEMATICS-II**					**Core**
Prerequisite	**Contact Hours Per Week**					**Credits**
--	**L**	**T**	**D**	**P**	**CIE**	**SEE**	
	3	**1**	**-**	**-**	**40**	**60**	**4**

Course Objectives
  ➤ To study matrix algebra and its use in solving system of linear equations and in solving eigen value problems
  ➤ To provide an overview of ordinary differential equations
  ➤ To study special functions like Legendre and Beta Gamma functions
  ➤ To learn Laplace Transforms and its properties

Course Outcomes
The students will able to
   1. understand engineering problems through mathematics knowledge
   2. Solve system of linear equations and eigen value problems
   3. Get the command over solving first order differential equations
   4. Solve certain higher order differential equations with constant and variable coefficients
   5. Solve basic problems of Beta Gamma and Legender's Function
   6. Apply Laplace Transforms: solve ordinary Differential Equations by using it

Unit-I
Matrices: Rank of a matrix, Echelon form, System of linear equations, Linearly dependence and independence of vectors, Linear transformation, Orthogonal transformation, Eigen values, Eigen vectors, Properties of eigen values, Cayley - Hamilton theorem, Quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation, Nature of quadratic forms.

Unit-II
Differential Equations of First Order: Exact differential equations, Integrating factors, Linear differential equations, Bernoulli's, Riccati's and Clairaut's differential equations, Orthogonal trajectories of a given family of curves.

Unit-III
Differential Equations of Higher Orders: Solutions of second and higher order linear homogeneous equations with constants coefficients, Method of reduction of order for the linear homogeneous second order differential equations with variable coefficients, Solutions of non-homogeneous linear differential equations, Method of variation of parameters, solution of Euler-Cauchy equation.

Unit-IV
Special Function: Gamma Functions, Beta Functions, Relation Between Beta and Gamma Function, Error Functions. Power Series Method, Lengender's Differential Equations and Legender's Polynomial $P_n(x)$, Rodrigue's Formula (without proof).

Unit-V
Laplace Transforms: Laplace Transforms, Inverse Laplace Transforms, Properties of Laplace Transforms and inverse Laplace Transforms, Convolution Theorem (without proof). Solution of ordinary Differential Equations using Laplace Transforms.

Text books:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna publishers, 44th edition, 2016.
2. Erwin Kreyszig, "Advanced Engineering Mathematics, Wiley, 9th edition, 2013.
3. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 4th Edition, 2014.

Reference Books:

1. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill,2018
2. N.P.Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, latest edition.
3. H.K. Dass and Er. RajnishVerma, "Higher Engineering Mathematics", S.Chand Publishing, 1st edition, 2011.

Course code	Course title						Core/Elective
U21CH201	**ENGINEERING CHEMISTRY**						**Core**
Pre-requisites	**Contact Hours Per Week**				**CIE**	**SEE**	**Credits**
-	**L**	**T**	**D**	**P**			
	3	**1**	**-**	**-**	**40**	**60**	**4**

Course Objectives:
1. Correlate the properties of materials with their internal structure and use for Engineering applications.
2. Apply the principals of electrochemistry in storage of electrical energy in batteries.
3. Gains knowledge in causes of corrosion and its prevention.
4. Attains knowledge about the disadvantages of hard water for domestic and industrial purposes.
5. Also learns the techniques of softening of hard water and treatment of water for drinking purpose.
6. Exposed to qualitative and quantitative parameters of chemical fuels.
7. Aware eco-friendly materials and processes.

Course Outcomes:
On successful completion of this course, students will be able to:
1. Apply concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries.
2. Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods.
3. Estimate the physical & chemical parameters of quality of water and explain the process of water treatment.
4. Explain the influence of chemical structure on properties of materials and their choice in engineering applications.
5. Classify chemical fuels and grade them through qualitative analysis.
6. Relate the concept of green chemistry to modify engineering processes and materials.

UNIT-I Electrochemistry and Battery Chemistry: Electrochemistry: Electrochemical cells, Electrolytic and Galvanic cells-notation, cell reaction and cell potentials. Types of electrodes, Calomel Quinhydrone and Glass electrodes. Determination of pH of a solution by using Quinhydrone electrode. Thermodynamics of emf of cells, Nernst equation and its derivation. Applications of Nernst equation to electrode potential and emf of cells. Numerical problems.
Batteries: Primary batteries: Zn - Carbon battery. **Secondary batteries:** Pb-Acid battery and Li-Ion battery, Applications.
Flow batteries (Fuel cells): Methanol-Oxygen fuel cells, Construction, Applications.

UNIT-II Water Chemistry and Corrosion: Water Chemistry: Hardness of Water-Types and units of hardness, estimation of temporary and permanent hardness of water by EDTA method. Alkalinity of water and its determination. Water softening by Ion exchange and Reverse Osmosis methods. Numerical problems. Specifications of potable water. Sterilization by Chlorination. Break Point Chlorination.
Corrosion: Causes and its effects. Types of Corrosion-Dry or Chemical corrosion and Wet or Electrochemical corrosion and their mechanism. Electrochemical corrosion –Waterline and Pitting Corrosion. Factors influencing rate of corrosion. **Corrosion control methods:** Cathodic protection methods - Sacrificial anodic and impressed current methods. **Surface coating methods:** Hot Dipping-Galvanizing**.**

UNIT-III Engineering Materials: Polymers: Basics of terms polymers: Monomer and its functionality, Polymers and degree of polymerization. Classification of polymers - Thermoplastics & Thermosetting resins. Types of Polymerization (i) Addition (ii) Condensation (iii) Co-Polymerization. Mechanism of free radical polymerization.

Preparation, Properties & Uses of the following polymers: Plastics - PVC and Bakelite, Fibers - Nylon 6:6, and Kevlar, Elastomers - Buna-S, Butyl and Silicone Rubbers.
Conducting polymers: Introduction, Classification and Mechanism of conduction in Poly-acetylene, Applications of conducting polymers.
Biodegradable polymers: Introduction preparation, properties and applications of polylactic acid.

UNIT-IV Chemical Fuels: Classification of fuels: Introduction, definition and classification of chemical fuels- Primary and secondary fuels. Solid, liquid and gaseous fuels. Requirements of a good fuel. Calorific Value – HCV and LCV. Theoretical calculations of calorific value by Dulong's formula – Numerical problems. **Solid Fuels:** Coal and its Ranking. Analysis of coal - Proximate and Ultimate analysis. **Liquid Fuels:** Fractionation of Petroleum. Composition and uses of Gasoline, Diesel and Kerosene. Cracking & its Significance- Catalytic cracking by moving bed method. **Knocking:** Fuel rating – Octane and Cetane numbers. **Gaseous Fuels:** LPG, CNG -Composition and Uses. **Combustion:** Ignition temperature of a fuel, calculation of air quantities by weight and volume required for combustion of a fuel- Numerical problems.

UNIT-V Green Chemistry and Composites: Green Chemistry: Concept, Principles of green chemistry – Atom Economy, Catalysis. and examples of clean technology. **Biodiesel:** Sources, Concept of Trans esterification and carbon neutrality. Properties and significance. **Composites:** Introduction to composites, composition and characteristic properties of composites. Classification of composites based on matrix, reinforcement and ply. Applications of composites.

Text books:
P.C. Jain & M. Jain, Engineering Chemistry, Dhanpatrai and sons Publishing Company, 17th Edn, New Delhi (2010).
Rama Devi, Venkata Ramana Reddy and P.Rath, Engineering Chemistry, Cengage Learning, New Delhi (2016).
S.S.Dara, S. Chand, A Text Book of Engineering Chemistry, S.Chand Publications, Reprint edition, 2017.
Puri and Sharma, Principles of Physical Chemistry, Vishal Publications Co.2019
Agarwal Shikha, Engineering Chemistry, Cambridge University Publications 2015.
Reference Books:
C. V. Agarwal, C. P. Murthy, A. Naidu, "Chemistry of Engineering Materials", Wiley India, 5th Edition, 2013.
R. P. Mani, K. N. Mishra, "Chemistry of Engineering Materials", Cengage Learning, 3rd Edition, 2015.
Shashi Chawla, Engineering Chemistry, Dhanpatrai and Company Ltd, Delhi (2015)
S.S Dara, Dr.K Mukkanti, A text book of Engineering Chemistry ,S Chand 2010.

Course code	Course title						Core/Elective
U21EE201	**BASIC ELECTRICAL ENGINEERING**						**Core**
Pre-requisites	**Contact Hours Per Week**				**CIE**	**SEE**	**Credits**
--	**L**	**T**	**D**	**P**			
	3	**-**	**-**	**-**	**40**	**60**	**3**

Course Objectives:
1. To understand the behavior of different circuit elements R, L & C, and the basic concepts of electrical circuit analysis.
2. To know the concepts of AC circuits, RMS value, Average value, Phasor analysis etc.
3. To understand the basic principle of operation of Transformer and DC machines.
4. To understand the basic principle of operation of AC machines.
5. To know about different types of electrical wires and cables, Batteries, domestic and industrial wiring.

Course Outcomes:
On completion of this course, students are able to
1. To analyze DC electrical circuits and measure the parameters of electrical energy.
2. To analyze AC electrical circuits and measure the parameters of electrical energy.
3. To comprehend the working principles of Electrical DC Machines and Transformers.
4. To comprehend the working principles of Electrical AC machines.
5. To identify various electrical switchgear components and installations.

UNIT-I
DC Circuits: Basics definitions, Classification of energy sources, Passive elements, KVL, KCL, Network reduction techniques. Superposition Theorem, Thevenin's and Norton's Theorems, Maximum Power Transfer Theorem.

UNIT-II
AC Circuits: Representation of sinusoidal waveforms, Peak and RMS values, Phasor representation. Analysis of 1Φ AC circuits with R, L, C and series combinations. 3Φ circuits, Voltage and current relations in star and delta connections.

UNIT-III
DC Machines: Basic Laws of Electromagnetic Induction, Construction and working principle of DC generator, EMF equation, Types and its applications, OCC characteristics. Working principle of DC motor, Back EMF, Types and its applications.
Transformers: Working Principle, Construction, EMF equation, Ideal and practical transformer, OC and SC tests, Losses and efficiency.

UNIT-IV
AC Machines
Asynchronous Machines: Working principle of a three-phase induction motor, Concept of slip, Construction, Types and its Applications. 1Φ induction motors: Working Principle, Construction, Types and its Applications. Synchronous Generators: Construction, Working Principle, Types, Applications, OC and SC Characteristics.

UNIT-V
Electrical Installations: Components of LT Switchgear: Switch Fuse Unit, MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, Power factor improvement using capacitors, Types of Batteries, Characteristics for Batteries and Battery backup. Elementary calculations for energy consumption.

Textbooks:
1. J.B.Gupta, "Fundamentals of Electrical Engineering and Electronics" S.K.Kataria & Sons Publications, 2002.
2. J.B.Gupta, "Utilization of Electric Power and Electric Traction" S.K.Kataria & Sons Publications, 2010
3. Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, "Basic Electrical Engineering" Tata McGraw Hill, Publications, 2009.
4. Hughes, "Electrical Technology", VII Edition, International Student -on, Addison Welsey Longman Inc., 1995.
5. D.P. Kothari and I.J. Nagrath, "Electrical Machines", 3rd Edition, Tata McGraw Hill, Publications.

Course code	Course title					Core/Elective
U21EN201	**ENGLISH FOR PROFESSIONAL COMMUNICATION**					**Core**
Pre-requisites	**Contact Hours Per Week**				**CIE**	**SEE**	**Credits**

Pre-requisites	**Contact Hours Per Week**				**CIE**	**SEE**	**Credits**
	L	**T**	**D**	**P**			
--	2	-	-	-	40	60	2

Course Objectives:

To enhance English language abilities of Engineering students, especially in reading and writing, by
1. Using inspiring content for language learning
2. Inculcating professional ethics and morals through inspiring contents.
3. Developing their language competency.
4. Refining their reading and comprehension skills
5. Cultivating their academic and technical writing skills
6. Encouraging them to think creatively and critically

Course Outcomes:

After completing this course, the student will be able to:
1. Develop various skills to communicate through Reading & Writing
2. Inculcate a habit of reading following various techniques, for general & specific details.
3. Comprehend the topic or content critically, analytically and logically.
4. Enrich vocabulary through various ways of word formation to use appropriate words in context.
5. Write grammatically correct sentences following syntax, structure and concord.
6. Learn and use various formats – letters, memo, essay, scripts, reports etc.

UNIT-I
Reading: Jawwad Patel "Let's Think Beyond Normal".
Vocabulary: Word Building – Prefixes, Suffixes, Root, Influence and Usage of foreign language/words in English, Collocation.
Grammar: Articles, Prepositions, Determiners.
Writing: Note Making.

UNIT-II
Reading: Rabindranath Tagore "Where the Mind is Without Fear".
Vocabulary: Word Formation – Compounding and Blending, Contractions.
Grammar: Transitions, Connectives, Punctuation.
Writing: Paragraph Writing.

UNIT-III
Reading: Martin Luther King Jr., 'I Have a Dream'.
Vocabulary: Synonyms, Antonyms, Connotation, One Word Substitutes.
Grammar: Voice, Common Errors in English.
Writing: Formal/Official Letter Writing.

UNIT-IV
Reading: Robert Frost, 'The Road Not Taken'.
Vocabulary: Homophones, Homonyms, Homographs, Standard Abbreviations.
Grammar: Narration (Direct - Indirect Speech).
Writing: Basics of Report Writing.

UNIT-V
Reading: George Orwell, 'The Sporting Spirit' (Excerpt).
Vocabulary: Euphemisms, Idioms, Phrases.
Grammar: Concord, Tense.
Writing: Statement of Purpose (SOP).

Textbooks:
1. Ashraf Rizvi, M, Effective Technical Communication, Tata McGraw Hill, 2nd Edition. 2017.
2. Meenakshi Raman and Sangeeta Sharma. Technical Communication: Principles and Practice. OUP, 3rd Edition. 2011.

Reference Books:
1. E. Suresh Kumar, Engineering English, Orient Black Swan,2014.
2. Language and Life - A Skills Approach, Orient Black Swan,2018.
3. Michael Swan, Practical English Usage. OUP, 4th Edition. 1995.

Course code	Course title						Core/Elective
U21CH2L1	**ENGINEERING CHEMISTRY LAB**						Core
Pre-requisites	**Contact Hours Per Week**				CIE	SEE	**Credits**
	L	T	D	P			
-	-	-	-	3	25	50	**1.5**

Course Objectives:
1. Conduct experiments, take measurements and analyze the data through hands-on experience in order to demonstrate understanding of the theoretical concepts of quantitative analysis while working in small group.
2. Interpret the electro analytical principles with experimental results graphically.
3. Demonstrate writing skills through clear laboratory reports.

Course Outcomes:
1. Estimation of hardness of water.
2. Estimation of mobility of ions in strong acids and weak acids using conductivity meter.
3. Measure the electrode potential of a given solution.
4. Apply the principles of Colorimetry and Electrochemistry in quantitative estimations.
5. Estimation of the rate constant of a reaction.
6. Synthesis of drug.

List of Experiments:

1.Introduction to Chemical Analysis.
2. Techniques of Weighing.
Volumetric Analysis:
3. Preparation of Standard Mohr's salt solution, Standardization of KMnO4 and estimation ferrous ion.
4. Estimation Iron (II) by Dichromatometry.
Water Analysis:
5. Preparation of Standard Magnesium sulphate solution, standardization of EDTA and Estimation of Total Hardness.
6. Preparation of Standard Sodium Carbonate Solution, Standardization of HCl and Estimation of Carbonate and Bicarbonate by Alkalinity.
Conductometry:
7. Estimation of HCl.
8. Estimation of CH3COOH and mixture of acids.
Potentiometry:
9. Estimation of HCl.
10. Estimation of Iron.
pH Metry:
11. Estimation of HCl.
Colorimetry:
12. Verification of Beer-Lambert's law and estimation of Manganese.
Chemical Kinetics:
13. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate.
Drug Synthesis:
 Preparation of Aspirin.
Note: Minimum ten experiments should be conducted in the semester

Textbooks:
1. B.D. Khosla, A. Gulati and V.Garg, ‗Senior Practical Physical Chemistry, (R. Chand & Co., Delhi)
2. K. K. Sharma and D.S. Sharma, An Introduction to Practical Chemistry, Vikas publishing, New

Course code	Course title					Core/Elective
U21EN2L1	**EFFECTIVE COMMUNICATION SKILLS LAB**					**Core**
Pre-requisites	**Contact Hours Per Week**				**CIE**	**SEE**	**Credits**

Pre-requisites	Contact Hours Per Week				CIE	SEE	Credits
--	**L**	**T**	**D**	**P**			
	-	-	-	3	25	50	1.5

Course Objectives:
To enhance the listening and speaking skills of students by:
1. Giving them sufficient practice in listening with comprehension
2. Providing them ample opportunities to improve their public speaking skills and soft skills
3. Training them in the use of correct pronunciation, stress and intonation
4. Sensitizing them to the use of verbal and non-verbal communication appropriate to the context
5. Encouraging them to learn the art of conversation to suit formal and informal situation
6. Preparing them to make formal presentations and face interviews

Course Outcomes:
After completing this course, the student will be able to:
1. Listen, understand and interpret formal and informal spoken language
2. Speak English with acceptable pronunciation, stress and intonation
3. Present themselves with confidence in formal situations
4. Participate in individual and group activities with relative ease
5. Use verbal and nonverbal communication while using soft skills
6. Make formal presentations and face interviews

LIST OF ACTIVITIES

1. Listening for comprehension
2. Pronunciation, Intonation, Stress and Rhythm
3. Conversation Skills
4. Introducing Oneself and Others
5. Asking for and Giving information
6. Making Request and Responding to them Appropriately
7. Giving Instructions and Responding to them Appropriately
8. Making Formal Announcement and Emceeing
9. Group Discussion
10. Just A Minute (JAM)
11. Role Play
12. Debate
13. Public Speaking Skills and Body Language
14. Interviews
15. Formal Presentations

Textbooks:

1. Board of Editors. Language and Life Skills Approach. Orient Black Swan,2018
2. Bala Subramaniam, T.A. Text book of English Phonetics for Indian Students, Macmillan, 1981.
3. CIEFL, Exercises in Spoken English. PART-III, Oxford University Press.
4. Pillai, Radhakrishna G. Spoken English for You – Level II. Emerald Publisher, 8th Edition.2014.
5. Sethi, J. and PV Dhamija. A Course in Phonetics and Spoken English. Prentice, India Learning Private Limited, 2nd Edition.1999
6. Robert. M.Sherfield & et al. Developing Soft Skills. Pearson Education.4th Edition. 2009.

Course code	Course title						Core/Elective
U21ME2L2	**ENGINEERING & IT WORKSHOP LAB**						**Core**
Pre-requisites	**Contact Hours Per Week**				**CIE**	**SEE**	**Credits**
-	**L**	**T**	**D**	**P**	**50**	**50**	**3**
	1	**-**	**-**	**4**			

Course Objectives:
  The Objective of this course is to impart knowledge of
1. Engineering Practices & develop holistic understanding of various Engineering materials and Manufacturing processes.
2. Steel, Plastic, Composite and other materials for suitable applications.
3. Hands on practice on techniques of fabrication, welding, casting, manufacturing, metrology, and allied skills.
4. Productivity, create skilled manpower which is cognizant of industrial workshop components and processes and can communicate their work in a technical, clear and effective way.
5. Engineering Skill development with regard to making components, system integration and assembly to form a useful device.

Course Outcomes – (Laboratory):
  After completing this course, the student will be able to
1) Understand about the tools and Fabricate components with their own hands.
2) Get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3) Understand the Assembling of different components and will be able to produce small mechanisms/devices of their interest.
4) Gain practical skills of carpentry, tin smithy, fitting, house wiring.
5) Gain knowledge of different Engineering Materials and Manufacturing Methods.
6) Understand trades and techniques used in Workshop and chooses the best material/ manufacturing process for the application.

A. TRADES FOR EXERCISES

T1. FITTING

1. Square fitting
2. Dovetail fitting
3. V- Template fitting

T2. CARPENTRY

1. End lap joint
2. T- Bridle joint
3. Dovetail lap joint

T3. ELECTRICAL/HOUSE WIRING

1. Two lamps in parallel with 5 Pin 6amp socket and switches.
2. Two lamps in series connection with switches .
3. Staircase wiring.

T4. TIN SMITHY

1. Square Tin
2. Rectangular Scoop
3. Conical funnel

T5. WELDING PRACTICE

1. Lap Joint
2. V- Butt Joint
3. T-joint

B. TRADES FOR DEMONSTRATION AND EXPOSURE

T6. Machining (Lathe & Drilling)
T7. Black smithy (Introduction, Round to Square, Square to Octagon)
T8. Plumbing (Introduction of tools, joints, couplings, and valves etc.,)

C. PRESENTATIONS AND VIDEO LECTURES

1. Manufacturing Methods
2. Rapid Prototyping
3. Glass Cutting
4. 3D printing
5. CNC LATHE
6. Injection Moulding
7. Mould Making and casting
8. Basic Electronics lab Instruments

D. IT WORKSHOP

1. **Task 1:** Computer hardware & Identification of parts,
2. **Task 2:** Disassembly & Assembly of computer to working condition,
3. **Task 3:** Operating System Installation.
4. **Task 4:** Hardware Trouble Shooting

Text Books:
1. H S Bawa, "Workshop Practice", Tata Mc Graw Hill Education Private Limited, New Delhi, Second Edition, 2009.
2. V Ramesh Babu, "Engieering Workshop Practice", VRB Publishers Pvt Ltd, New Edition, 2009.
3. P. Kannaiah & K.L. Narayana "Workshop manual" 2nd Ed., Scitech publications (I) Pvt. Ltd., Hyderabad.

Reference Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K., Nirjar Roy S.K. "Elements of Workshop Technology" Vol-I 2008 &Vol-II 2010 Media Promoters & Publishers Pvt. Limited, Mumbai.
2. B S Raghuwanshi, "A Course In Workshop Technology", Dhanpat Rai & Co.(P) Ltd, Educational & Technical Publishers, Vol-II, 2011.

Note: At least two exercises from each trade should be performed.